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June 10th - 11th, 2023

Samarth Educational Trust



Arvind Gavali College of Engineering
Satara, Maharashtra, India

In Association With:

Department of Medical Biology

Faculty of Medicine, Nigde, Omer Halisdemir University, Nigde,
Turkey

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10, 11 June 2023



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Innovative Technologies in Structural Design, Construction Techniques, and Management

Design Of Modular Multi-Storied Steel Frame Building

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Abstract- Recent deadly 7.8-magnitude earthquakes in Nepal on April 24, 2015, destroyed numerous homes and claimed many lives. Poor building practises and the use of heavy building materials are to blame for these numerous losses. Earthquakes in wealthy nations like China, Japan, and others do not claim lives or devastate homes. This is due to the fact that they forgo using bulky concrete building structures in favour of pre-fabrication building methods and steel or aluminium frame structures.

The prefabricated house is built using a light steel frame, sandwich panels for the building envelope, a standard module for space series combination of components, bolt connections and a new idea in prefabricated housing for environmental protection. The prefabricated parts are delivered to the location, where they are assembled using building blocks. Work can be finished in 30 to 45 working days and is never delayed by curing time or a lack of supplies. According to additional research, it can also reduce project costs overall by 12% when compared to typically built homes made of CHBs (Concrete Hollow Blocks).

This essay contains an examination of pre-fabricated and steel constructions. Many people were asked about the types of homes they want in a broad poll, and earthquake-resistant and affordable homes were frequently mentioned as preferences. This essay also compares and contrasts conventional versus prefabricated buildings in terms of cost, quality, strength, environmental friendliness, and cost. The study intends to introduce and provide more information on modular homes to the market and to satisfy the need for a lovely, reliable, and inexpensive shelter shared by all facets of society, especially those in economically disadvantaged places.

Keywords: *pre-fabrication, aluminum frame structures, earthquake resistant structures, economical houses, environment friendly, CHB, affordable shelter*

I. INTRODUCTION

Steel buildings are now a significant part of the construction industry. Because of its adaptability, steel is frequently used to create massive structures such as buildings, malls, convention centres, hospitals, bridges, underground works, railway stations, stadiums, industrial buildings, multi-level parking complexes, etc.

The availability of cutting-edge design software, technology, and equipment for fabrication and erection has tipped the scales in favour of using steel structures more and more, creating new difficulties. One immediate example is the use of pre-engineered buildings everywhere in the world. This allows flexibility in shape and size to the appropriate degree while also saving time.

For those who need affordable housing quickly, modular construction is quite popular. This technique may also be very helpful for the rapid design and construction of emergency healthcare facilities. Building multi-story buildings using the modular concept is a current trend. In order to meet the enormous housing and commercial needs.

The term "modular construction" is used to indicate the usage of factory-produced Pre-engineered building units are transported to the construction site and combined to form huge volumetric components or important building components. The modular modules can make up entire rooms or stand alone, heavily maintained units like bathrooms or lifts. The collection of discrete modular parts typically comes together to form a self-supporting structure, while distant buildings could rely on a separate structural framework.

The preliminary, transportation, and erection stages are all a part of modular construction. We can categorically state that modular construction has the advantage of being quick. The time required to build a unit of structure can be cut in half with effective planning of the entire construction process. For instance, modular construction allows for the construction of 300 homes as opposed to the conventional construction method's limit of 200. This reduces overhead costs associated with the employees' idle time at the project while also decreasing worker wages as the task is completed piecemeal. In traditional building, the walls cannot be built until the roof is installed, and the floor cannot be finished until the walls are installed. All of this work may be finished quickly and affordably by using modular construction.

II. EASE OF USE

Benefits of Modular Construction Compared to Traditional Construction:

- Modular construction offers several advantages over traditional construction techniques. These include:
- Construction delays due to adverse weather and other onsite issues are not an issue with factory manufacture, eliminating many potential delays to project completion dates.
- Factory conditions allow for a higher quality product with improved operating procedures and monitoring, while employees are able to work in a more comfortable environment. Construction can also more easily be extended 24/7 if required to complete a project.
- Material supplies are easier to control in a factory setting, reducing wastage and thereby cost, as well as lowering the environmental impact of a build. The UK group WRAP, estimates that this can equate to up to a 90% reduction in material use as compared to traditional builds.
- Manufacture of the modules can begin before onsite preparations, such as foundation complete, speeding up the whole build process.
- Modular construction allows for different parts of the building to be built at the same time - further reducing the time taken to complete a project
- Modular construction is highly suited to remote locations where onsite building could prove difficult or expensive. Building away from these locations also means that staff can work in places where medical and sanitary provision is more readily available if required
- Modular structures can be added to over time or even be treated as a relocatable building which can also be readily refurbished to meet a new need
- Because modular units need to meet regulations for travel and assembly, the final product can end up being more durable than a traditional build that didn't have to be assessed part by part
- Many modular units use Structural Insulated Panels which are light yet durable and provide improved thermal insulation as well as damp and cold resistance when compared to materials like timber. The factory construction also removes the potential for high levels of moisture being trapped inside the construction, improving the quality of the product
- Modular constructions have been shown to offer time savings of more than 50% when compared to traditional builds, with the inherent cost savings this provides.

- **Applications:**

- Where modular building used to be associated with design and unit sizes mean that this type of construction continues to find new applications. From offices to homes and even larger builds like sports halls, the uses of modular construction are constantly growing.
- No longer associated with small, low cost structures, the modern wave of modular buildings are proving

that they can be used for any number of applications while offering cost and time savings along with comparable levels of quality to traditional builds.

III. ANALYSIS OF G + 4 MULTI-STORIED MODULAR STEEL FRAME BUILDING STRUCTURE

- **GENERAL**

The analysis of design of modular multi-storied steel frame building is done through three stages which are Transportation, Erection and In-field stage.

In transportation the steel structure is transported from factory to the site. The process is carried out further by next stage that is Erection, and the steel structure is erected. In the in-field stage the steel structure is analysed for service loads like usual structures so this stage is also known as service stage. Further all the stages will be discussed in detail.



TRANSPORTATION STAGE

In transportation stage, modules are premanufactured

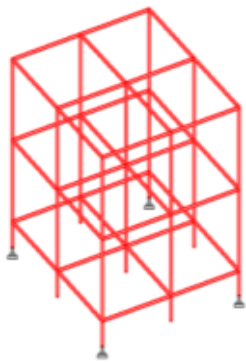


in a factory miles away from the job site where they need to be transported either directly to the job site or staged at a place nearby and then set in place. Modules sizes are usually limited first by allowable sizes on road (may be 10m wide by 10m long) and capacity available crane (to lift as much as 25 tonnes) across the depth of a project site.

While in transportation stage, the structure is divided module by module and then the module is uplifted with the help of crane, the lifting is done.

The lifting is done according to the following span, horizontal span of 8m, vertical span of 10m and the width of 8m.

Transportation analysis is carried out using STAAD.pro software. Module is considered to be transported in horizontal position. It is assumed that all equipments and cables are tied suitably during transportation. Hinge supports are considered at four points. While travelling, self-weight and acceleration loads are considered.



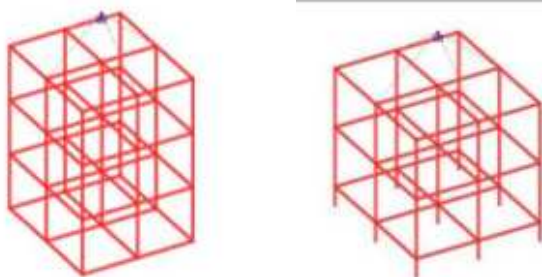
ERECTION STAGE

Erection of structural steelwork consists of an assembly of steel components into a frame on site. The processes involves lifting and placing components into position

then connecting them together. Generally this is achieved through bolting but sometimes site welding is used.

While erection, module is erected according to the following span, horizontal span of 8m, vertical span of 10m and the width of 8m.

Module is suspended from the top with the help of cables and



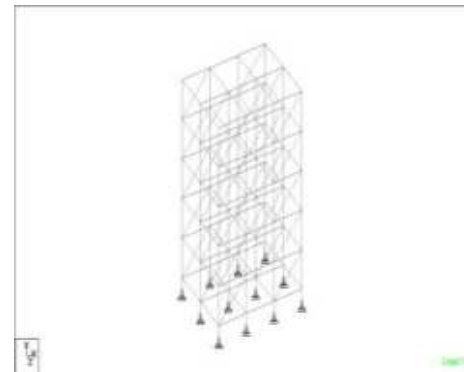
tied with one fixed support.

There is no horizontal movement while erection. Self weight and gravity loads are considered.

IN-FIELD STAGE

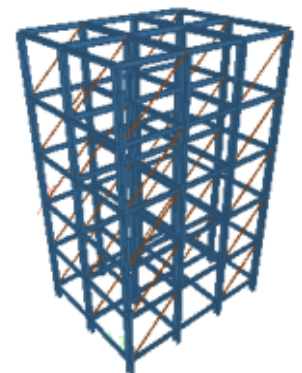
In In-field stage, analysis of steel structure is carried out after transportation and erection just like other in-situ structures for gravity and other loads. Sizes of beams and columns are assigned on the basis of preliminary design based on simple

analysis. The end conditions for a steel frame structure at the base are assumed to be hinged as shown in the fig No.5.7. The sizes assigned to staad model will be finally checked next for max. values of actions or forces from all three stages.



STRUCTURAL MODELLING

The structural Modelling deals completely with the modelling aspects of the building using software STAAD.Pro. Various facilities available in STAAD are utilized along with process of modelling structural component.



IV. RESULT AND DISCUSSION

In this paper, after carrying out the Modular Erection of steel structure of G +4 steel building by limit state method. The results obtained by these methods will be presented and compared. Also compared at first are the results obtained by hand calculations and by software. It is necessary to use software for this kind of structures. Here an attempt is made to analyse such structures by softwares to insure whether the use of software is reliable to provide desired results for this kind of structures.

Modular steel buildings are fast evolving, as an effective alternative to conventional onsite steel buildings but knowledge of their behaviour is limited at this time. There is also no record on the performance of Modular steel building under past earthquakes since it is a relatively new technique. The main assumption that governs the use of this approach may hold for this

Frame type but special vertical connections of units of the MSB frame seem to impose additional demand on columns located at lower levels of the frame. It is shown that the use of the direct summation approach, where vertical components of yielding/buckling brace forces are added directly to determine brace induced column actions for design may compensate this additional demand. The analysis also revealed that care must be taken in the ductility design of beams in braced frame configurations with non-braced bays. For such beams within non braced bays, the effect of redistributed loads due to brace buckling or yielding cannot be reliably accounted for in their designs unless the complete failure mechanism on the entire frame including the sequence of plasticization is known. This can be possible only after a complete nonlinear analysis to failure is conducted. Assigning these beams with sections obtained from the capacity design of beams in braced bays, although appear convenient, may lead to undesirable response of the entire frame since such beams could be more critical and govern the design of floor beams at any level.

V. CONCLUSION

The primary benefit of modular construction is time saving and faster return on investment. Since modular construction allows for industrialized assembly that happens concurrently with site preparation, the total time it takes to build a structure can be dramatically reduced.

The modular construction institute reported that modular construction allowed projects to be completed in a half the time of the conventional construction, with the conclusion that the modular construction eliminated weather delays because 60%–90% of the construction work was achieved inside the factory.

Modular construction technique is a technique that uses prefabricated modules/units and it is a technique that has perfect solution in remote, rural and urban areas where conventional or traditional construction may not be possible. Modular construction technique should be adopted for construction of buildings such as churches building, temple, mosque, medical and healthcare facilities and retail shops, fast food joints, etc. also the modular construction technique generate less waste on-site because building elements are prefabricated in the factory and then transported to the site for their final installation; therefore, saving time and money. Therefore modular construction technique is much more efficient and sustainable.

The module-to-module combination of the units appears to have provided an inherently rigid system that performed much better than conventional buildings. Modular construction is a construction method in which all of the pieces of a building, known as modules, are manufactured in a factory and then delivered to a job site to be put in place by a crane. Modular construction incorporates skilled labour, assembly line production, high efficiency, consistent quality, and speed. Modular construction is not a new building method. It has been used to manufacture prefabricated homes.

temporary offices, and mobile homes. Manufacturing takes place in a large factory where each module is sent down an assembly line. Work is completed at each station along the assembly line by skilled professionals. Division of labour amongst skilled laborers ensures that all work is done quickly and with great precision. Modular construction generates a lot less waste than stick-built construction. Because modular construction is completed inside a controlled environment, there is no risk of having materials damaged by moisture penetration. This gives modularly built projects an interior air quality that is greatly superior to stick-built construction. Because of all of these things, modular construction is considered much "greener".

In the Design of modular multi- stored steel frame building we have used STAAD PRO V8i software to design the steel frame then we have done the calculation by using limit state method and then further checks are done. This modular construction is done by three stages and design is also done stage wise firstly preliminary design is done.

Then the transportation is done of the entire structure by using crane. Then comes the service stage the final stage, and the erection is done of the structure.

The conclusion may be generalized and then reported

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Experimental Analysis on Green Concrete

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Abstract— This project work was experimentally done to study the effects of partially substituting local ingredient Rice Husk Ash (RHA) for regular Portland cement (OPC), which is known to be extremely pozzolanic in concrete when used at the right replacement percentage. Utilizing agricultural outputs and industrial trash is quite beneficial. Due to their pozzolanic behavior, many industrial wastes and agricultural byproducts, such as Fly Ash, Rice Husk Ash, Silica Fume, and Slag, among others, which ordinarily need huge tracts of land for dumping, can be employed as cementing materials. The primary sources of such alternative materials can be large quantities of wastes that are produced as byproducts by various businesses. The anticipated annual global rice crop is 738.1 million tons, and India is with a yearly production of 152.6 million tons, India is the second-largest producer of rice in the world. In this project, a feasibility study is conducted to determine whether rice husk ash may be added to Portland Pozzolana Cement, which has previously been replaced with rice husk ash, to increase the concrete's compressive strength. The IS technique of mix design is used for control concrete, and the replacement method's mix design was created using this as a foundation. For the study regarding replacement method, three alternative replacement levels—0%, 10%, and 20%—were picked. The current study takes a wide range of curing periods—starting at 7 days and going up to 28 days—into account.

Keywords— RHA, OPC, Fly ash, Pozzolana, Silica Fume,

I. INTRODUCTION

Green Concrete is the revolutionary topic in the history of concrete industry, this was first invented in Denmark in year 1998. Green concrete has nothing to do with colour. Green concrete is the type of concrete which is much like the conventional concrete but the production of such concrete require minimum amount of energy and causes least harm to environment. It is a concept of using eco-friendly materials in concrete, to make the system more sustainable. Green concrete is very often and also cheap to produce, because for example, waste products are used as a partial substitute for cement, charges. The size of construction industry all over the world is growing at faster rate. The huge construction growth boosts demand for construction materials. Aggregates are the main constituent of concrete. Due to continuously mining the availability of aggregates has emerged problems in recent times. To overcome this problem, there is need to find replacement to some extent. Nowadays, there is a solution to some extent and the solution is known as "Green Concrete".

II. LITERATURE REVIEW

Neeraj Agarwal , Nikhil Garg (2018) has founded that it use of recycled aggregates and materials, will reduces the extra load in landfills and mitigates the wastage of aggregates. Thus, the net CO₂ emission are reduced. The reuse of materials also contributes intensively to economy. They concluded that We can replace cement by (glass + fly ash) upto 30%.

Supriya Kulkarni (2018) The study shows that Geopolymer concrete is more resistant to corrosion and fire, and has high compressive and tensile strengths, it also gains its full strength quickly (cures fully faster). The shrinkage is also less compared to standard concrete. Thus, taking account these structural advantages it may be concluded that, in near future Geopolymer concrete may find an effective alternate to standard cement concrete. These constituents of geopolymer concrete are capable of being mixed with low alkali activating solution and are curable in short time, under natural conditions.

Shaswat Kumar Das, Jyotirmoy Mishra, Syed Mohammed Mustakim (2018) They presented that An overview of recent advances in geopolymer in terms of fresh concrete properties: setting time and workability and hardened concrete properties: compressive strength and durability. it is concluded that geopolymer concrete provides tremendous potential to be used as a construction material in the coming future. Setting time, workability and durability characteristics of Geopolymer concrete proved to be better than OPC based concrete. However certain limitations need to be overcome which will lead to a better acceptance of geopolymer concrete.

Adanagouda ,Pampapathi G S , A.Varun , RamyaMadagiriMeruguKeerthan (2017) This research work was to produce a carbon dioxide emission free cementitious material. The geopolymer concrete is totally cement free concrete. In this present study the main limitations of fly ash based geopolymer concrete are slow setting of concrete at ambient temperature and 11 Granulated Blast Furnace Slag (GBS) as replacement for natural sand. The strength of geopolymer concrete was increased with increase in percentage of GBS in a mix. The samples were stored in a controlled environment to test time. The results show that the addition of RHA has shown better results for 20% replacement level OPC 90 days. In the durability test all samples passed for 20 cycles.

III. GREEN CONCRETE

Concrete which is made from concrete wastes that are eco-friendly are called as “green concrete”. Concrete that uses less in energy in its production and produces less carbon dioxide than normal concrete is green concrete. The other name for green concrete is resource saving structures with reduced environmental impact for e.g. energy saving, co2 emissions, waste water. Green concrete is very often also cheap to produce because for example, waste products are used as a partial substitute for cement, charges for the disposal of waste are avoided, energy consumption in production is lower, and durability is greater. Green concrete is a type of concrete which resembles the conventional concrete but the production or usage of such concrete requires minimum amount of energy and causes least harm to the environment. The co2 emission related to concrete production, is between 0.1 and 0.22 t per tonne of produced concrete. However, since the total amount of concrete produced is so vast the absolute figures for the environmental impact are quite significant, due to the large amounts of cement and concrete produced. Since concrete is the second most consumed entity after water it accounts for around 5% of the world's total co2 emission. The solution to this environmental problem is not to substitute concrete for other materials but to reduce the environmental impact of concrete and cement. The potential environmental benefit to society of being able to build with green concrete is huge. It is realistic to assume that technology can be developed, which can halve the co2 emission related to concrete production. During the last few decades society has become aware of the deposit problems connected with residual products, and demands, restrictions and taxes have been imposed. The goal of the centre for green concrete is to reduce the environmental impact of concrete. To enable this, new technology is developed. The technology considers all phases of a concrete construction's life cycle, i.e. structural design, specification, manufacturing and maintenance, and it includes all aspects of performance, i.e. 1. Mechanical properties (strength, shrinkage, creep, static behaviour etc.) 2. Fire resistance (spalling, heat transfer etc.) 3. Workmanship (workability, strength development, curing etc.) 4. Durability (corrosion protection, frost, new deterioration mechanisms etc.) 5. Thermodynamic properties (input to the other properties) 6. Environmental aspects (co2-emission, energy, recycling etc.)

Environmental benefits to using green concrete

1. Lasts longer: green concrete gains strength faster and has a lower rate of shrinkage than concrete made only from portland cement. Structures built using green concrete have a better chance of surviving a fire, as it can withstand temperatures of up to 2400°F. It also has a greater resistance to corrosion, which is important with the effect pollution has had on the environment. Acid rain greatly reduces the longevity of traditional building materials. All of those factors add up to a building that will last much longer than one made with ordinary concrete. Similar concrete mixtures have been found in ancient roman structures. This material was also used in the ukraine in the 1950s and 1960s. Over 40 years later, those ukrainian buildings are still standing. If buildings do not constantly have to be rebuilt, fewer construction materials are needed. The impact on the

environment is reduced. 2. Reduces energy consumption: if you use less Portland cement and more fly ash when mixing concrete, then you will use less energy. The materials that are used in Portland cement require huge amounts of coal or natural gas to heat. Fly ash already exists as a byproduct of another industrial process, so you are not expending much more energy to use it to create green concrete. Another way that green concrete reduces energy consumption is that a building constructed from it is more resistant to temperature changes, thus saving heating and cooling costs. 3. Reduces carbon dioxide emissions: among the main ingredients in ordinary cement are pulverized limestone, clay, and sand which are heated to a high temperature. This process is responsible for between 5 and 8% of all carbon dioxide emissions worldwide. The manufacturing of green concrete releases up to 80% fewer carbon dioxide emissions. As a part of a global effort to reduce emissions, switching completely to green concrete for construction will help considerably.

Application of green concrete

- it is used in the construction of bridges
 - it is widely used in the building construction
 - it is used in the construction of column
 - it can be used in the road construction
- advantages of green concrete
- much change is not required for the preparation of green concrete compared to conventional concrete.
 - reduces environmental pollution
 - have good thermal and acid resistance.
 - compressive and split tensile strength is better with some materials compared to conventional concrete.
 - reduces the consumption of cement overall.
 - green concrete is economical compared to conventional concrete.



green concrete having better workability than conventional concrete. Concrete is widely and globally used throughout the history of humankind. Concrete is a mixture of sand and coarse aggregate combined together by a hardened paste of cement and water. The increased use of concrete is going to grow the demand for its ingredients' resources (cement, sand, and gravel). The high rate of concrete constituents is increasing rapidly and hence there is a requirement for an unconventional material that is low-cost and readily presented that will also give a similar or greater strength when used for concrete. Cement is one of the constituents of

concrete which is costly and its production releases large amounts of CO_2 during its manufacturing. Manufacturing one tonne of cement releases about one tonne of CO_2 in the atmosphere while 1.6 tonnes of natural resources are required to produce about one tonne of cement. In many studies the cement is partially replaced by agricultural/industrial waste such as glass powder, sugar cane bagasse ash, rice husk ash (rha), blast furnace slag, maize cob ash, millet husk ash, fly ash etc. In order to reduce cost, waste and CO_2 emissions while these resources are easily available. rice husk ash (rha) fillers are derived from rice husks, which are usually regarded as agricultural waste and an environmental hazard. Rice husk, when burnt in open air outside the rice mill, yields two types of ash that can serve as fillers in plastics materials. The upper layer of the rha mound is subjected to open burning in air and yields black carbonized ash. The inner layer of the mound being subjected to a higher temperature profile results in the oxidation of the carbonized ash to yield white ash that consists predominantly of silica. Concrete is the most essential aspect of any construction. And widely used material in the construction industry. Selection of concrete depends on various factors like environment, energy consumption, budget and technical aspects. Hence the concrete technology stepped towards the development of alternative building material which can fulfil these aspects and are locally available so as to reduce the cost of construction. Many materials are used for these purposes like ground granulated blast furnace slag (ggbs), rice husk ash (rha), silica fume, fly ash etc. All these materials are categorized as pozzolanic admixtures or mineral admixtures. They are also known as a supplementary cementitious material. Rice husk ash is a by-product of agriculture and is generated in rice mills. Rice husk (rice hull) is the coating of seeds or grains of rice. This coating protects the seed or grain during the growing season. The husk converts to hard materials, including opaline silica and lignin. When properly burnt, rice husk contains high amounts of silica (SiO_2). Hence it can be used as supplementary cementitious material in combination with cement to make concrete products. When paddy is milled, 80% of the weight is of rice and 20% of the weight obtained is husk. This husk can also be used as a fuel for steam or power generation and other purposes. The rice husk ash has good reactivity when used as a partial substitute for cement. These are prominent in countries where the rice production is abundant. The properly rice husk ashes are found to be active within the cement paste. So, the use and practical application of rice husk ash for concrete manufacturing are important

IV. METHODOLOGY

a) Mix design

Concrete mix design is the process of choosing suitable ingredient of concrete and determining their relative quantities with the object of producing as economically as possible concrete of certain minimum properties, notable workability, strength and durability M20 grade concrete has a notional cement-to-sand-to-aggregate-to-water ratio of roughly 1:1.5:3, with the water-cement ratio being kept between 0.4 and 0.6. It is composed of a mixture of cement, sand (fine aggregates), and coarse aggregate. M20 concrete mix ratio: M20 concrete is a 1:1.5:3 mixture of cement,

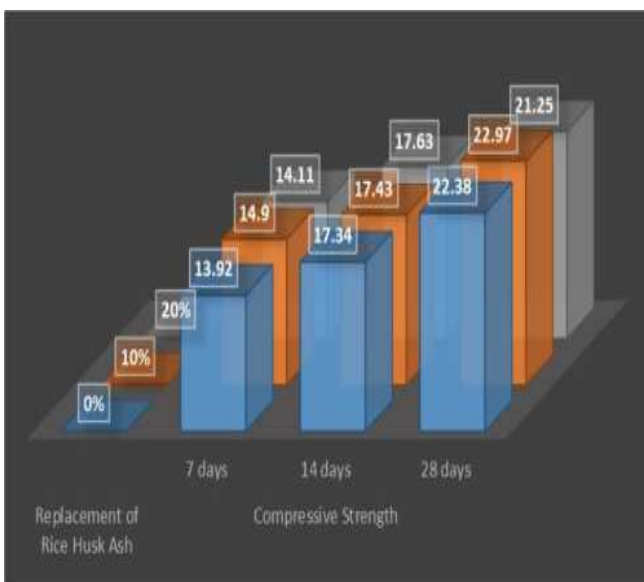
sand, and aggregate, where cement makes up one part, sand makes up 1.5 parts, and aggregate or stone makes up the remaining three parts.

Mix Design For M20 grade		
Material	1 m ³	0.003375m ³
Cement	358.47Kg	1.20Kg
Fine Aggregate	736.90Kg	2.48Kg
Course Aggregate	1176.88Kg	3.96Kg
Water	197.16Kg	0.66Kg

Mix Design			
Replacement of cement in %	0%	10%	20%
Cement	3.6Kg	3.24Kg	2.88Kg
Fine Aggregate	7.44Kg	7.44Kg	7.44Kg
Course Aggregate	11.88Kg	11.88Kg	11.88Kg
Water	1.98Kg	1.98Kg	1.98Kg
RHA	0	0.36Kg	0.72Kg

V. RESULT

a) Compressive strength



Compressive strength of concrete mixes made with and without rice husk ash with different percentage were determined at 7, 14, and 28 days of curing. The test results are given in table. The maximum compressive strength was obtained for a mix having a 10% rice husk ash by weight and increase in strength over plain concrete. The results of

compressive strength presented in Table. The test was carried out obtain compressive strength of concrete at the age of 7 and 28 days. The cubes were tested using Compression Testing Machine (CTM) of capacity 2000KN available in structures lab. The compressive strength is up to 13.92 N/mm² and 22.97 N/mm² at 7 and 28 days. The maximum compressive strength is observed at 10% replacement of rice husk ash. If higher percentages of rice husk ash were used, then compressive strengths decreased. The 7 day compressive strength of rice husk ash concrete was found to be high as 14.90 Mpa. This is more than ordinary concrete. Similarly, 28 day compressive strength was found to be about 22.97 Mpa which is more than that of ordinary concrete. The effect of replacement of cement with three percentages of Rice husk ash on the compressive strength of concrete . It is clear that the replacement of cement with 20 % of Rice husk ash reduced the compressive strength of concrete.

VI. CONCLUSION

The result of study shows that there are good prospects of using Rice husk Ash (RHA), as a pozzolana combination with ordinary Portland cement (OPC) in the Concrete cube. M-20 grade concrete cube is casted and its compressive strength is determined. The combination of 0%, 10% and 20% cement replacement Mix is prepared by using agricultural waste. Compressive Strength of concrete increased with increasing percentage mix give good compressive strength. When Rice Husk Ash replaces cement in concrete it has been observed that its 10% and 20% mix gives good compressive strength. Concrete is a versatile building material which is largely used in construction. When cement is replaced by these waste material up to 10%. From the study conducted, it was clearly shown that Rice husk ash (RHA), are pozzolanic material and can contribute to the sustainability to the construction material

At all the cement replacement levels of Rice husk ash, the rate of development of compressive strength up to 28 days is slower as compared with that of concrete in which RHA content is zero, while the rate of development of strength gradually increases after 28 days

The compressive strength of concrete having 10% replacement was found to be more than the other levels of replacements. (i.e. 0% & 20%).

For the desired strength, the water content required in case of RHA mixed concrete was more than in normal concrete. This is because RHA is finer than cement & the fact is that RHA particles being finer it has more surface area and hence water required is comparatively more,

The addition of RHA increases the degree of hydration of cement at the later period. This positive effect of RHA on the hydration of cement is possibly attributed to the pozzolanic reaction and the absorbed water in the porous Structure of RHA. Thus, such a concrete is very useful in conditions of hot weather & in mass concreting.

By using this Rice husk ash in concrete as replacement the emission of greenhouse gases can be decreased to a greater extent. As a result there is greater possibility to gain more

number of carbon credits. 35

The technical and economic advantages of incorporating Rice Husk Ash in concrete should be exploited by the construction and rice industries.

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Analyse and Design of Equitable Water Supply for Rural Water Distribution Network

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Abstract— Water is the one thing that all living creatures must have. Water is used for irrigating, industrial, and domestic purposes. To meet the expanding population, a water distribution system should be built in the most straightforward way imaginable. An improved environment can be supplied by sufficient installation. The water's quality shouldn't deteriorate due to the distribution pipe. For each distribution point to receive enough pressure, a good water distribution system utilizes minimal loss. An effective water distribution system satisfies customer demand when it is needed. Planning and analyzing a water distribution network could be a difficult process. Water delivery systems use a variety of water sources, including groundwater and surface water. The water is often then cleaned. For Fluoridation is occasionally used in disinfection. To a reservoir, which may be at the bottom or elevated like a reservoir, treated water is either gravity-fed or pumped there. The water is then fed into the distribution system. Pumps, valves, tanks, basins, pipes, and other elements of hydraulic infrastructure a part of the water delivery system. The production of water for consumers requires the use of distribution mains, arterial mains, storage basins, and system components such valves, hydrants, mainline metres, service connections, and backflow preventers. Distribution main refers to the complex of pipes that make up the distribution system. They deliver water from water sources or water treatment facilities to clients. A service connection connects a private building or other plumbing systems to the distribution system mains. the water.

Keywords— Aeration, Coagulation and Flocculation, Sedimentation, Filtration, Chlorination

I. INTRODUCTION

Different regions of the world endure varying degrees of water scarcity. Water shortages are a common occurrence in some nations, whereas they only last a brief time in others when one or more system components fail. The simplest way to address a source water shortage is to distribute the available water equally among the consumers. The design of a water distribution network that can provide an equal supply during a shortage in addition to delivering satisfactory results in non-deficit conditions is the subject of this article. A example water distribution network's performance under conditions of source water shortage is described in depth. The real supply from each node to consumers is calculated using head dependent outflow analysis and extended period simulation. duration and relationship For understanding the

behaviour, the amount and volume of supply available at the source as well as supply from each node are established. the network when there is a shortage of supply. The largest disparity in supply-demand ratios across various consumers is referred to as "inequity" in this context. This is based on the network's actual performance rather than surrogate measurements, which are typically employed for reliability. It is demonstrated that a single analysis can be used to predict the highest "inequity" in supply in a network over the course of supply. The design of a water distribution network is described, taking equity into account in addition to cost reduction and the minimum head requirement. This multi-objective problem is solved using a genetic algorithm. Two benchmark problems serve as illustrations for the solution methodology namely the Hanoi network and two loop networks. Results indicate that equitable supply can be greatly improved.

II. LITERATURE REVIEW

G. ANISHA et al [2], This research is all about the analysis of the existing network and concludes about the reliability on the network for the future. The analysis is carried out based on various public demands, quantities of inflows and out flows of the over-head reservoirs. This analysis provides the information about various demands, losses, and uses of the public. The design of a new network of supply will make the municipality be aware of the new demands, rate of increase in the demands. The design is made keeping in view of the population growth rate, and the developing town. The design brings out an improvement in the existing network.

Dr. G. Venkata Ramana et al [3], This paper highlights only the effective design and distribution of network of pipes using EPANET tool. The residual head at each and every node was found out by having the elevation as input and

III. METHODOLOGY

Saigaon Gram panchayat is located in Koregaon tehsil of Satara district. Saigaon gram panchayat has an area of 1.3 sq. Km. Saigaon is located at a distance of 17 km to the southeast of Satara and 14 km south of Koregaon. The study

area covers 7 zones of Saigaon village and some eastern parts of Dahmer village attached to Saigaon village. The current population of the study area is 840.

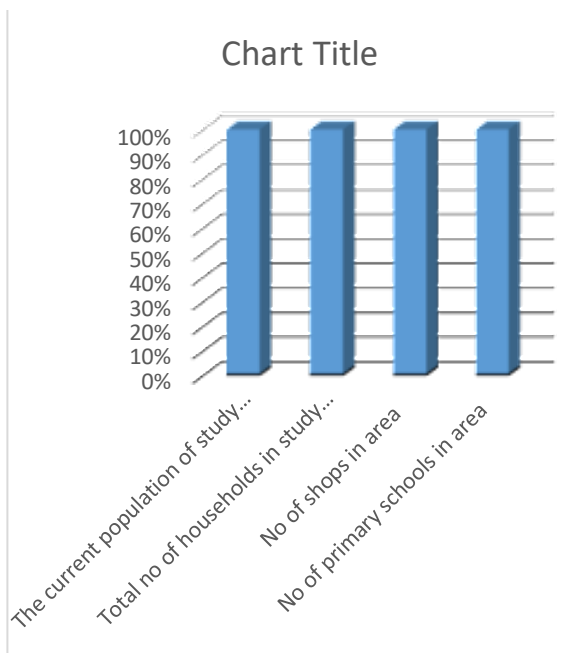


Fig. No. 1

A. Population Forecasting Methods of population forecasting

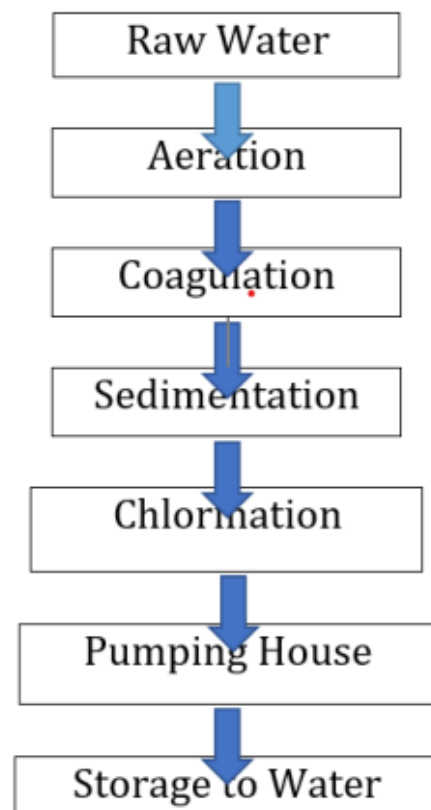
- 1) *Arithmetical increase method.*
- 2) *Geometrical increase method.*
- 3) *Incremental increase method.*

As saigaon is a small village but the migration rate of population from karnataka as daily wedge labor is more here. These migrated people work on construction sites or in midc area near satara. So here we adopting a method for population forecasting is the “incremental increase method”. The design period for proposed water distribution supply scheme is 30 years. So population forecasting have to be done for the year 2050.

B. Location



C. Flow Chart.



•Airiarton



When the water comes in close contact with the technique, oxygen is absorbed and up to 20% of the carbon dioxide is liberated. To get rid of the smell, it eliminates hydrogen sulphide. While the activities are being carried out, water is pouring from this cascade equipment. Add some alum to the water after aeration to get rid of the bacteria. And TCI with same proportion.

- Coagulation and Flocculation



Broadly speaking, coagulation and flocculation are physical and chemical processes that combine water with coagulants and flocculants. The main goal is to create particles that are large enough to be eliminated by the settling or filtration procedures that come next. Coagulation, flocculation, sedimentation, and filtration are methods for removing colloids, suspended matter, bacteria, and other organisms from source water. These particles' sizes can differ by several orders of magnitude. Through the production of particles during the coagulation and flocculation processes, some dissolved material can also be eliminated. The process of coagulation uses the aluminium sulphate salt known as alum $[Al_2(SO_4)_3 \cdot 14H_2O]$, which forms a variety of chemical species known as aluminium hydrolysis products. These species develop both during and following the period. The cleaned water is combined with the alum. A gentle mixing process called flocculation transforms submicroscopic microfloc into observable suspended particles. The lengthy mixing process brings the microflocs into contact with one another.

- Sedimentation



The water is kept in the basin during this plain sedimentation treatment method so that the suspended particles can only fall by gravity. This plant makes use of circular tanks with radial flow. This tank has a MID capacity. The water enters the tank through the centre lintel pipe, which is positioned inside the deflector box. The water is deflected to the bottom side of the box, where it exits through the role. From the deflector hox, water radiates outward towards the tank's circle, where an outlet is situated on the fall. The sloping floor sees all of the suspended particles fall to the bottom.

- Filtration

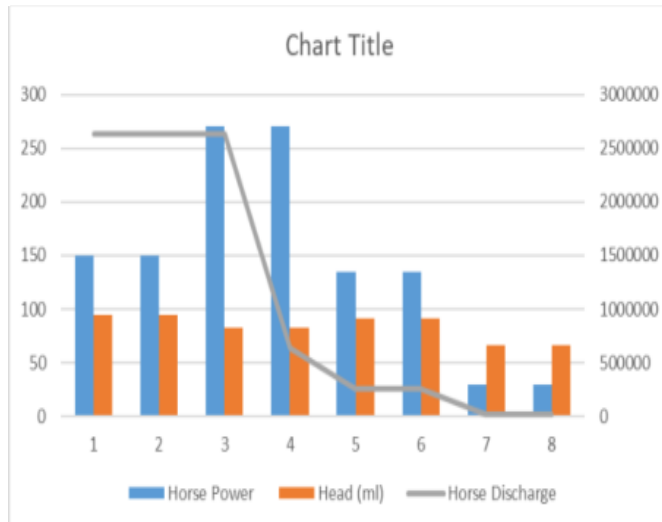


The water is kept in the basin during this plain sedimentation treatment method so that the suspended particles can only fall by gravity. This plant makes use of circular tanks with radial flow. This tank has a MID capacity. The water enters the tank through the centre lintel pipe, which is positioned inside the deflector box. The water is deflected to the bottom side of the box, where it exits through the role. From the deflector hox, water radiates outward towards the tank's circle, where an outlet is situated on the fall. The sloping floor sees all of the suspended particles fall to the bottom.

- Chlorination

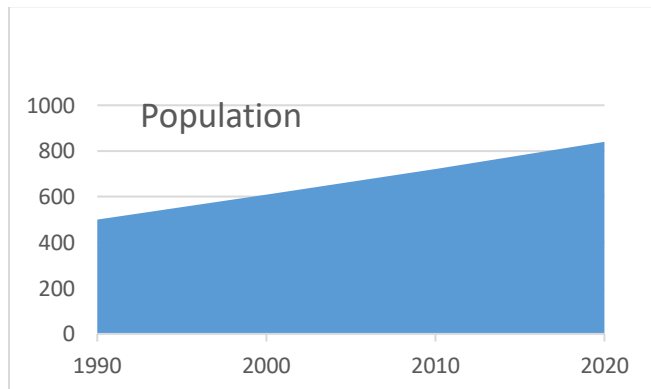
The process of adding chlorine compound such as sodium hydrochloride to water. This method is used to kill bacteria and other microbes in top water. In this plant, used gas chlorination process to removal of bacteria. The doses of chloride gas are depending upon the turbidity of water. In plant, the turbidity of water count by the site laboratory. This process is automatically run on the site when chlorine gas may first be dissolved in the small quantity of water and the solution is prepared to point.

- water pump house

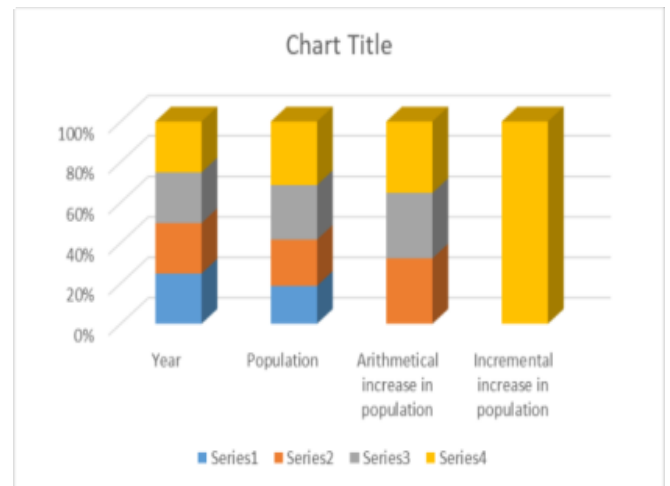


IV. DATA ANALYSIS

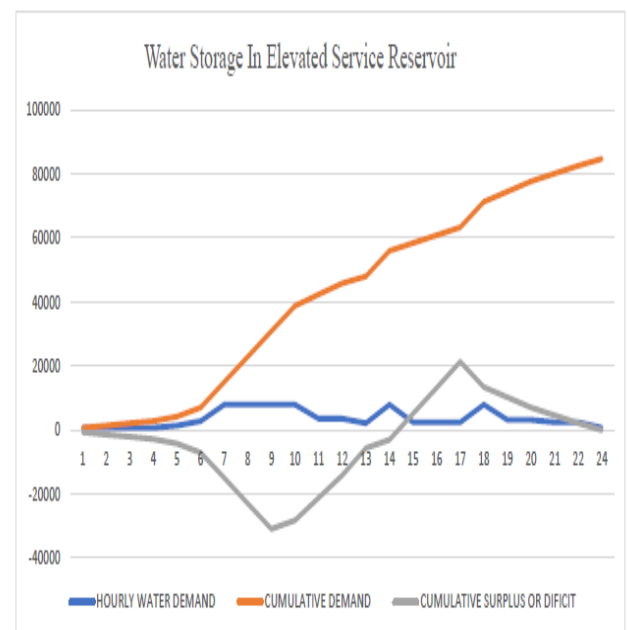
a). Past Increase in Population



Past Increase In Population



B. IMPLEMENTATION OF WATER DISTRIBUTION NETWORK



START HR.	END HR.	HOURLY DEMAND FACTOR	HOURLY WATER DEMAND	CUMULATIVE DEMAND	AVERAGE RATE OF PUMPING PER HOUR	CUMULATIVE PUMPING	CUMULATIVE SURPLUS OR DEFICIT
0	1	0.2	705.8334	705.8334		0	-705.8
1	2	0.2	705.8334	1411.667		0	-1411.7
2	3	0.2	705.8334	2117.5		0	-2117.3
3	4	0.2	705.8334	2823.334		0	-2823.3
4	5	0.4	1411.667	4235		0	-4235.0
5	6	0.8	2823.334	7058.334		0	-7058.3
6	7	2.25	7940.826	14999.96		0	-14999.9
7	8	2.25	7940.826	22939.59		0	-22939.6
8	9	2.25	7940.826	30880.21	0	0	-30880.2
9	10	2.25	7940.826	38820.84	10587.5	10587.5	-38233.3
10	11	1	3529.167	42350	10587.5	21175	-21175.0
11	12	1	3529.167	45879.17	10587.5	31762.5	-14116.7
12	13	0.8	2117.5	47996.67	10587.5	42350	-5646.7
13	14	2.25	7940.826	55937.3	10587.5	52937.5	-2999.8
14	15	0.7	2470.417	58407.71	10587.5	63525	-5117.3
15	16	0.7	2470.417	60878.13	10587.5	74112.5	-13244.4
16	17	0.7	2470.417	63348.55	10587.5	84700	-21381.5
17	18	2.25	7940.826	71289.17		84700	-13410.8
18	19	0.9	3176.25	74465.42		84700	-10234.6
19	20	0.9	3176.25	77641.67		84700	-7058.3
20	21	0.7	2470.417	80112.09		84700	-4587.9
21	22	0.7	2470.417	82582.51		84700	-2117.5
22	24	0.2	705.8334	84700.01		84700	0.0
MAXIMUM SURPLUS						21351.5	
MAXIMUM DEFICIT						-30880.2	

WATER STORAGE IN ESR

V. CONCLUSION

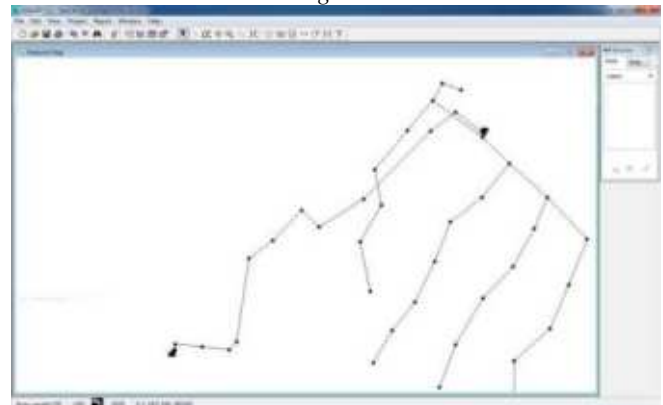
The water distribution network has been designed and analyzed successfully using the Epanet software for the village Saigaon. At the end of analysis it was found that to supply water from source well to ESR, we have to provide 90 mm PE-100 HDPE pipe with 2.5 HP water pump. And for the distribution network, main distribution pipe should be 110 mm dia. and sub main distribution pipes should be 90 mm dia. . ESR should be constructed 10 m elevated from ground level with 1 lakh capacity. In the analysis its found that residual pressure is greater than 15 m at each node. And IS 1172 recommends minimum residual pressure of 7m, so end user will get water with sufficient pressure. So, it is concluded that design can be able to supply water for 24 Hour to village saigaon for the next 30 years to the population of 1210.

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C. Distribution network design



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AUTOMATED HIGHWAY SYSTEMS

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Abstract - Automated highway system (AHS), which promises an increase in traffic capacity. The core of this protocol to achieve a fully automated highway system is four-layer hierarchical control architecture. Automated Highway System, abbreviated as AHS is newly developed idea which uses different sensors and microprocessors for automatic design process. The management and control of traffic system using roadside controllers and intelligent vehicles is innovative technique for the design of highway system. The Automated Highway System is the design concept introduced to enhance safety, efficiency and many other vehicular as well as user characteristics of highways. This concept has introduced for the improved architectural layout of highway design and also helped in reducing the environmental effects of the vehicles running on the highways

Key Words: AHS Functional Evolution, Incremental Deployment, Reducing Accident Rate, Smart Highway.

1. INTRODUCTION

The Automated Highway System (AHS) concept defines a new relationship between vehicles and the highway infrastructure. AHS refers to a set of designated lanes on a limited access roadway where specially equipped vehicles are operated under completely automatic control. AHS uses vehicle and highway control technologies that shift driving functions from the driver/operator to the vehicle.

Throttle, steering, and braking are automatically controlled to provide safer and more convenient travel. AHS also uses communication, sensor and obstacle-detection technologies to recognize and react to external infrastructure conditions. The vehicles and highway cooperate to coordinate vehicle movement, avoid obstacles and improve traffic flow, improving safety and reducing congestion. In sum, the AHS concept combines on-board vehicle intelligence with a range of intelligent technologies installed onto existing highway infrastructure and communication technologies that

2. LITERATURE REVIEW

[1] Shivam B. Gawande, Prof. Y. S. Khandekar, Prof. Ashish R. Bijwe

In this paper author discuss about the problems associated with the annual growth of automobile transport start spreading from large metropolitan cities to small towns. For many years, scientists and engineers have envisioned building an automated highway system (AHS) to increase both the safety and efficiency of the nation's highways. In such a system, the vehicles become driving robots, capable of sensing and reacting to the surrounding environment while the driver is free to do other tasks. Automating the vehicle has significant potential it can reduce accidents caused by driver error and can potentially increase

trafficking capacity and fuel economy by eliminating human driver inefficiencies.

[2] T. Ajay Kumar Dayma , Arihant Verma , h way System Mr. Arun Bihani

In this paper author proposed Automated highway system (AHS) is an intelligent transportation system, which removes human drivers from the operation of vehicles during driving. AHS includes control problems from the vehicle level to the highway network and its challenging opportunities for intelligent mechatronics. This technology requires extreme accuracy in vehicle location within the least times. AHS refers to a set of designed lanes on a limited access roadway where specially equipped vehicles are operated under completely automatic control. It can help reduce fuel consumption and individual vehicle discharge. The AHS designed requires advanced sensors, actuators, and communication technologies. It managed transportation systems for traffic problems in big cities, congestions, accidents, delays.

[3] Shivam B. Gawande, Prof. Y. S. Khandekar, Prof. Ashish R. Bijwe

Automated highway system (AHS), which promises an increase in traffic capacity. The core of this protocol to achieve a fully automated highway system is four-layer hierarchical control architecture. Automated Highway System, abbreviated as AHS is newly developed idea which uses different sensors and microprocessors for automatic design process. The management and control of traffic system using roadside controllers and intelligent vehicles is innovative technique for the design of highway system. The Automated Highway System is the design concept introduced to enhance safety, efficiency and many other vehicular as well as user characteristics of highways. This concept has introduced for the improved

architectural layout of highway design and also helped in reducing the environmental effects of the vehicles running on the highways.

[4] Namratha M M, Navya M N, Niharika R, Namitha N V

Road safety is a concern of everyone in the current scenario of increased vehicular traffic. Internet is part of our daily life and available in most of the places because of revolution of electronic communication. It has become an integral part of our lives. We are living in a world of automation. Almost everything around, us is automated. Automation plays an important role in the field of transportation. As of now, vehicles are just monitored but not automatically controlled pertaining to the road safety rules. In this work a system is designed for automatic control of vehicles in restricted areas, where the safety signage boards are installed. The four applications namely speed control, hump detection, no parking and no horn zone are implemented using IoT.

3. Methodology.



Fig 1. A concept drawing of an Automated Highway System with dedicated lanes in the centre of the

highway.

As shown in figure, a driver electing to use such an automated highway might first pass through a validation lane, similar to today's high-occupancy-vehicle (HOV) or carpooling lanes. The system would then determine if the car will function correctly in an automated mode, establish its destination, and deduct any tolls from the driver's credit account. Improperly operating vehicles would be diverted to manual lanes. The driver would then steer into a merging area, and the car would be guided through a gate onto an automated lane. An automatic control system would coordinate the movement of newly entering and existing traffic. Once travelling in automated mode, the driver could relax until the turnoff. The reverse process would take the vehicle off the highway. At this point, the system would need to check whether the driver could

retake control, then take appropriate action if the driver were asleep, sick, or even dead. The alternative to this kind of dedicated lane system is a mixed traffic system, in which automated and non-automated vehicles would share the roadway. This approach requires more-extensive modifications to the highway infrastructure, but would provide the biggest payoff in terms of capacity increase. In fact, a spectrum of approaches can be envisioned for highway automation systems in which the degree of each vehicle's autonomy varies. On one end of the

range would be fully independent or "free-agent" vehicles with their own proximity sensors that would enable vehicles to stop safely even if the vehicle ahead were to apply the brakes suddenly. In the middle would be vehicles that could adapt to various levels of cooperation with other vehicles (platooning). At the other end would be systems that rely to a lesser or greater degree on the highway infrastructure for automated support. In general, however, most of the technology would be installed in the car.

4. Control design of an automated highway System

The Control design of an Automated Highway system can be looked upon the basis of a 5 layer theory which together comprise the two systems viz. the On-board Vehicle System and the Roadside System. The control design is explained with the aid of the figure :

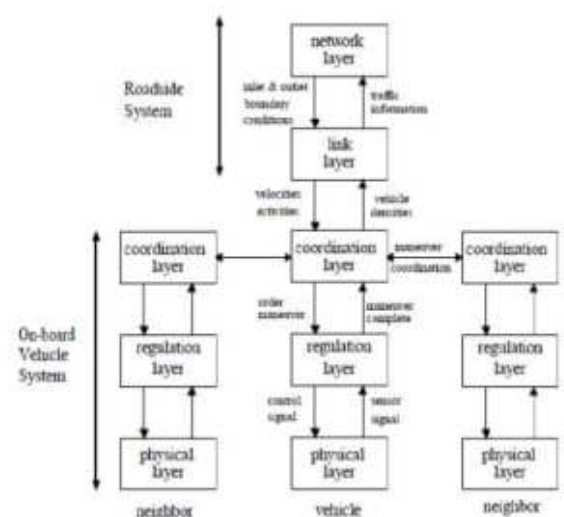


Fig 2. The Control Design of an Automated Highway System

The Five Layer Theory

The physical layer comprises all the on-board vehicle controllers of the physical components of a vehicle.

These include the engine and transmission, brake and steering control systems, as well as the different lateral and longitudinal vehicle guidance and range sensors. The main function of the physical layer is to decouple the longitudinal and lateral vehicle guidance control and to approximately linearize the physical layer dynamics. The regulation layer is responsible for the longitudinal and lateral guidance of the vehicle, and the execution of the manoeuvres ordered by the coordination layer. The regulation layer must carry out two longitudinal control tasks. The first task is that of a vehicle follower in a platoon and consists in maintaining a prescribed constant spacing from the preceding vehicle. The second task is that of a platoon leader or free agent and consists in safely and efficiently executing a manoeuvre commanded by the coordination layer. The coordination layer is responsible for selecting the activity that the vehicle should attempt or continue to execute, in order to realize its currently assigned activity plan. It communicates and coordinates its actions with its peers—the coordination layers of neighbouring vehicles—and supervises and commands the regulation layer to execute or abort manoeuvres. It also communicates with the link layer roadside control system, from which it periodically receives an updated activity plan. There is one link layer controller for each 0.5 to 5 km-long segment of the highway, called a link. Its task is to control the traffic flow within the link so as to attain its full capacity and minimize vehicle travel time and undesirable transient phenomena, such as congestion. A link is itself subdivided in sections, one per lane. A link receives

and discharges traffic flow from and to neighbouring links, as well as AHS entrances and exits. The controller measures aggregated vehicle densities in each of the link's sections. These densities are specific to vehicle type, including origin and destination, and whether the vehicle is a platoon leader, follower or is changing lanes. It broadcasts commands in the form of a specific activity plan for each vehicle type and section, to the vehicle coordination layer controllers. The link layer controller receives commands from the network layer in the form of demands on the inlet traffic flows at the AHS entrances, and outlet flow constraints at the AHS exits, as well as desired inlet-to-outlet traffic flow split ratios, in case a vehicle can take more than one route to each the same destination, while travelling in that highway link. The task of the network layer is to control entering traffic and route traffic flow within the network of highway links that constitute the AHS, in order to optimize the capacity and average vehicle travel time of the AHS and minimize transient congestion in any of its highway links.

5. CONCLUSION

Automated Highway Systems brings major transportation benefits in terms of safety, efficiency, affordability and usability, and environment in order to achieve its development goals. A key feature of the control design architecture is the separation of the various control functions into distinct layers with well-defined interfaces. Each layer is then designed with its own model that is suited to the functions for which it is responsible. The models at the various layers are different not only in terms of their formal structure (ranging from differential equations to state machines to static graphs), but also in the entities that have a role in

them. The AHS is a complex large-scale control system, whose design required advances in sensor, actuator, and communication technologies (not discussed here) and in techniques of control system synthesis and analysis. It is a measure of the advanced state of the art that these techniques have reached a stage that they could be successfully used in the AHS project. Though it has been said so, the reasons why many federal programs like the National Automated Highway System Research Program (NAHSRP) failed was that the program was trapped in technology-optimism. Several U.S. DOT reports on AHS show that there are no technical and non-technical showstoppers. However, legal, institutional, and societal challenges just as critical as technical issues. Moreover, these institutional and societal issues cannot be settled in one day, because they are much to do with people's perception, behavior, consensus and social changes based on those.

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Utilization of plastic waste for making plastic bricks

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Abstract— The plastic waste is the hazardous problem in today's world. This is most dangerous problem in front of humanity. These plastic mixed in the soil, it directly effects on fertility of the soil. Nowadays, the large amount of plastic is deposited into sea. This plastic wastes gives hazardous effect on the aquatic life . So, we try to finding efficient way to solve this problem of plastic waste. So, we added this plastic wastes into the bricks and create the bricks by using plastic wastes. It is most economical solution present in the construction industry and it is also economical and environment friendly solution of the plastic wastes.

INTRODUCTION — 1) General - Plastic is a very common material that is now widely used by everybody in the world. Plastic plays a predominant role in reusable in this era, as it is compact and light in weight. Common plastic items that are used are covers, bottles, and food packages. The great problem with plastic is its decomposition. Plastic is made of polymer chemicals and they are non-biodegradable. This means that plastic will not decompose when it is placed in earth. Though plastic is a very useful material that is flexible, robust and rigid they become waste after their use and they pollute the air and land. Recycling is processing use waste materials into new products to prevent waste of potentially useful materials. Thus disposal of waste plastic is a serious problem globally, since they are non biodegradable and also researchers have found that the plastic materials can remain on earth for 4500 years without degradation. Plastic have many good characteristics which include versatility, lightness, hardness, and resistant to chemicals, water and impact. There is considerable imbalance in the conventional building materials; there is a great demand in recent past years. In quarries while cutting out the lateritic stone with help of cutting machines which produces 15- 20% of soil wastes which poses a problem of disposal & utilizing the quarry waste. The quantity of plastic waste in municipal solid waste collection is expanding rapidly, the rate of expansion is double for every 10 years . .. 2) Present scenario of waste generation in India - Growth of population has increased our urbanization as a result rising standard of living due to technological

innovations have contributed to an increase both in the quantity and variety of solid wastes generated by industrial, agricultural activities, mining and domestic. Globally the estimated quantity of wastes generation was billion tones in the year 2002 of which 11 billion tones were industrial wastes and 1.6 billion tones were municipal solid wastes (MSW). About 19 billion tons of solid wastes are expected to be generated annually by the year 2020. Annually, Asia alone generates 4.4 billion tons of solid wastes and MSW comprise 795 million tons of which about 48 (6%) MT are generated in India. MSW generation in India, is expected to reach 300 Million tones and land requirement for disposal of this waste would be 169.6 km² as against which only 20.2 km² were occupied in 1997 for management of 48 Million tones. As it is studied that apart from municipal wastes, the organic wastes from agricultural sources alone contribute more than 350 million tons per year.

LITERATURE REVIEW

2.1 Critical review on types of bricks type 14: Plastic sand bricks: 1) Manish Kumar Sahu, 2) Lokesh Singh: volume- 5, issue-11, nov.-2017)

2.2 Manufacturing and Testing of Plastic Sand Bricks 1) Mr. N. Thirugnanasambantham, 2) P. Tharunkumar, 3) R. Sujithra, 4) R. Selvaraman, 5) P. Bharathi

2.3 Utilization of Waste Plastic in Manufacturing of Plastic Sand Bricks Mohammad sultan 1) Rahul jaiswal ,2) Roshan Jaiswal, 3) Falgunee Ram Sahu, 4) Devannand, 5) Megha Sahu

2.4 Utilization Of Waste Plastic In Manufacturing Of Bricks 1) K.B. Manjunath ,2) Dasharatha T H, 3) Mahendra H N, 3) Sneha K R, 4) Bhavani G T, 5) Keerthi H

2.5 Fabrication and Testing of Plastic Sand Bricks S S Chauhan, Bhushan Kumar, Prem Shankar Singh, Abuzaid Khan, Hritik Goyal, Shivank Goyal Department of Mechanical Engineering, G.L. Bajaj Institute of Technology & Management, Greater Noida, India

Objective

- 1) To develop an efficient way to utilize the waste plastic.
- 2) To produce cost effective material.
- 3) To reduce disposal problem of plastic waste.
- 4) To prevent the consumption of natural resources.

Methodology 1 The Methodology Adopted :-

→ Collection of Materials.

→ Preparation of brick mould.

→ Batching.

→ Melting.

→ Mixing.

→ Moulding.

→ Curing.

Collection of materials :-

The process is incredibly simple. Put the dustbin in the canteen for collection of waste bottles. Select the plastic bottles of cold drinks and water from canteens. Bring river sand for plastic brick. IS2386 (Part- I) The more you collect the more plastic you will divert from the landfill or clean up out of the environment.



Plastic



Sand

Preparation of brick mould :- The moulds used are wooden moulds and are made in the carpentry shop. All the sides and surfaces of the mould should be even for the brick to have better surface finish. Both fixed and movable moulds can be used for the purpose. Wooden mould will be cost effective and serve the purpose whereas if better surface finish is needed then cast iron moulds can be used.



Mould

size would be (230*100*75) mm.

Batching :-

Measurement of materials for making brick is called batching. After collection of materials we separate the types of plastic and remove any other waste presented in the collected material and check that any water content in the sample collected then proceed for burning.



Mechanical



Manual

Sand Sieving Process



Burning of waste plastic : - After completion batching the plastic waste were taken for burning in which the plastic bags are drop one by one into the container and allowed to melt. These would be done in closed vessel because to prevent the toxic gases released into atmosphere. These will be at the temperature of 90-110 degrees centigrade.



Mixing : -

Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensure that the mass becomes homogeneous, uniform in colour and consistency. Generally, there are two types of mixing, Hand mixing and mechanical mixing. In this project, we adopted hand mixing. until the entire plastic content required for making plastic brick of one mix proportion is added into it. then these plastic liquids thoroughly mixed by using trowel before it hardens. The mixture has very short setting bags are turned to molten state; the river sand is added to it. The sand added is mixed time. Hence mixing process should not consume more time.



Moulding : -

After completion of proper mixing we place mix into required mould. In these projects we use the normal brick sizes (19x9x9 cm). after 2 days remove the brick from the mould and then done curing



. Curing : -

The test specimens after moulding were allowed to dry for a period of 24 hours. The specimens were kept in curing tank and allowed to cure for a period of 24 hours.



1 Tests carried on plastic bricks : -

1. Compressive strength
2. Water absorption
3. Soundness
4. Colour
5. Efflorescence
6. Hardness

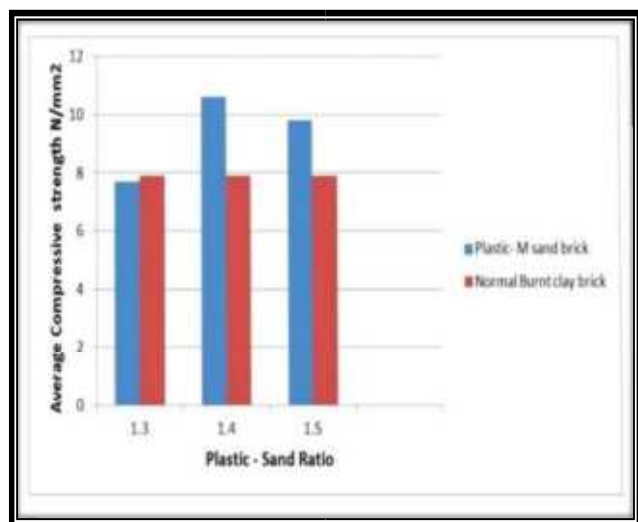
Compressive strength : -

In this test, the cubical brick specimen is placed in the compression strength testing machine. After placing it we will apply the load on the brick without any shock. The load will be increased at a rate of 140kg/cm² min continuously till the specimen's resistance to increasing load breaks down and it cannot withstand any greater load further. Recording the maximum load applied to the brick specimen and the appearance and type of failure is also noted along with any unusual features.



Result of compressive strength

Plastic Sand ratio	Compressive Strength (N/mm ²)	
	Plastic Sand brick	Normal burnt clay brick
1 : 3	7.7	7.9
1 : 4	10.6	7.9
1 : 5	9.8	7.9



Water absorption : -

In this test at first the bricks are weighed in total dry conditions. Then they will be allowed to be dipped in fresh water for about 24 hours in a container. The bricks are taken out of the water after 24 hours and are wiped with a cloth. The wet brick is weighed using a weighing machine. For the calculation of water absorption, the difference between wet brick and dry brick is done. The difference is the amount of water absorbed by the brick. After that the percentage of water absorption is calculated using the data.



3

Soundness : -

The soundness test is also done in the field. After the manufacturing of the brick are allowed to dry in air for 2 days. Then the bricks are made to hit each other the ring sound produced during the process, which denotes the quality of the brick that it is good. Good quality bricks produce the clear ringing sound. In our project both fly ash bricks and plastic sand bricks clear ringing sound produced.

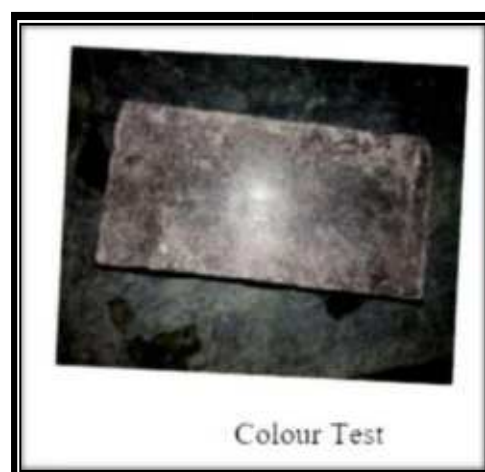
Result of soundness test : -

Ring sound produced and bricks are not break.

Colour Test : -

Result of colour test : -

Mud colour as present on plastic pieces and present even after 24 hours in water.



6 Hardness : -

In this test a scratch is made on brick surface with steel rod (any hard material can be used) which was difficult to imply the bricks or blocks were hard. This shows the brick possess high quality.

Result of hardness test : - little bit scratch visible



Conclusion : -

- 1) Waste plastic, which is available everywhere, may be put to an effective use in brick/tiles making.
 - 2) Plastic sand brick possesses more advantages which includes cost efficiency, resource efficiency, etc.
 - 3) Plastic sand bricks/tiles can help reduce the environmental pollution, thereby making the environment clean and healthy.
 - 4) Plastic sand bricks/tiles reduce the usage of clay in making of bricks/tiles.
 - 5) Plastic sand bricks/tiles give an alternative option of bricks/tiles to the customers on affordable rates.
 - 6) Water absorption of plastic sand brick is 2 %.
- Compressive strength of plastic sand brick is more when 1 : 4 ratio of plastic to sand is taken i.e 20 % plastic and 80 % sand.
- 7) We conclude that the plastic sand bricks are useful for the construction industry when we compare with Fly Ash bricks and 3rd class clay bricks.
 - 8) This method is suitable for the countries which has the difficult to dispose /recycle the plastic waste.
 - 9) Owing to numerous advantages further research would improve quality and durability of plastic sand bricks.

Future scope : -

The plastic bricks used for further in construction projects due to its light weight and economic purpose. It give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering materials which shows some remarkable response

in future industry and Changes the thoughts of the researchers, users and industries. Such as, in going for plastic sand wall in framed structures as a partition wall, plastic sand benches in the parks, plastic sand tracks for running and jogging in place of concrete or stone tracks.

Plastic sand bricks give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering materials which shows some remarkable response in future industry and changes the thoughts of the researchers, users and industries. Such as, in going for

Plastic sand wall in framed structures as a partition wall.

Plastic sand benches in the parks.

Plastic sand tracks for running and jogging in place of concrete or stone tracks.

Research on Composition of plastic with fly ash, Quarry dust etc.

ACKNOWLEDGMENT

It is our privilege to acknowledge our deep sense of gratitude to our guide Prof.Sakpal Sir ,Civil Engineering at Arvind Gavali College of Engineering, Satara for his valuable suggestions and guidance throughout our degree course and the timely help given to us in completion of our project work. We are thankful to Dr. V. A. Pharande, Principal, Arvind Gavali College of Engineering, Satara and Prof.Sakpal Sir Civil Engineering Engineering department for their kind cooperation & morale support. Finally, we wish to express our sincere thanks to all the staff members of Arvind Gavali College of Engineering, Satara for their direct and indirect help during the course of our project.

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CELL FILLED CONCRTE PAVEMENT

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I. RLATED WORDS

"Cell filled concrete pavement/plastic road/plastic cell
Plastic in road construction,cell filled'

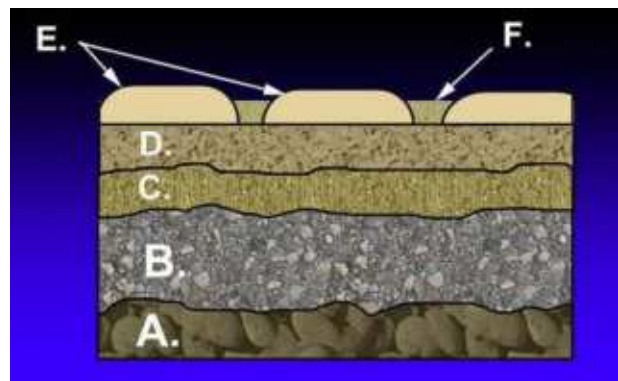
Specification of our cell filled concrte pavement

MATRIAL –

1. Bottel cap/plastic cell
2. Concrte- mix of cement,sand,aggregate

Length- 400mm

Width -30mm



- **Abstract—** Cell-filled concrete pavement is the technology developed by IIT Kharagpur, which has proved to be a very promising solution for overloaded vehicles, inadequate drainage facilities, and waterlogging problems. Cell-filled concrete pavement consists of formwork of plastic cells over the compacted subgrade / sub-base, filled with concrete or stones.

To explore the possibility of using plastic cell filled concrete block pavement (PCCBP) as overlay in pavement construction, an experimental investigation has been carried out by comparing the structural behaviour (layer elastic moduli) of a ~ 50 mm thick PCCBP overlay and a conventional bituminous surface of similar thickness. To economise the cost of construction of PCCBP, an attempt has also been made to use waste stone dust in place of the traditional river sand as fine aggregates in concrete.

Introduction

the rural road network has experienced a considerable growth. The good quality roads being constructed, immensely contribute in the progress of the country.

Most of the low volume village roads being constructed are flexible pavements provided with a thin bituminous surface. Quite often these roads get damaged due to overloaded vehicles, inadequate drainage facility and water logging problems, and hence require early periodic maintenance.

The technology developed by IIT Kharagpur, known as cell filled concrete pavement, has proved to be a very promising solution for this issue. It provides long lasting concrete pavements (permanent asset) at low initial cost which are almost maintenance free. This also generates employment opportunities in rural areas.

Cell-filled concrete pavement consists of formwork of plastic cells over the compacted subgrade

3.CONSTRUCTION OF CELL FILLED CONCRTE PAVEMENT

A] SUBGRADE-

1. The subgrade forms the top 300 mm thick portion of the embankment. The embankment subgrade is compacted in two layers, usually to a higher standard than the embankment.

2. If the embankment soil is poor, the top 300mm of the subgrade may consist of good quality material from borrow pits with CBR exceeding five. The subgrade shall be compacted to at least 100 percent of Maximum Dry Density per IS:2729 (Part 7).

3. The subgrade shall be compacted to at least 100 percent of Maximum Dry Density per IS:2729 (Part 7). The expansive black cotton soil (BCS) should be compacted to a minimum of 95% of the maximum dry density with moisture content 2% higher than the optimum.

4. The subgrade soil of existing roads is expected to have attained the required stability due to traffic, and the CBR test should be done at in situ dry density and moisture content after four days of soaking.

B] SUB-BASE COARSE –

1. The subbase consists of laterite boulder consolidation, water-bound macadam, wet mix macadam, crusher run macadam, lime-fly ash-aggregate mixtures, lime stabilized soil, cement stabilized soil, and others with proprietary stabilizers.

2. Locally available aggregates such as murrum and kankar mixed with lime fly ash may also be used.

If the number of commercial vehicles is more than fifty per day, 150mm of cementitious sub base with a minimum 7-day strength of 1.5 MPa is recommended.

The subbase should be provided with stone/concrete block, or Brick on edge should be laid on either side of the carriageway projecting 50 to 100 mm above the subgrade/subbase for the confinement and protection.

Stone/ concrete block or Brick on end edge should be laid on either side of the carriageway projecting 50 to 100 mm above the subgrade/subbase for confinement and protection.

C] PLASTIC CELL

The plastic cells act as both the form and reinforcement for the pavement. The plastic cells are made from reclaimed high-density polyethylene (HDPE) sheets of thickness 0.22 mm to about 0.25mm.

These plastic cells can be supplied as rolls of strips 50mm to 100mm wide, depending upon the depth requirement. The strips can be heat-welded or stitched to form cells.



BOTTEL CAP

In this project we have used a bottle cap because this our project was small scale

Bottle cap and plastic cell is made of a similar material so not big difference between them



After This plastic bottle cap layer completely filled with aggregates.



This layer works/acts like sub- base layer of pavement

CONCRTE –

Conventional pavement concrete with 28-day strength of 30 MPa with a slump of about 30 to 50mm can fill up the cell.

Pourinig concrte done into the cell with well compaction.



ACTUAL CONSTRUCTION PROCESS

1. The construction of embankment, subgrade, and subbase should be done as per Specifications for Roads.
2. A proper camber as applicable to rural roads shall be provided. Drainage layer should be provided in high rainfall areas (annual rainfall exceeding 1000 mm) as laid down in Road Manual.
3. Stone/concrete block or Brick on end edge should be laid on either side of the carriageway projecting 50 to 100 mm above the subgrade/subbase for the confinement and protection of cell-filled concrete.
4. A hard shoulder with proper camber is necessary for the concrete blocks' stability since trucks traveling close to the edge may damage the unconfined concrete blocks.
5. The width of the hard shoulder should be about 0.85 m on either side of the pavement.
6. Formwork of plastic cells shall be laid across the compacted subbase and put under tension with iron spikes so that cells are close to squares in plan.
7. Nylon threads passing at 10 mm below the top of the cells shall prevent the cells from collapsing while filling the cells with concrete.
8. If any stitch of the cells opens up during tensioning, it should be stapled near the top, middle, and bottom.
9. The concrete shall be filled into the cells to a depth of 120 mm, which is about 20 mm higher than the cell's depth.
10. The iron spikes shall be removed after the cells are filled up with concrete. For RCC, two passes of the roller in static mode followed by two passes in
11. The number of passes in static and dynamic modes depends upon the texture of aggregates and moisture content.
12. Pan vibrators can be used to compact the conventional concrete having a slump of about 30 to 40 mm.
13. The number of roller passes, the amplitude of vibrations, the depth of loose concrete in cells, and the amount of water to be added shall be determined from the trial run.
14. The concrete's surface shall be covered with wet jute mats or paddy straw to prevent drying during hot weather.



ADVANTAGES OF CELL FILLED CONCRETE PAVEMENT

1. Use of recycled plastic.
2. As the expansion or contraction joints are not required, and hence maintenance of joints is eliminated.
3. The cost of construction is considerably reduced when compared to conventional cement concrete pavement.
4. The consumption of aggregates is almost reduced to 50% when compared to normal CC pavements.
5. If the individual block fails, it can be easily replaced without much effort and with the least cost.

DISADVANTAGES OF CELL FILLED CONCRETE PAVEMENT

1. The preparation of the cells is cumbersome.
2. There are high chances of cells getting disturbed while placing the concrete, and hence proper care is required.
3. Due to slow progress, the men and machinery's efficiency is less than the normal.

Features of cell filled pavement -

1. Long-lasting
2. Reduces rutting and is maintenance-free
3. Employment generation
4. High strength and sustainability
5. No cracking
6. Fast to deploy and install even in remote areas
7. Uses onsite fill, confines, and stabilizes soil.
8. Greatly extends pavement life
9. Permeable infill leads to cooler pavements

APPLICATION –

1. Most beneficial in rural areas
2. It is essentially the best cost-efficient alternative solution to areas with technical challenges
3. Overlays on damaged tar roads
4. Pavements and footpaths
5. Container yards
6. Parking area for heavy vehicles
7. The plastic cell filled concrete finds excellent utility in road surface stabilization, road shoulder stabilization, or road base stabilization.

INVIROMENTAL IMPACT

Cell are made with reused plastic so it well help the utilization of plastic

They require less maintenance, and the plastic is immune to weathering, unlike asphalt. However, plastic roads have some potential environmental impacts that are important to consider.

By combining recycled plastic with other sustainable materials, plastic roads can provide an environmentally-friendly solution for roads and pavements.

VI. ACKNOWLEDGMENT

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CONCLISION

Cell Filled concrete pavement can be recommended for weak base and subbase layers instead of flexible pavement, since it showed resistance to structural durability.

Cell filled pavement has very little effects to the riding comfort in terms of roughness

Construction of cell fill concrete pavement is advantageous compared to conventional and asphalt pavement since cell filled roads are economical (cost per km) to conventional concrete roads and they need very less annual maintenance (as per good PCL rate) compared to flexible roads.

Conventional and cell filled concrete roads could be a solution for the rural roads because of the life of concrete roads it beneficial to use cell filled in low volume traffic condition.

Cell filled concrete roads is a challenge in the rural road construction with the effective diversion of traffic.

VIII FUTURE SCOPE

This new plastic cell filled pavement technology can be used for high volume roads to resist higher vehicular loadings.

Replacement of the self curing admixture polyethylene glycol-400 can be done to make it more compelling with strength and workability.

Measures on methods can be taken to make the initial costing of the plastic cell concrete pavement mush less as till now it is more as initial stages.

These plastic cells can also be used at the sub-grade level of the foundation to make the soil erosion resistant beneath the concrte pavement

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“Analytical Investigation on Mitigation of Short Column Effect in Partial Infilled Frames”

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ABSTRACT

The usage of the unreinforced masonry infills between the column frames has been in practice from a long time even if the area is seismically active. Masonry infills are provided within a structure without realizing that during the seismic action they act as single unit i.e., a combination of brick elements and the concrete. The masonry infills provides enough stiffness and strength to the structure. Hence, helps in reducing the drift. The infills up to certain height are sometimes unwittingly removed for different purpose such as window, better ventilation purpose etc. due to which, the resistance against the lateral loads is reduced. From earthquake history it is seen that the partial infilled frames do not behave as expected and undergo short column effect. The present study is dedicated towards reducing the shear force in columns of the partial infilled frame.

Here the building models with variation in their masonry infills are considered as basic models. The percentage of the infills are varied only on the outer periphery of the models. The infills are modelled as masonry infill panels. To mitigate the short column effect, four different structural forms i.e. building with additional infills to the adjoining columns, structure with bracing, frame-shear wall structure and composite column structure with partial infilled masonry are considered to assess their performance in reducing the shear force in the column.

The G+7 storied buildings considered are modelled and analyzed using ETABS20 by response spectrum method as per IS 1893:2016. The behaviour is studied in terms of shear force in column, storey shear, base shear, storey displacement, storey drift and time period of the structure. The results show that when compared to the other methods, the method of providing additional infills adjoining to the short column in the partial infilled frames mitigates the shear force effectively. The reduction in shear force for varying (25,50,75) percentage of infill models are 283.82%, 536.54%, 835.85% respectively.

CHAPTER 1

INTRODUCTION

1.1 GENERAL

The term "masonry infill" refers to the process of using masonry to fill openings in R.C. structural frames. In multistorey buildings, they are employed as exterior walls and interior partitions to constitute a portion of the building envelope. Typically, masonry infills are added to reinforced concrete structures without considering them to be a composite of brick and concrete elements, even though they actually function as a unit during earthquakes. The infills are important in increasing the overall structure's lateral rigidity [3].

When the gravity loads are applied, there is addition in the infills' self-weight. When exposed to seismic forces, an infill wall usually interacts with the frame. The strength gained from the masonry infills can improve the performance of structures; however, this strength gain also results in increase of the structure's initial stiffness, which may draw in more lateral inertia forces from earthquakes. The structures' strength and rigidity are significantly increased by the infill walls, and failure to maintain them will result in many failure of multi-storey buildings. Infills are generally not provided for all frame components because they depend on the functional and architectural requirements. According to the requirements for the provision of partitions, doors, and windows, infills are provided fully or with openings. The types of frames - bare frame, fully infilled frame, partial infilled frame and window opening in the infilled frame.

To build partial infill frames, the bare frame is filled with masonry of brick to a specific height along its entire length. In many different types of buildings, partial infilled walls are widely employed, with the incomplete height typically being attributed to window apertures. For example- Hospitals, Academic Institutions, Business Buildings, etc.

1.2 SHORT COLUMN EFFECT

As the name suggests, a column that is prevented from moving laterally over a portion of its height is known as a short column. This might happen if a column's lateral deformation is restricted over a portion of the column's height by non-structural features [21]. According to the historical experience of various earthquakes, structures with partially filled frames are negatively impacted. These walls are seen to play a paradoxical role in

increasing the lateral rigidity of the structure while also having a negative effect known as the "short column effect"[3]. A short column might experience substantial damage at the time of an earthquake if it is not properly built to withstand such a powerful impact. These short columns frequently sustain X-shaped cracking damage, which results from shear failure.

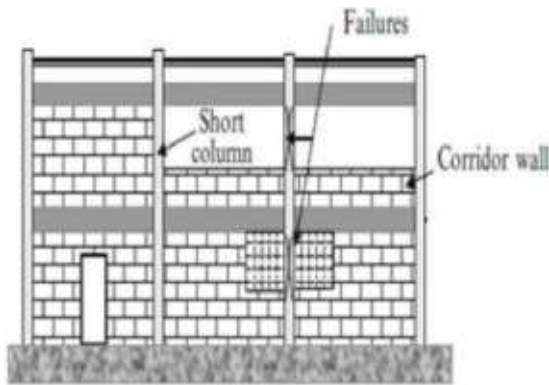


Figure 1.1: Short column [21]



Figure 1.2: Partial infilled wall - short column formed [21]

Causes for the formation of the short column are listed below.[21]

- The addition of partially-height walls between the columns to make room for slit windows that give in natural light. An example of this is when small windows are added to a basement wall that rises above ground level as shown in figure 1.2.
- Partial height walls are provided along the corridors.
- Foundations at various levels.
- A column's height is divided by a beam supporting a stair landing; or the addition of a mezzanine floor.

Some examples of building constructions that have suffered damage as a result of short column effect shown in the figure 1.3- figure 1.6. By looking at these photographs, the need to study on short column effect for lateral loading may be justified.



Figure 1.3: Shear failure in short column [20]



Figure 1.4: Partial infilled frame [3]



Figure 1.5: Short column failure [2]



Figure 1.6: Damaged column [3]

1.3 SHORT COLUMN BEHAVIOUR

Consider a partial height wall that is constructed to allow for a window to fill the rest height. As the walls are present, the adjacent columns function as short columns. Because there are no adjacent walls, other columns in the same storey are frequently of standard height. During an earthquake, the floor slab vibrates, displacing the upper ends of the columns. However, the rigid walls prevent the lower portion of a short column from moving horizontally and deform completely across the short height next to the opening of the window.[19]

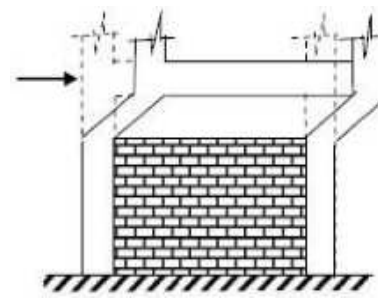
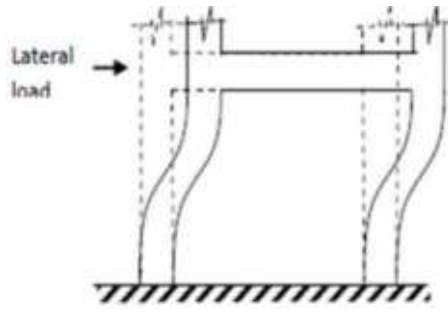


Figure 1.7: Lateral deformation in bare frame[3] **Figure 1.8:**Lateral deformation in partial infilled frame[3]

Over their entire height, regular columns are deformed. A short column provides more resistance to horizontal ground motion and attracts a greater force than a regular column since the effective height across which the column could freely bend is constrained (Figure 1.9). The entire column height is considered while calculating stiffness. The lowered column's lateral stiffness varies with the cube of their effective height ($12EI/L^3$ for both ends fully fixed). A column's stiffness, however, increases if it is later stiffened by deep spandrel beams, intermediate bracing, partial height infill walls, stairs, etc. This causes the column to attract stronger shear pressures, which can lead to shear failure.[21]

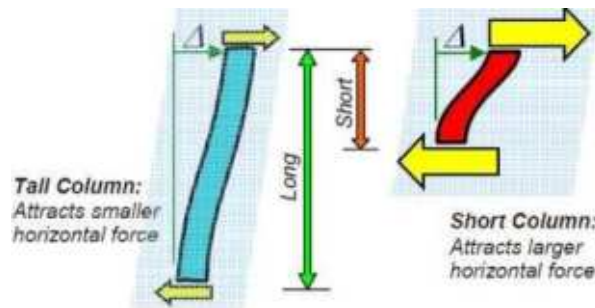


Figure 1.9: Short Column attract large lateral forces [19]

In comparison to the shear needed to produce a flexural yield in a full-length column, the shear needed to develop flexural yield in an effectively shorter column is significantly larger. Shear failure may begin before flexural yield and frequently fail in a brittle way if this influence of the infill is not taken into account.[20].

1.4 STRUCTURAL FORMS

Various structural forms have evolved and are commonly adopted to resist gravity and seismic forces. Few of the structural forms can be modified so as to reduce or eliminate the short column effect. A detailed study on such forms is required. Few such structural forms taken into consideration in the current study are discussed here.

1.4.1 ADDITIONAL INFILLS

It has been customary to fill the spaces between frame columns with inflexible, unreinforced masonry to create a building envelope. Even though the nonstructural masonry walls may have a lesser strength than the column, during lateral deformations, the resulting "nonstructural" walls frequently have enough stiffness to change the behaviour of the column. As a result of this type of building envelope's significant contribution to frame rigidity, drift. Since the nonstructural walls effectively restrict the lower portion of the column, damage to the short upper segment of the column typically occurs before the failure of confining wall.

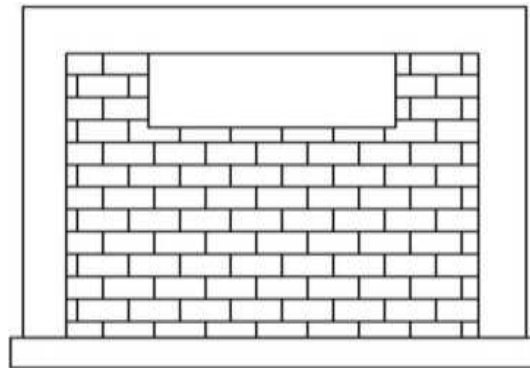


Figure 1.10: Additional infill frame

1.4.2 BRACING

When a structure is subjected to lateral loads, bracings are used. These bracing are resistive to earthquake forces and wind loads. They improve the structural strength. Here, the foundation receives the lateral loads from the bracing. Bracing creates a laterally very rigid construction with the least amount of weight addition. As a result, they are regarded as a particularly cheap structural type for buildings of any height.

Steel bracing improves the stiffness, strength, and bending capabilities of the R.C. multistorey construction. They increase the stability of the structure [22].

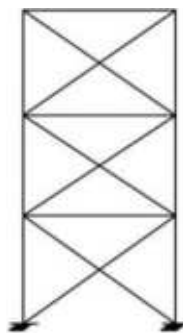


Figure 1.11: X-Bracing

The type of bracing adopted is based on the architectural requirements.

The bracing types are:

- a) Concentric type bracing: the ends of the diagonal brace join at the beam-column connection which creates a stiff frame.
- b) Eccentric type bracing: the ends of the diagonal brace joins at an offset from the connection between beam and column.

Of the various kinds of bracings, X bracings are frequently utilized.

It should be highlighted that the bracings are beneficial as they: avoid weak columns thereby increasing strength; Boost the building's stiffness and capacity. They don't require a lot of labor, offer the structure good stabilization, and are cost-effective.

1.4.3 SHEAR WALL

A shear wall is a structural element in reinforced concrete frame construction that resists lateral loads. They minimize lateral displacements and can sustain the majority of the lateral shear forces produced by earthquakes. To lessen the torsional loads, shear walls are normally symmetrically positioned in both directions in the building's layout. Shear wall systems are more cost-effective up to 35 stories and more rigid horizontally than rigid frames [23].

Shear wall systems are one of the most well-liked and dependable lateral load resisting techniques in medium- to high-rise buildings. Shear walls are substantially more earthquake resistant than columns. They are a component that resists lateral forces, sustains vertical loads, shear forces parallel to the length of the wall, and bending moments about the strong axis of the wall.

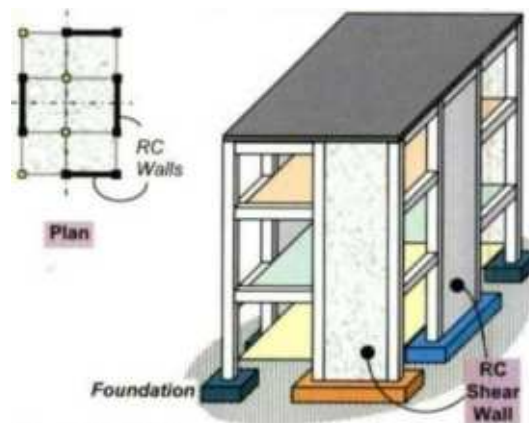


Figure 1.12: Shear wall

It can give the building the necessary strength and stiffness to withstand seismic and wind loads. It is commonly known that stiffer structures absorb more seismic forces as long as a good design is taken into account i.e. both strength and ductility [23]. Shear walls are divided into the following categories: plain rectangular kind and flanged walls, Coupled walls that shear, walls with a rigid frame, walls supported by columns, walls of the core kind.

Shear walls provide several benefits – Provides significant stiffness, stability, and strength in the direction of orientation, considerably lessens lateral sway, effective in reducing earthquake damage and is efficient in terms of cost of construction, Structural and non-structural damage is minimized.

1.4.4 COMPOSITE COLUMN

A composite column is a compression member which consists of concrete and structural steel. They are typically employed as a load-bearing part in a framed structure. Composite columns can support significantly more loads than conventional reinforced concrete columns because of the composite effect involved. Concrete and steel interact with one another through bond and friction to resist external loads.

The different types of R.C.-Steel composite columns that are commonly found are : Completely encased sections; Partially encased sections and; Concrete filled section.

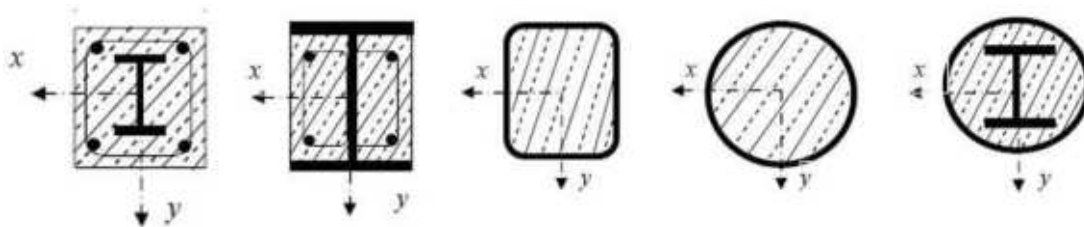


Figure 1.13: Types of composite column

Some of the advantages of composite sections are,

- They have a high load-carrying capacity for a given section dimensions
- They have high structural stiffness,
- There is exceptional ductility under powerful dynamic excitations,
- There is overall reduction in the weight of the structure.
- They are an economised building material.
- The concrete encased column shows good resistance against fire and corrosion protection.

CHAPTER 2

LITERATURE REVIEW

2.1 GENERAL

Studies on the short column effect have been investigated experimentally and through analytical models as the occurrence of such failures during earthquakes are severe. The various work on the short column effect in a multi-storey building located in earthquake prone regions is studied, and the brief review is presented here.

- **Alqatamin et.al. (2009)** This paper studies the response of short columns in R.C. buildings to seismic forces in buildings with intermediate floors, mezzanines, partial masonry infills, as well as buildings constructed on sloping ground. Further, suggests solution short column effect according to which in new buildings, extra care should be given during the architectural design stage and structural design by providing special confining reinforcement, and in existing buildings, strengthening measures such as retrofit techniques which are well-known should be employed.
- **Ismail Hakki Cagatay et.al. (2010)** To avoid short column effect, this research demonstrates an economical approach of placing segments of additional infill wall bounding the short column. A study is conducted out for a single-storey infilled frame with a number of bays ranging from one to five, using the number of spans and additional infill wall percentage bounding the short column as the parameters, to demonstrate the role of adding an infills in the effective reduction of the shear force in the short column. The investigation is broadened to include a case study of a G+1 building in Turkey that was damaged by the short column effect in the Adana-Ceyhan earthquake,1998. The findings demonstrate that adding additional infill walls to a structure is an efficient technique to reduce shear force.
- **P. M. Pradhan et.al. (2012)** This work represents the importance of interpreting partially filled frames. It summarises the results of various academic studies on how partially infilled frames behave under lateral loads. It is noticed that the structural strength is improvised by the addition of infills. To realise the combined action of the frame and masonry infill, it is necessary to fully comprehend the

contribution of partial infill walls while analysing models for real constructions. Furthermore, it is important to identify a strategy to model such structures to reduce the structure's earthquake risk. The ductile detailing might be provided to columns over their whole height that are prone to be subjected to the short column effect. Additionally, it underlines the necessity for more research on the short column effect.

- **Md Irfanullah et.al. (2013)** Analysis is on G+10 R.C.C. framed building is modelled using on ETABS to investigate the outcome of masonry infills on the bare frame, fully infill, soft ground floor, soft basement and infill in swastika pattern in the ground floor. The structural parameters, Base Shear, Storey displacement, inter storey displacement are considered. According to the results, the introduction of the infills improves the performance in terms of storey displacement and drift control.
- **Mohammed Tosif Ahmed et.al. (2014)** To understand the right procedure and impact of masonry infill panels, an analysis was performed on several models of G+10 R.C. framed buildings with the soft storey and shear walls. The equivalent double diagonal strut method and modelling of infill wall panels are carried out. According to the findings, the double diagonal strut has a greater value of storey drift and storey displacement than models with an infill panel. Also, the fundamental time period is reduced when the R.C. shear wall and the masonry infill stiffness are considered. It has been discovered that models with masonry infills show more strength and stiffness than double diagonal strut models, suggesting that masonry infill panels could be a useful way to simulate masonry infill.
- **Mohammad H. Jinya et.al (2014)** The paper's major goal is to make the building industry's analysis idea simpler. Additionally, carry out the static linear analysis and time history analysis of G+9 R.C.C. building using a single diagonal strut technique in using IS 1893:2002 and IS 456:2000, which are modelled in ETABS. In this instance, peripheral walls have varying percentages(15% and 25%) without strut and with strut of infill wall of centre openings. The factors considered in the current study are storey displacement, base shear, storey drift, and axial force with

and without soft stories while taking into account the effects of infill walls with various opening percentages. In this study, conclusions are drawn after discussing the outcomes of the bare frame, soft story, and infill wall panel. According to which the diagonal strut will impact the seismic performance in the R.C. building. There is an increase observed in axial force in the column and also due to the higher stiffness of infill the base shear increases, and storey drift and storey displacement decreases. Also, there is a reduction in the lateral stiffness due to an increase in percentage of opening.

- **Chidananda HR et.al. (2015)** Infill walls without openings, infill walls with central opening in the outer periphery and partial opening are all subject to analysis. Models of G+14 R.C. framed buildings are analysed in ETABS software using the Equivalent Static Lateral Force method and the Response Spectrum method using IS 1893: 2002, which includes p-delta effects. The criteria considered in this study include storey displacement, storey shear, and storey drift with soft storey. The strut width has been determined for modelling purposes using FEMA 273, utilising the equivalent diagonal strut approach. The P-delta effect results from the investigation revealed very little variance in which time period had considerable changes, and it might be taken into consideration for higher-storey buildings. The reduction is indicated on measurements for displacement due to the addition of infill whereas displacement is increased due to the openings.
- **Sristi Gupta et.al. (2016)** This research is a study of general seismic behaviour resulting from a change in level on sloping lots, particularly in hilly places. As a result of the increased rigidity of the structure, infill panels have a significant impact on the behaviour of frames under seismic events. When compared to an infilled frame, the bare frame has a larger deflection. Shear walls braced frames, and composite columns could also be useful in preventing excessive shear in columns.
- **Mehrzad Mohabbi Yadollahi et.al. (2016)** The influence of the infill wall on the formation of a short column at the G+3 military aid watchtower in Turkey was investigated. The collected data is compared to the consequence of earthquakes that have been seen following an earthquake. Structural drift and shear force are

among the parameters investigated. The results reveal that the insertion of infills reduces structural drift due to reduced column ductility, and the presence of infills increases the shear force in the short column, causing the structure to fail. Due to partially infilled structures, incorrect shear flow during lateral loads will damage the short column, resulting in structural failure.

- **Md. Rokanuzzaman et.al. (2017)** An Analysis of G+15 model is carried out by using the equivalent static method in ETABS 9.6.0. Models without shear wall and with shear wall at the central portion on the periphery sides and with shear wall at corners in the form of L-shape are considered. The parameters considered are base shear and displacement under lateral loading. According to the results, the model with a shear wall placed at the central portion on the periphery sides performs better.
- **Rakshith K L et.al. (2017)** An investigation of G+9 regular and vertically irregular buildings, both with and without bracing systems, was carried out. A response spectrum analysis for the models that use different bracing strategies are employed. The results of ETABS in terms of displacement, storey shear, storey drift in seismic zones III and V are considered. In R.C. frame construction with different kinds of bracing systems, displacement and storey drift are reduced, while base shear increases. When X-bracing is compared against regular R.C. frame and irregular R.C. frame systems, it is proven to perform better.
- **Mouzzoun Mouloud et.al. (2019)** The strut model is used in the study to analyse the seismic response of multistorey R.C. frames with masonry infill and capture the overall impact of the infill. The seismic behaviour of two eight and ten-storey R.C. Building models have been assessed using nonlinear pushover analysis in ETABS20. The outcomes of numerical simulations demonstrate that the infill walls significantly impact the seismic response. It would not be prudent to avoid these impacts, and these factors should be considered while designing and evaluating seismic systems. The reinforced concrete frame's time period with bare frames is decreased by the use of infill panels. A bare frame idealisation results in an overestimation of natural periods and an underestimating of the design lateral forces. Pushover analysis findings indicate that the infilled frame has greater

energy dissipation, initial stiffness and strength, than the bare frame. Under various earthquake intensities, it was found that entirely masonry infill panels performed noticeably better than the bare frame.

- **Sachin Patel et.al. (2019)** In the present study, a method is developed in which seismic analysis of R.C. frame structures is carried out while complete infills, without infills, and partially infills are all taken into consideration. Software called STAAD PRO is employed in this investigation. In this study, linear static analysis in zone IV is utilized to examine floating column constructions with and without bracing systems and infill walls under seismic parameters as per IS-standards in STAAD PRO. From the analysis above, the following conclusions are made: An increase in lateral stability of the structure is demonstrated by infill wall structure, which aids in resisting high storey displacement and huge storey drift.
- **Preetha V et.al. (2020)** The linear static and response spectrum analysis of a G+10 building with a R.C.C. column, an encased column, and an infilled rectangular tube is performed in ETABS. The study's characteristics include displacement, storey drift, and time period. According to the findings, storey shear and storey drift decrease in the composite column, the time period is reduced in the R.C. column, and storey displacement increases in the composite column.

2.2 SUMMARY AND LITERATURE GAP

Numerous research has been done to understand the behaviour of masonry infills. It was noted that the buildings with partial in-filled masonry frames undergo short column effect. To understand the behaviour of the structure undergoing short column effect it is important to rightly represent the masonry in-fills in the building model. Therefore, masonry infills are modelled as panels. In order to mitigate the short column, effect the addition infill walls around short column are provided in above research papers. In the present study an attempt is made to study various other methods to mitigate this short column effect.

CHAPTER 3

PROBLEM STATEMENT, OBJECTIVES & SCOPE OF THE STUDY

3.1 PROBLEM STATEMENT

From the reference of various above papers, we understand the behavior of masonry infills in the structures under the action of seismic forces. The papers conclude that the partial infilled frames undergo short column effect. As there is reduction in the height of column due to partial infills there is increase in the stiffness. When this column deforms laterally under seismic forces they attract larger shear forces. Therefore, it becomes necessary to understand the behaviour of such column and reduce the shear force in them. Hence in the present study, it is attempted to reduce the shear forces in partial infilled columns affected by short column effect.

3.2 OBJECTIVES

With the main objective to reduce the shear in the column affected by **short column effect**, the following objectives are framed:

1. To model RC bare-frame and frame with masonry infills of varying height using ETABS20.
2. To assess the short column effect in RC bare-frame building and building with masonry infills of varying height.
3. To evaluate and compare the performance of the following structural forms in mitigating the short column effect in buildings with masonry infills of varying height.
 - i. Additional infills adjoining the short column
 - ii. RC frame with bracing
 - iii. RC frame and shear-wall structure
 - iv. Composite column construction

3.3 SCOPE OF THE STUDY

The analytical study is carried out on building frames with masonry infills. Masonry infills are modelled as panels instead of representing the masonry by diagonal strut method. The plan area of 20m x 20m having G+7 stories using ETABS20. The building with additional infills adjoining the short column, bracings, shear wall and composite column construction were modelled and analyzed. The parameters evaluated in the present study are Shear force in column, Storey shear, Base shear, Storey Displacement, Storey Drift and time period parameters are evaluated.

3.4 ORGANISATION OF THE DISSERTATION

- Chapter one titled “Introduction” consists of an introduction to the topic.
- Chapter two titled “Literature review” consists of work done on the masonry infills, short column effect, additional infills, bracing, shear wall and composite column by researchers composed from diverse journals.
- Chapter three is “Problem Statement, Objectives and Scope of study” which includes problem statement, objectives, scope and organisation of the dissertation
- Chapter four is “Methodology” describes the problem, the approach followed, Seismic Analysis using software, loading parameters, Measures/structural forms investigated.
- Chapter five is “Modelling and Analysis” deals with the procedure for modelling and analysis used in the study.
- Chapter six “Results and Discussion”
- Chapter seven “Conclusions” deals with the final concluding remarks.

CHAPTER 4

METHODOLOGY

4.1 GENERAL

With the objective to study the behaviour and to mitigate the short column effect, an analytical study was taken up on partially infilled masonry frames. The analytical study is carried out on a building frame with plan area 20m x 20m with G+7 stories using ETABS20.

ASSESSMENT OF SHORT COLUMN EFFECT:

To evaluate the short column effect in buildings with partially infilled masonry, R.C. frame buildings with 25, 50 and 75 percentage of infills are investigated. The partial infills were considered on outer periphery of the building

Since it is difficult to predict the failure of a structure due to the short column effect, however the short column effect can be assessed by the shear force in the column members. In the present study Shear force in column, Storey shear, Base shear, Storey Displacement, Storey Drift and time period parameters are evaluated.

MITIGATION OF SHORT COLUMN EFFECT

A building with infill walls of varying height, is vulnerable to the short column effect. Elimination or reduction of short column effect in such buildings is very challenging and various methods have been suggested.

In the present study, various measures of modifying the structure such as additional infills adjoining the short column, bracings, shear wall and composite column construction are studied.

The extent of mitigation of each type is evaluated and results compared with respect to the various parameters i.e., Shear force in column, Storey shear, Base shear, Storey Displacement, Storey Drift and time period parameters are evaluated.

4.2 SEISMIC ANALYSIS:

The seismic analysis as per IS:1893-2016 is done by Response Spectrum method and the parameters considered for the the study include shear force, storey shear, base shear, storey displacement, storey drift and time period. The Equivalent static method evaluates the

linear seismic behaviour of the building. The linear static method is used for regular structures where height is limited. It is the simplest method with less computations as per IS:1893-2016. It can be applied for regular buildings with height less than 15m in the seismic zone II. In the present study, the building is 24 m and is located in seismic zone IV. Hence, the linear static method cannot be applied. Hence, linear dynamic analysis is carried out. The linear dynamic analysis is performed by response spectrum method (mode superposition method). The response spectrum method plots the response of the structure for displacement, velocity and acceleration.

4.3 ETABS20

General-purpose civil engineering software ETABS20 is excellent for structural system analysis and design. A practical and user-friendly object-based modelling environment that streamlines and simplifies the engineering process can be used to model, analyze, design, and optimize basic and advanced systems, spanning from 2D to 3D, of simple geometry to complex.

As part of the modelling process, ETABS20 is used for gravity and lateral load analysis in accordance with the IS codes that are available. Here, an effort is made to comprehend how partially infilled masonry frames behave and reduce the Short Column effect that develops in them as a result of the accumulation of significant forces in the column.

After analysing the structure by adding gravity and lateral loads with the proper load combination, Excel is used to represent the graphs and results of shear force in column, storey shear, base shear, storey displacement, storey drift and time period.

4.4 LOADING PARAMETERS

The loads on the structure include gravity and seismic loads. The load consideration for the structure is carried out in accordance with IS:875(part I, part II), IS:1893-2016. Here, load combinations are incorporated for design as per IS:1893-2016.

4.5 MEASURES / STRUCTURAL FORM INVESTIGATED

Various structural forms have evolved and commonly adopted to resist gravity and seismic forces. Few of the structural forms can be modified so as to reduce or eliminate the short column effect. A detailed study on such forms is required. Few such structural forms considered in the present study are discussed here.

4.5.1 ADDITIONAL INFILLS ADJOINING THE SHORT COLUMN

Here, In the study an additional infill of length of 20% of the bay length is considered referring to a literature. The additional infills are provided adjoining the column of partial infilled frame models with varying height of masonry infill in the outer periphery as shown in Figure 3.8, 3.12, 3.16.

It is seen that, though the masonry do not have strength as much as the columns they still have enough strength to impact the column behaviour during seismic tremors. It is known that the masonry infills improve the stiffness of the structure, here their contribution for the same in the models with partial infilled frame are checked.

4.5.2 R.C. FRAME WITH BRACING

In this study, X- bracings are offered for the models with partially infilled frames with varied infill heights in the alternative bay in both the X and Y directions. By using the trial-and-error process, the bracing section selected are ISA 130x130x12 and ISA 150x150x12. As far as lateral load resisting systems go, bracing is acknowledged to be one of the most popular techniques. It can be observed that bracing increases column strength since it connects at the joints where the beam and column intersect, improving the overall stiffness of the frame. It is also a cost-effective solution since it offers good resistance even with only a slight increase in the structure's weight.

These bracing system characteristics were some of those discovered to be beneficial in lowering the high shear force concentration seen in the columns of the partial infilled frames as a result of the short column effect on the structure's outer periphery.

4.5.3 R.C. FRAME AND SHEAR - WALL STRUCTURE

In this study, shear wall of 180 mm was placed orthogonally in both X and Y direction in the central bay. The shear wall is assigned as a shell element. And is provided with reinforcement in both the direction i.e. longitudinally and transversely. It is the most used lateral load resisting system and it efficiently transfers load to foundation. It improves the building's serviceability factor. The shear wall functions as a form of fuse, delaying the column's failure.

Therefore, the shear wall are used to check the effectiveness against the reduction of large accumulated forces in the short columns in the models with partial infilled frames with varying height of infills on the outer periphery.

4.5.4 COMPOSITE COLUMN CONSTRUCTION

In this study All the R.C.C columns are substituted by steel concrete composite column. The sectional dimensions of the column are reduced from 450x450mm to 380x380mm with encasement of structural steel section of ISMB 300.

The composite sections have good ductility which helps the structure to undergo larger deformations without any failure, stiffness helps in limiting the demands of deformation in the structure and are known for the better overall performance of the structure.

Therefore, in order to check the improvement in resistance against the larger forces attracted in the short columns the composite columns are used.

CHAPTER 5

STRUCTURAL MODELLING AND ANALYSIS

5.1 DESCRIPTION OF STRUCTURE:

The aim of the present study is to develop and evaluate a 3D model on an eight-storey building with a symmetrical layout in the X-Y direction using the ETABS20 software. The model does not depict any specific real-world construction that has been designed or constructed. However, the dimensions and other features were chosen to depict a building where it would be simple to study the masonry in-fills. The storey height under consideration is 3 m. Models considered include bare frames, frames entirely filled with masonry infill, and frames partially filled with masonry in-fills (i.e., 25%, 50%, or 75%) on the outer periphery.

In the present study R.C. frame building is considered having 8 stories with a total height of 24m and of plan size 20m x 20m. The height considered for each storey is 3m. The frames are placed in 4m x 4m bays, having 5 nos. of bays in each orthogonal direction. A foundation level of 1.2m below the ground is considered. The supports are assigned to be fixed. Analysis carried out are equivalent linear static analysis and response spectrum analysis (mode superposition method). The study takes into account the loads caused by gravity and earthquakes.

An important objective of the present study is to study different structural forms to reduce the short column effect, and accordingly, the partial in-filled frames with Additional in-fills, Bracings, Shear Wall and Composite Column respectively are modelled to reduce the large forces attracted in the partial in-filled frames due to short column effect.

For the basic building model, a beam of size of 300 mm x 450mm, and column size of 450mm x 450mm and a Slab thickness of 150 mm is considered. The masonry are modelled as shell elements with a thickness of 230mm.

For the braced frame, the bracings considered are ISA 130x130x12 and ISA 150x150x12 as per the requirement. Shear force reduction for the various sections of bracing are checked initially. Similarly, for the RC frame shear-wall, the shear wall are was checked from a minimum value of 150mm as per the IS code and the section provided is 180mm, orthogonally in the central bay of the RC building. For the Composite Column structural form, the composite column made up of ISMB300 encased in a concrete section of 380mm x 380mm was examined as it is one of the commonly used sections.

5.2 PROPERTIES OF MASONRY IN-FILL

As the masonry panels are modelled, it is crucial to understand the precise properties that must be entered in order for them to function as they would in reality.

According to IS 1893(part1):2016, the modulus of elasticity of the infill is given by

$f_m = 550f_m$ where, f_m is the compressive strength of masonry prism (IS 1905-1987),

$$f_m = 0.433f_b^{0.64}f_{mo}^{0.36}$$

f_b = Compressive strength of brick

f_{mo} = Compressive strength of mortar

Table 5.1 : Input values in ETABS20

Density of brick infill	20 KN/m ³
Compressive Strength of brick, f_b (IS:1077-1992)	7.5 N/mm ²
Compressive Strength of mortar, f_{mo} (IS:1905-1987)	3 N/mm ²
Compressive Strength of masonry, f_m (IS:1893-2016)	2.335 N/mm ²
Modulus of elasticity of brick infill, E_m (IS:1893-2016)	1284.25 N/mm ²
Shear Modulus, G	513.7 N/mm ²
Grade of concrete	M25
Grade of steel	Fe 500

5.3 MODEL CONFIGURATION

The structural models with the following variations are investigated.

A) Basic models of building with infill wall

Model 1 - Bare frame [BF]

Model 2 - Fully in-filled frame [F-IF]

Model 3 - 25% Partially in-filled frame [P-IF-25]

Model 4 - 50% Partially in-filled frame [P-IF-50]

Model 5 - 75% Partially in-filled frame [P-IF-75]

B) Models of buildings with additional in-fills adjoining the column

Model 6 - 25% Partially in-filled frame with additional in-fills adjoining the column [P-IF-25-AI]

Model 7 - 50% Partially in-filled frame with additional in-fills adjoining the column [P-IF-50AI]

Model 8 - 75% Partially in-filled frame with additional in-fills adjoining the column [P-IF-75AI]

C) Models of buildings with bracings

Model 9 - 25% Partially In-filled Frame with Bracings [P-IF-25-B]

Model 10 - 50% Partially In-filled Frame with Bracings [P-IF-50-B]

Model 11 - 75% Partially In-filled Frame with Bracings [P-IF-75-B]

D) Models of buildings with shear wall

Model 12 - 25% Partially In-filled Frame with Shear Wall [P-IF-25-SW]

Model 13 - 50% Partially In-filled Frame with Shear Wall [P-IF-50-SW]

Model 14 - 75% Partially In-filled Frame with Shear Wall [P-IF-75-SW]

E) Models of buildings with composite column

Model 15 - 25% Partially In-filled Frame with Composite Column [P-IF-25-CC]

Model 16 - 50% Partially In-filled Frame with Composite Column [P-IF-50-CC]

Model 17 - 75% Partially In-filled Frame with Composite Column [P-IF-75-CC]

Here are some of the views of the R.C building models which are modelled and analyzed in ETABS20

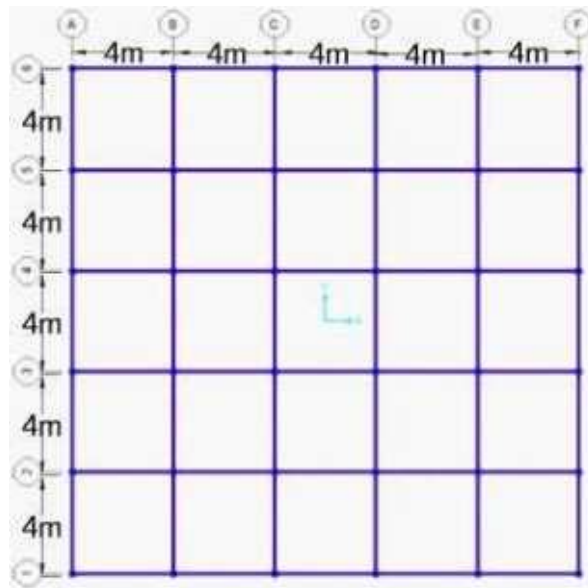


Figure 5.1: Plan of the building

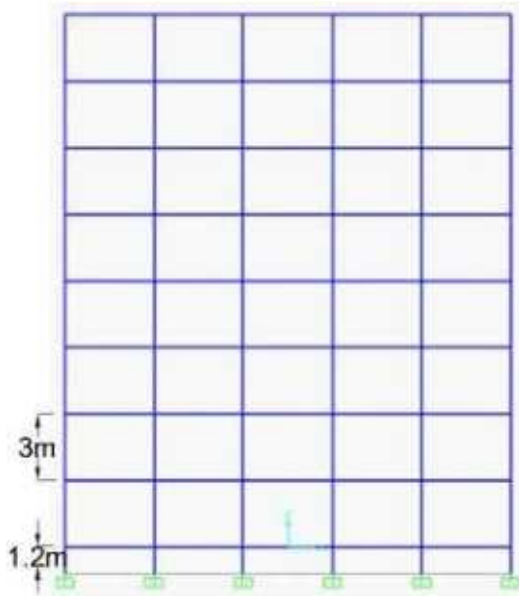


Figure 5.2: Elevation of the bare frame model

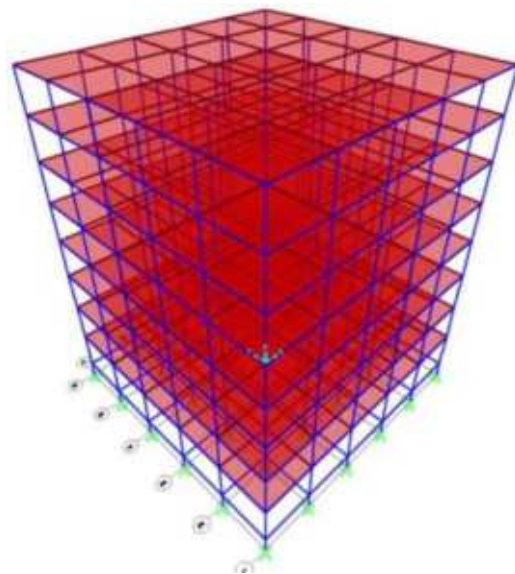


Figure 5.3: 3D View of the bare frame model

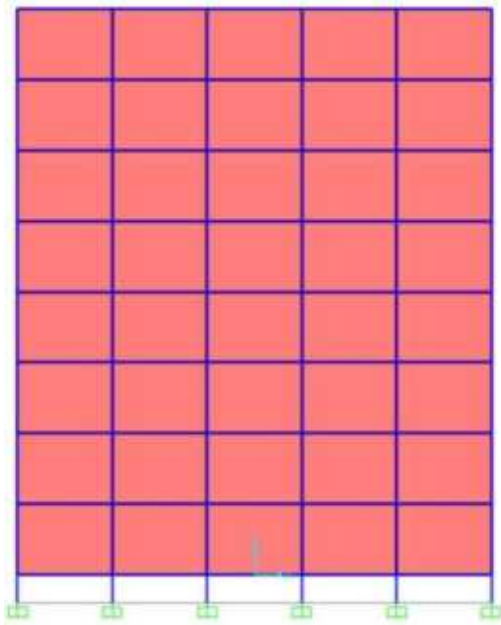


Figure 5.4: Elevation of fully infill model

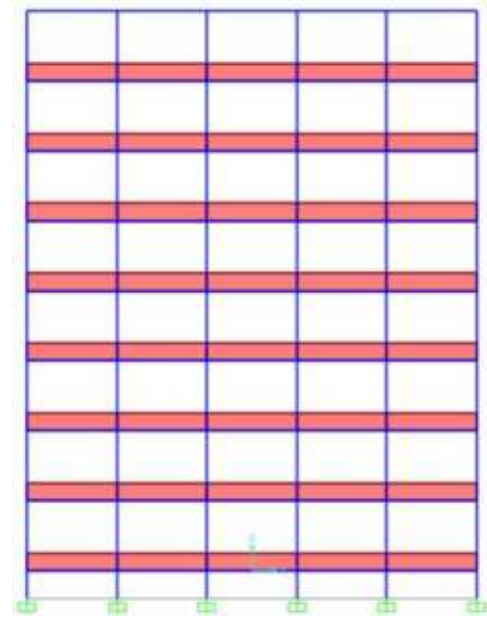


Figure 5.5: Elevation of 25% partial infill model

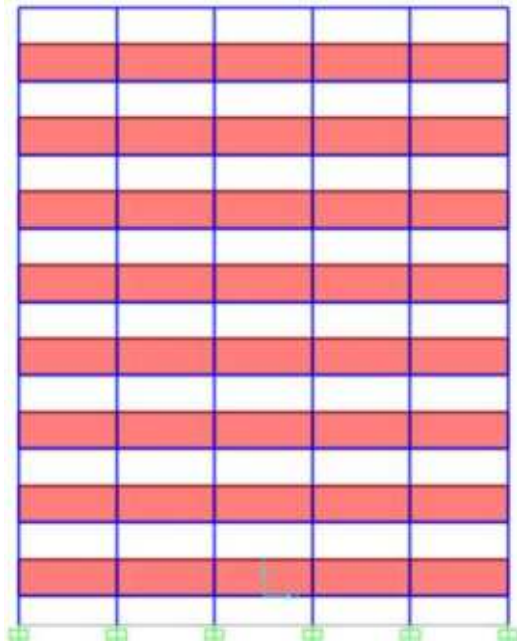


Figure 5.6: Elevation of 50% partial infill model

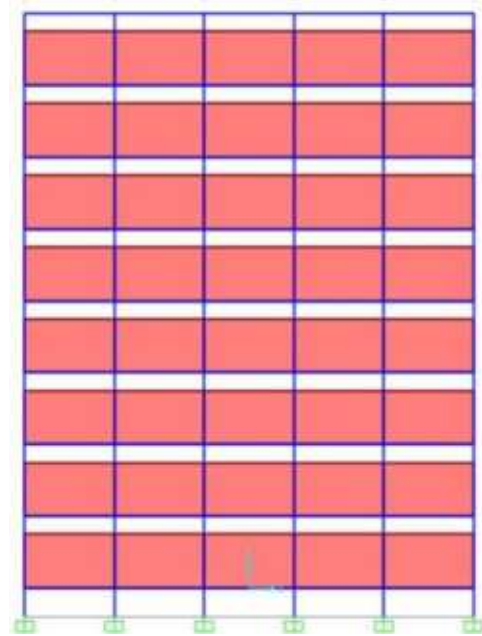


Figure 5.7: Elevation of 75% partial infill model

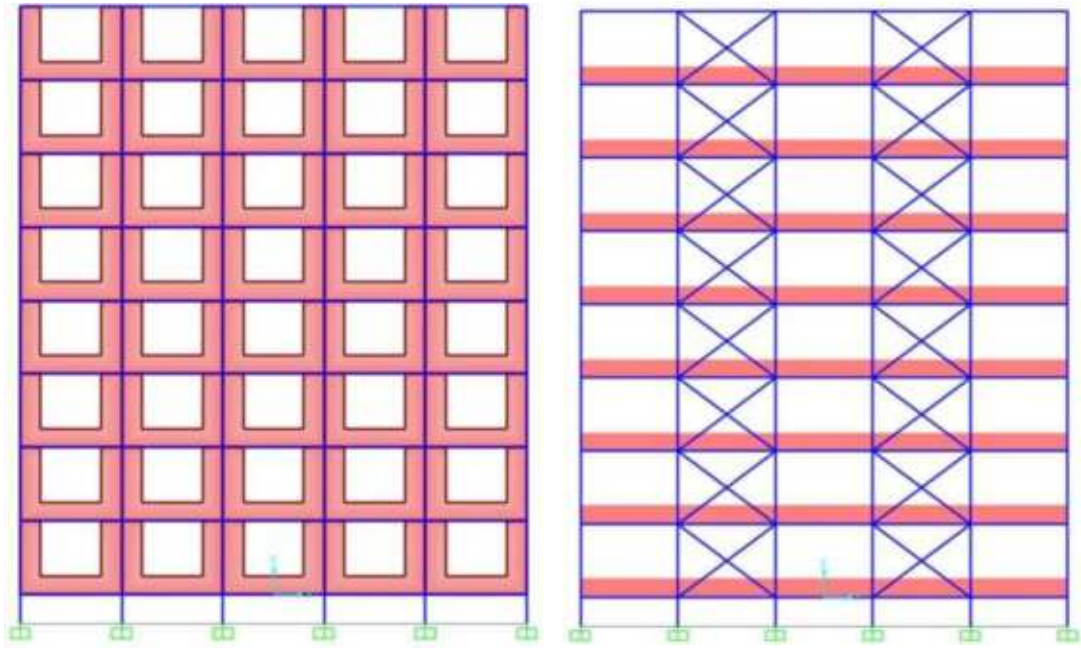


Figure 5.8: Elevation of 25% Partially in-filled frame with additional in-fills adjoining the column

Figure 5.9: Elevation of 25% Partially in-filled Frame with Bracings

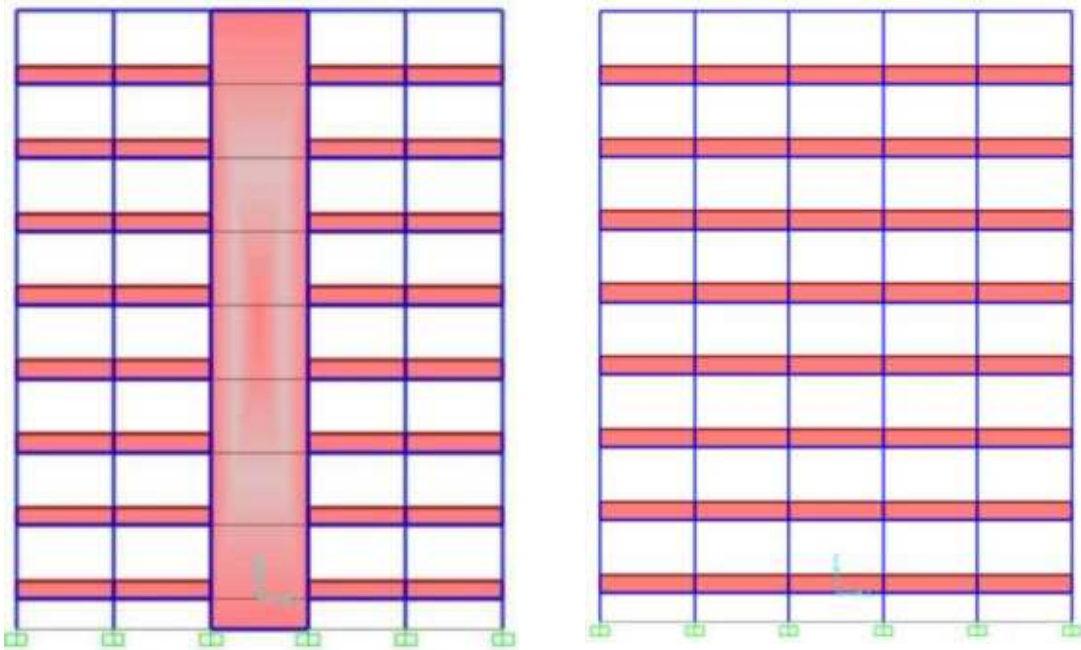


Figure 5.10: Elevation of 25% Partially in-filled frame with shear wall

Figure 5.11: Elevation of 25% Partially in-filled frame with composite column

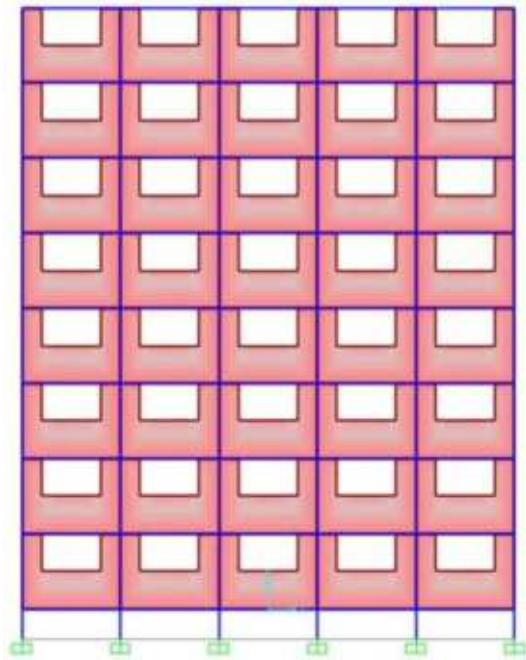


Figure 5.12: Elevation of 50% Partially in-filled frame with additional in-fills adjoining the column

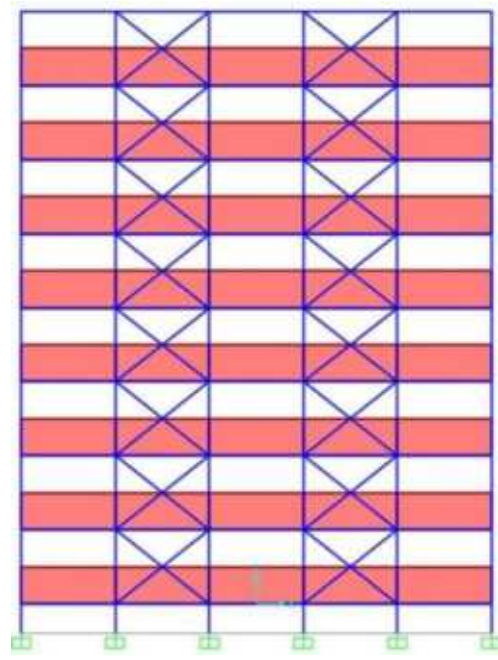


Figure 5.13: Elevation of 50% Partially in-filled Frame with Bracings

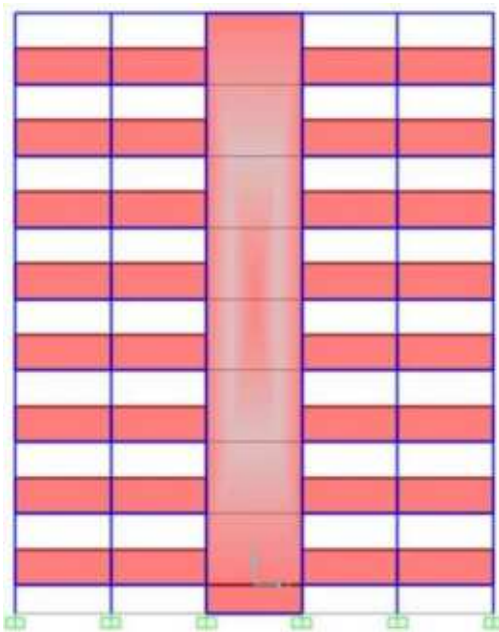


Figure 5.14: Elevation of 50% Partially in-filled frame with shear wall

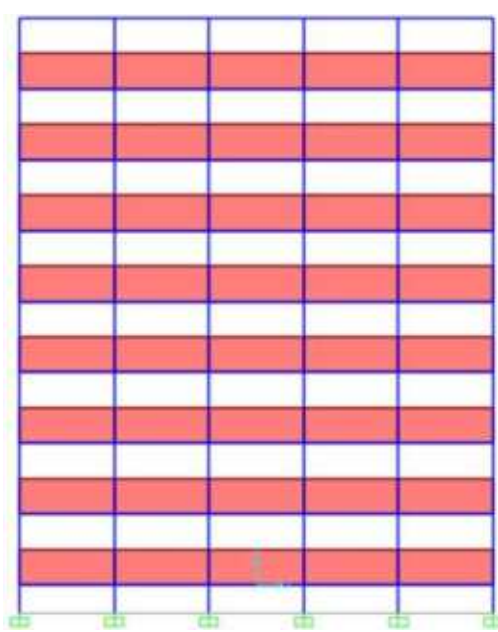


Figure 5.15: Elevation of 50% Partially in-filled frame with composite column

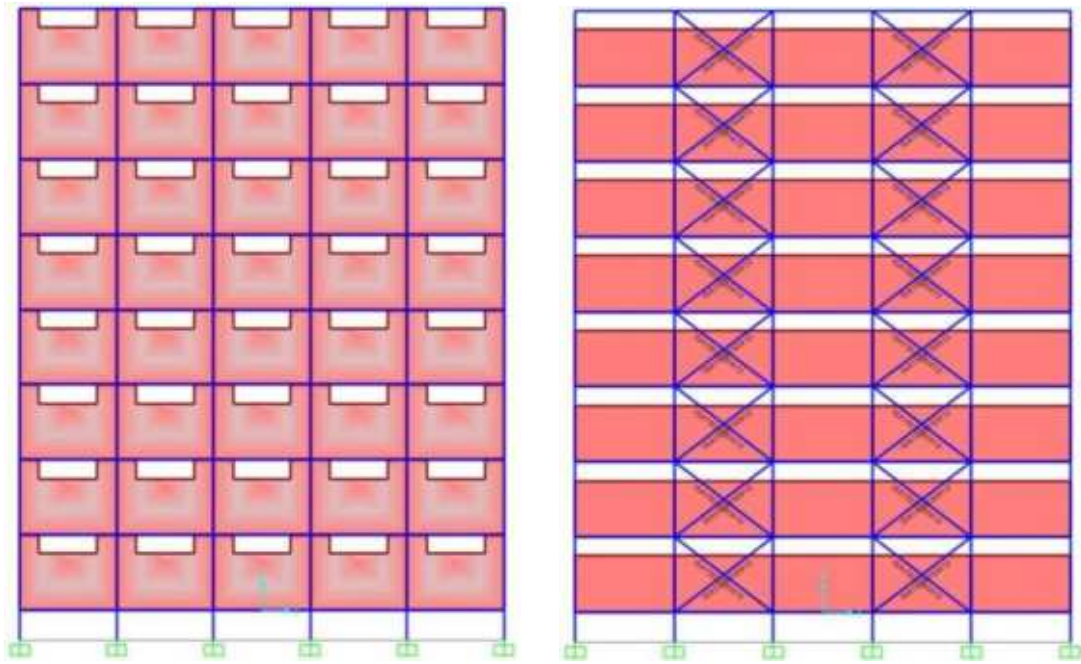


Figure 5.16: Elevation of 75% Partially in-filled frame with additional in-fills adjoining the column

Figure 5.17: Elevation of 75% Partially in-filled frame with bracings

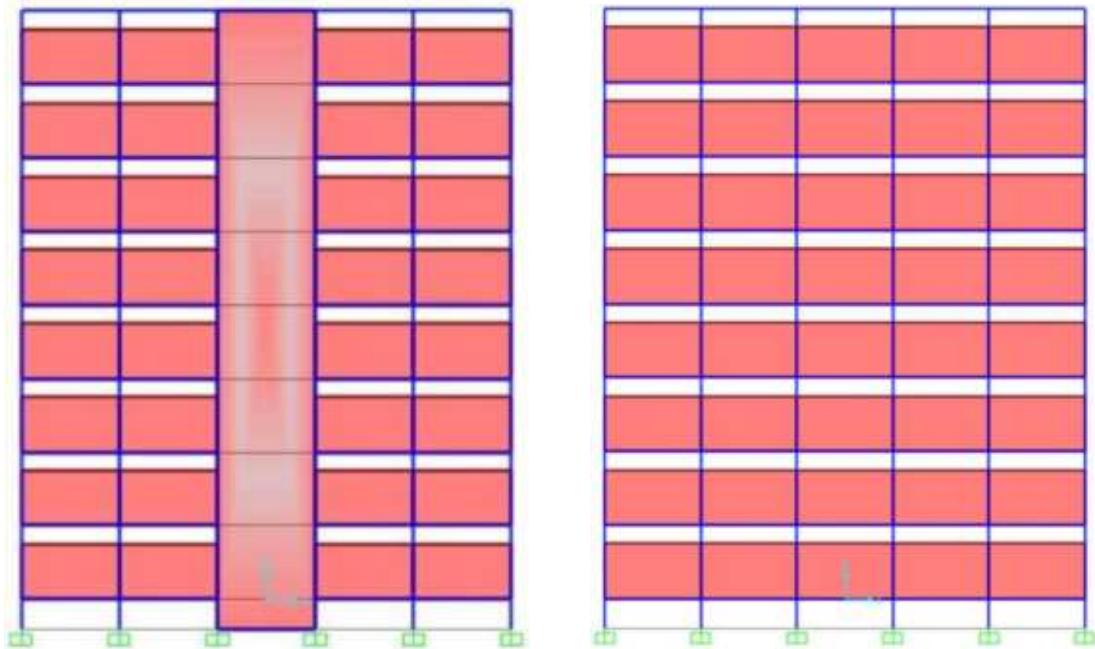


Figure 5.18: Elevation of 75% Partially in-filled frame with shear wall

Figure 5.19: Elevation of 75% Partially in-filled frame with composite column

5.4 LOAD COMBINATION

The loads acting on the structure include gravity and seismic loads. The load consideration for the structure is carried out in accordance with IS:875(part I, part II), IS:1893-2016. Here, load combinations are incorporated for design as per IS:875 (part V). The dead load of the structure is assessed according to the self-weight and floor finish of the structure. Self-weight of the structural members is computed by the software itself.

Table 5.2: Loads considered

1	Dead Load (Floor Finish) - 1 KN/m ²
2	Live Load - 3 KN/m ²
3	Earthquake X
4	Earthquake Y
5	Response Spectrum X
6	Response Spectrum Y

5.5 SEISMIC ANALYSIS:

The Equivalent static method evaluates the linear seismic behaviour of the building. The linear static method is used for regular structures where height is limited. It is the simplest method as it requires less computations as per IS:1893-2016. It can be applied for regular buildings with height less than 15m in the seismic zone II. In the present study, the building is 24 m and is located in seismic zone IV. Hence, the linear static method cannot be applied. Hence, linear dynamic analysis is carried out. The linear dynamic analysis is performed by response spectrum method (mode superposition method). The response spectrum method plots the response of the structure for displacement, velocity and acceleration.

By using a scale factor (SF), the acquired response spectrum values must be transformed to the particular set of units utilized throughout the model. The scale factor in the first run should have the value $SF = I \cdot g / (2R)$, where I is the importance factor, R is the response reduction factor. The base shear should be checked after the first run, and if it is less than the minimum value specified by the code, then increase the scale factor of the first run until the resulting base shear complies with the code's requirements.

The parameters considered in the study are shear force in the column, storey shear, base shear, storey displacement, storey drift and fundamental time period.

Table 5.3: Seismic consideration

Seismic Zone	IV
Seismic Zone Factor, Z	0.24
Importance Factor, I	1.2
Response Reduction Factor, R	5
Soil Type	II (Medium)
Damping ratio	5%

CHAPTER 6

RESULTS AND DISCUSSION

After the analysis of the models for the specified building, the performance of each model was assessed based on six different parameters: the shear force in the column, storey displacement, storey drift, base shear, storey shear, and the time period of the structure. The comparison of parameters was made on the basis of the maximum response of the structure. This chapter provides a brief review of the findings from response spectrum analysis for the specified building models with partial infills as well as the various mitigation approaches used.

6.1 RESULTS FOR BASIC MASONRY INFILL MODELS

6.1.1 SHEAR FORCE IN THE COLUMN

Seismic forces in terms of shear force in each column, at the base and every story level, are considered important parameters in the seismic design stages. The obtained values of shear forces considering and ignoring the effect of different percentages of masonry infill walls with different techniques are presented. The values of shear force presented indicate the maximum shear obtained in the columns. Also, it is noted that the maximum shear force in all the cases is observed in the ground story.

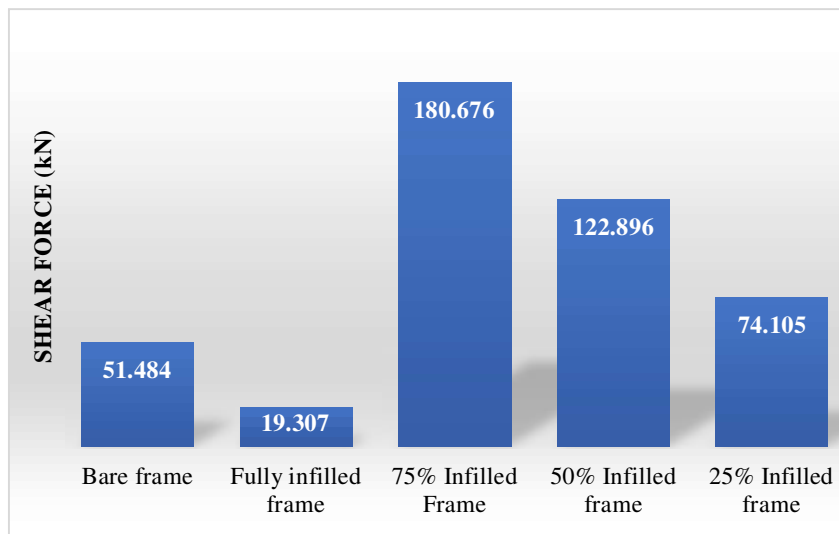


Figure 6.1: Shear Force variation for different percentages of masonry infills

The results show that the completely infilled model has a 62.49 % lower shear force than the model with no infills. In comparison to the fully infilled model, the shear force has increased by 283.82%, 536.54 %, and 835.85 % for the 25%, 50%, and 75% infilled models, respectively.

Now, in the models where the masonry percentage is reduced, there are significant forces concentrated into the columns as a result of the column's restriction to lateral deformation due to the partial confinement of the masonry wall. The rigidity of the columns increases as the overall height of the column decreases. The lowered column's lateral stiffness varies with the cube of their effective height. It is important to reduce such force concentration in the column.

6.1.2 STOREY SHEAR AND BASE SHEAR

The storey shear is the sum of design lateral forces at all the levels above the considered storey. Base shear is the calculation of the maximum lateral force that is anticipated to occur on a structure's base as a result of ground motion during an earthquake. The ground begins to move as a result of seismic activity. The ground's movement causes a lateral force to be generated in the opposing direction of motion. Base shear refers to the lateral force produced by seismic motion at the base of the structure.

Buildings are designed for base shear values. The building is constructed so that it can withstand lateral loads or earthquake-related loads equal to the base shear of the structure. The structure collapses as a result of lateral force that exceeds base shear.

The variation of storey shear and base shear for basic models is tabulated in Table 6.1 and is graphically represented by Figure 6.2 and Figure 6.3.

Table 6.1: Storey Shear variation for models with different percentages of masonry infills

Storey Level (m)	Bare frame	Fully infilled frame	75% infilled frame	50% infilled frame	25% infilled frame
0	1534.410	6034.010	5795.430	5557.160	5318.720
3	1458.869	5976.842	5742.006	5506.448	5270.354
6	1345.364	5814.682	5588.474	5360.661	5131.581
9	1205.994	5489.236	5278.842	5066.026	4851.221
12	1045.003	4944.198	4758.881	4570.609	4379.839
15	854.840	4123.263	3974.362	3822.477	3667.998
18	623.388	2970.126	2871.056	2769.696	2666.263
21	333.879	1428.480	1394.734	1360.333	1325.196

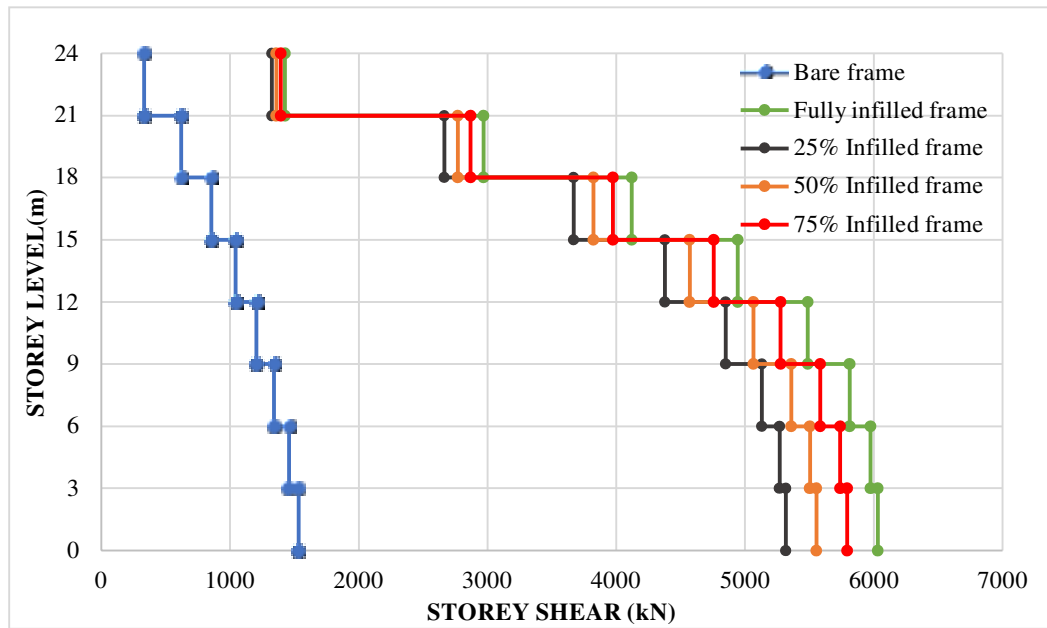


Figure 6.2: Storey shear variation for different percentages of masonry infills

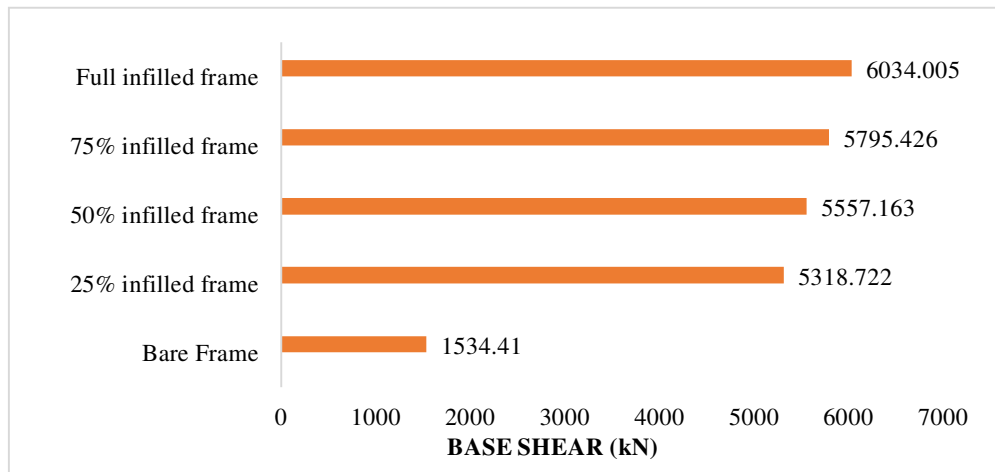


Figure 6.3: Base shear variation for different percentages of masonry infills

From the findings of the model with variation in the percentage of masonry infills in the outer periphery only it is noted that the base shear is minimum for the bare frame model and maximum for the model where there is complete inclusion of the masonry in the frame. The base shear goes on increasing as the percentage of the masonry infills is increased. It increases by 74.57% after the inclusion of the masonry infills.

The base shear reduces by 11.85% for 25% infilled frame, 7.90% for 50% infilled frame, 3.95% for 75% infilled frame when compared to the fully infilled model.

6.1.3 STOREY DISPLACEMENT AND STOREY DRIFT RATIO

It is important to take the storey's deflection in relation to the structure's foundation into account. It depends on how rigid the structure is. As stiffness increases, less displacement will be produced in the building and vice versa. As we proceed further up the structure, we can anticipate increasing total displacement values.

The lateral displacement of the adjacent stories in relation to the storey height is known as "storey drift." A storey drift ratio is defined storey drift divided by the storey height. The variation of storey displacement and storey drift ratio for basic models is tabulated in Table 6.2 and Table 6.3 which is graphically represented by Figure 6.4 and Figure 6.5.

Table 6.2: Storey Displacement for models with variation in percentage of masonry infills

STOREY LEVEL (m)	Storey Displacement (mm)				
	Bare Frame	25% Infilled Frame	50% Infilled Frame	75% Infilled Frame	Fully Infilled Frame
0	0.434	0.364	0.348	0.326	0.562
3	3.986	2.18	2.045	1.907	1.912
6	8.279	3.778	3.567	3.301	3.245
9	12.589	5.373	5.077	4.689	4.586
12	16.706	6.949	6.568	6.062	5.912
15	20.458	8.439	7.975	7.361	7.171
18	23.651	9.765	9.226	8.519	8.295
21	26.066	10.84	10.237	9.459	9.212
24	27.535	11.589	10.937	10.115	9.854

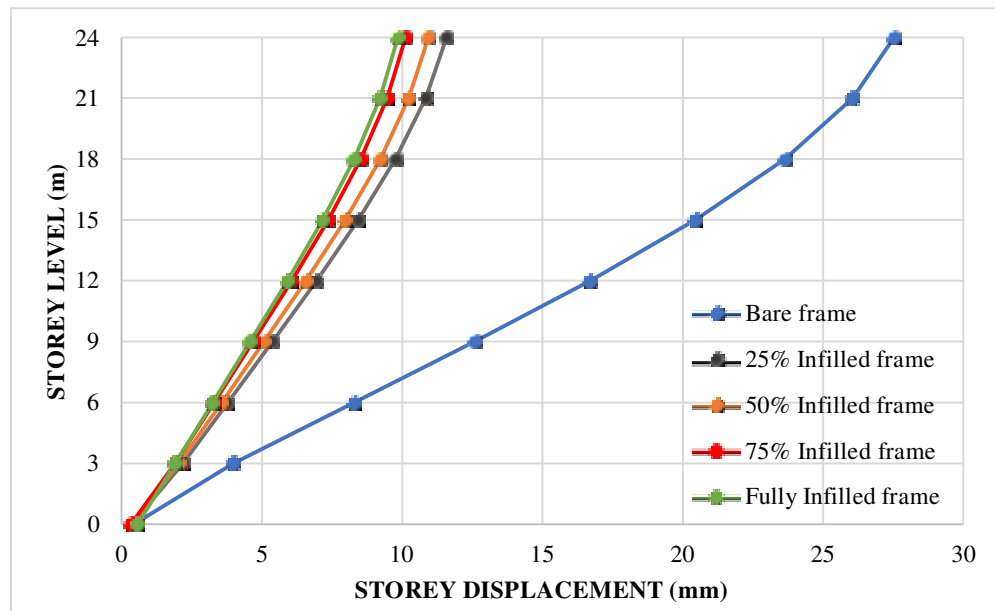


Figure 6.4: Storey Displacement variation for different percentages of masonry infills

From the above findings, it is clear that the displacement in the bare frame model is greater than the models with various infill percentages. Additionally, the model with a fully infilled frame has least displacement as the infills provide enough stiffness. Since the other models' infill percentages have decreased (i.e., for 25%,50%,75% partial infilled frames), it is seen that the displacement is increasing in comparison to the model with fully infilled frame.

Table 6.3: Storey Drift ratio for models with variation in percentage of masonry infills

STOREY LEVEL (m)	Storey Drift Ratio				
	Bare Frame	25% Infilled Frame	50% Infilled Frame	75% Infilled Frame	Fully Infilled Frame
0	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.001184	0.000916	0.000721	0.000480	0.000450
6	0.001431	0.000986	0.000756	0.000501	0.000444
9	0.001437	0.000973	0.000750	0.000500	0.000447
12	0.001372	0.000934	0.000727	0.000491	0.000442
15	0.001251	0.000857	0.000673	0.000462	0.000420
18	0.001064	0.000734	0.000583	0.000408	0.000375
21	0.000805	0.000558	0.000450	0.000325	0.000306
24	0.000490	0.000363	0.000294	0.000222	0.000214

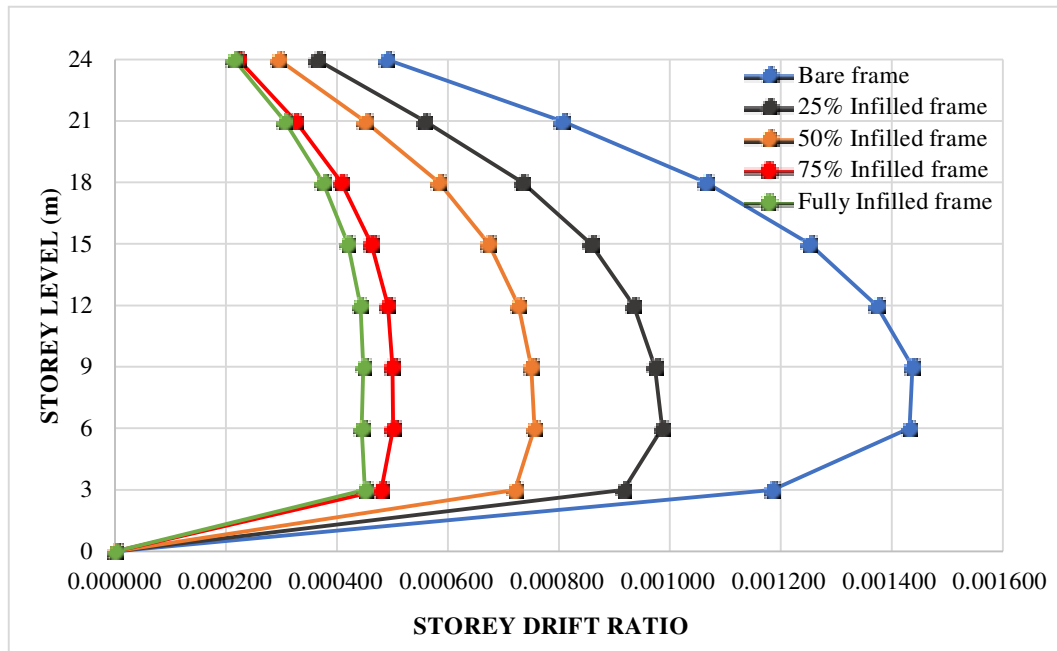


Figure 6.5: Storey Drift ratio variation for different percentages of Masonry infills

Storey drift ratio is observed to be more for bare frame models and less for completely infilled models. As the proportion of masonry infill decreases, the story drift keeps

increasing. According to the results, the inclusion of an infill wall enhances lateral stiffness and drift and displacement control.

6.1.4 FUNDAMENTAL TIME PERIOD

It is the property of the structure which depends on the mass and the stiffness. Here, the approximate method to find the time period proposed by design codes is not used as it provides constant natural periods. This can be due to the approximate method being dependent on an empirical formula influenced by key factors of total height and the type of the structure. The empirical expressions for the approximate method provide computed natural periods of 0.813 sec for bare frame model which is significantly shorter than that the obtained value.

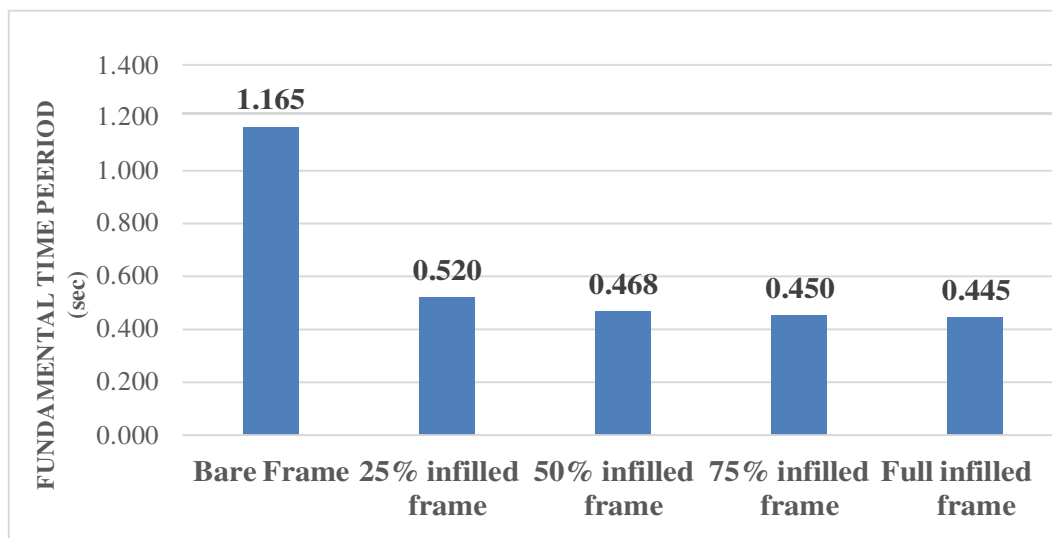


Figure 6.6: Fundamental Time Period variation for different percentages of Masonry infills

In the Bare frame model, as the masonry infill walls are ignored the natural period induced is overestimated compared to the fully infilled model. It can be observed from the numerical results that the bare frame model provides 1.62 times more the value of the natural period provided by the fully infilled frame model.

The results of the partially infilled frame model, provides natural period a bit higher than the corresponding value of the fully infilled frame model. This can be due to the presence of opening at the outer periphery due to the partial infilled frames. That is the masonry infill is ignored at that level leading to a reduction in the lateral stiffness. It is noted that the time period increases by 16.85%, 5.17%, 1.12% for 25%, 50%, 75% partial infilled masonry frames, respectively.

6.2 RESULTS FOR 25% PARTIAL INFILLED FRAME

6.2.1 SHEAR FORCE IN THE COLUMN

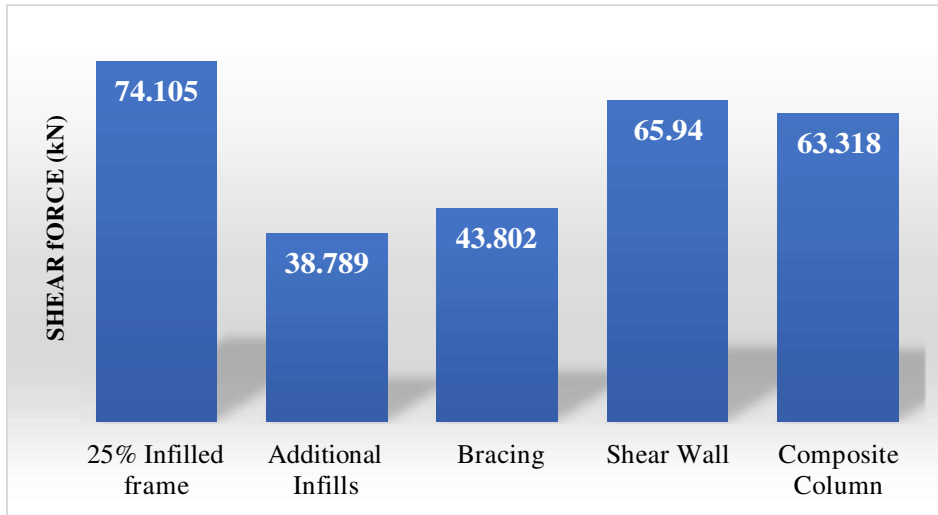


Figure 6.7: Shear Force variation for 25% partial infilled frames with different methods adopted

From the above findings, it is clear that the availability of various techniques aids in the decrease of shear force in the column with a 25% partial infilled frame. It should be noted that compared to the 25% partial-infilled frame, there has been a reduction in the shear force for the provision of additional infill frame by 47.65%, bracing by 40.89%, shear wall by 11.02%, and composite column by 14.56%.

6.2.2 STOREY SHEAR AND BASE SHEAR

The variation of storey shear and base shear for models with 25% partial infilled frames with different methods adopted is tabulated in Table 6.4 and is graphically represented by Figure 6.8 and Figure 6.9.

Table 6.4: Storey Shear variation for models with 25% partial infilled frames with different methods adopted

Storey Level (m)	25% infilled frame	Additional infills	Bracing	Shear Wall	Composite Column
3	5318.720	5604.660	5334.363	5415.439	5207.190
6	5270.354	5412.888	5286.127	5366.255	5159.863
9	5131.581	5280.462	5147.022	5224.723	5023.861
12	4851.221	5122.113	4865.928	4939.006	4749.29
15	4379.839	4631.303	4393.248	4458.828	4287.828
18	3667.998	3888.241	3679.384	3733.916	3591.154
21	2666.263	2840.711	2674.739	2713.997	2610.948
24	1325.196	1436.497	1329.714	1348.795	1298.888

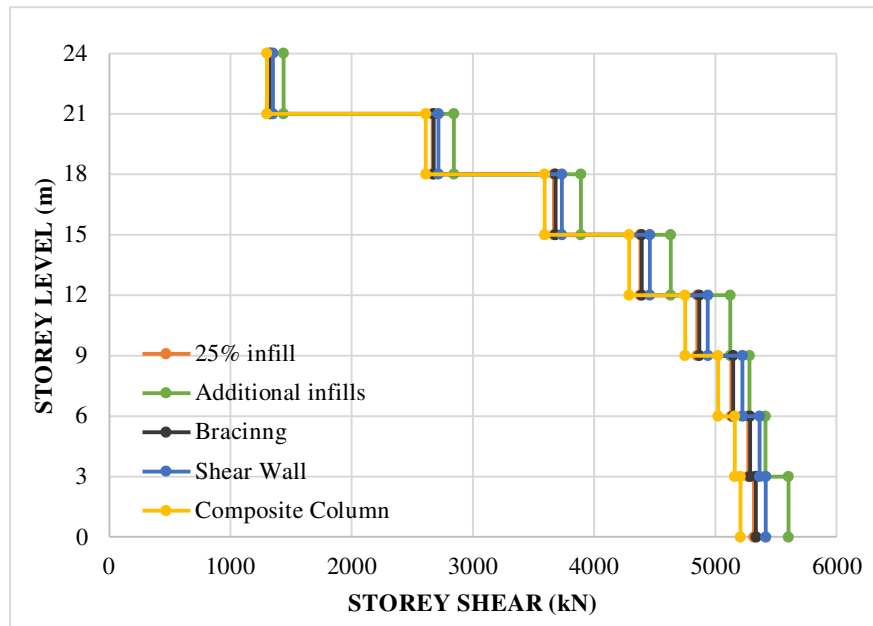


Figure 6.8: Storey Shear variation for models with 25% partial infilled frames with different methods adopted

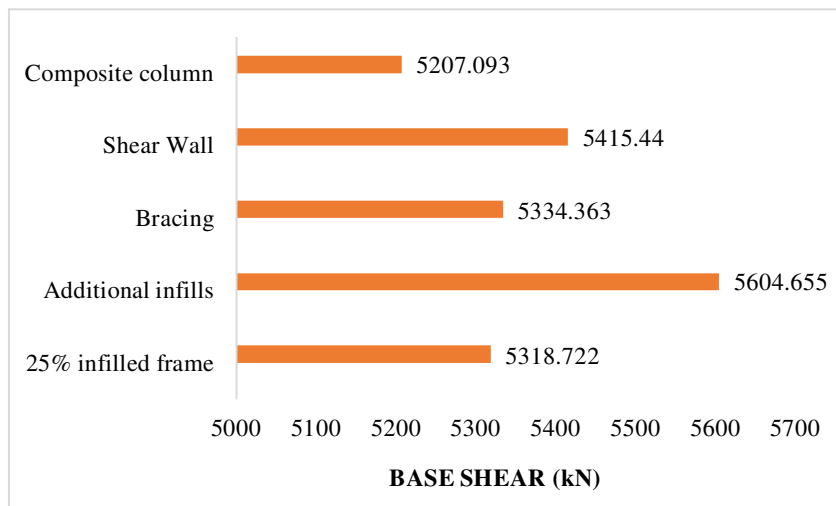


Figure 6.9: Base Shear variation for models with 25% partial infilled frames with different methods adopted

From the results obtained it is noticed that the base shear value when compared to the 25% partially infilled frame, increases by 5.38% for additional infill frames, 0.29% for bracing, 1.82% for shear wall and 2.09% for composite column.

6.2.3 STOREY DISPLACEMENT AND STOREY DRIFT RATIO

The variation of storey displacement and storey drift ratio for basic models is tabulated in Table 6.5 and Table 6.6 which is graphically represented by figure 6.10 and figure 6.11.

Table 6.5: Storey displacement Variation For models with 25% partial infilled frames with different methods

STOREY LEVEL (m)	STOREY DISPLACEMENT (mm)				
	25% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.364	0.373	0.361	0.241	0.286
3	2.180	2.323	1.890	1.954	2.378
6	3.778	3.976	3.310	3.370	3.995
9	5.373	5.652	4.729	4.766	5.615
12	6.949	7.305	6.138	6.124	7.220
15	8.439	8.866	7.476	7.378	8.740
18	9.765	10.253	8.673	8.454	10.097
21	10.840	11.374	9.654	9.262	11.204
24	11.589	12.146	10.352	9.768	11.979

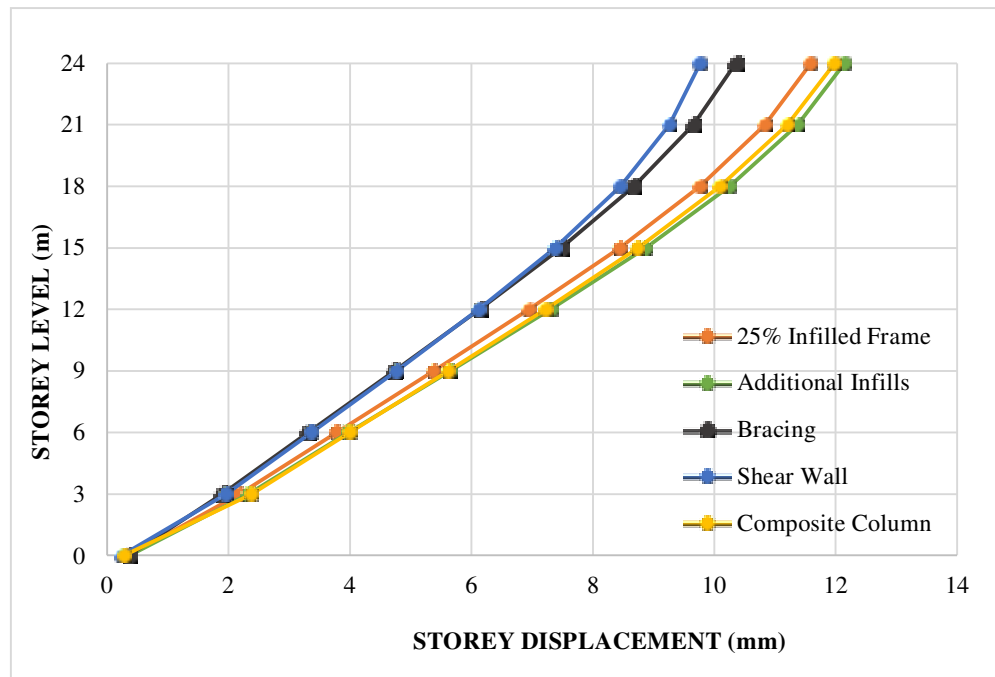


Figure 6.10: Storey displacement variation for 25% partial infilled frames with different methods adopted

The results show that when compared to the 25% partially infilled frame model, the maximum displacement for models with 25% Partially infilled Frame with Additional infills adjoining the column and composite column increased by 4.8% and 3.36% and decrease in models with bracing, shear wall by 10.67% and 15.71% respectively.

Table 6.6: Storey drift ratio variation For models with 25% partial infilled frames with different methods adopted

STOREY LEVEL (m)	Storey Drift Ratio				
	25% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000916	0.000650	0.000510	0.000571	0.000697
6	0.000986	0.000551	0.000473	0.000472	0.000539
9	0.000973	0.000559	0.000473	0.000465	0.000540
12	0.000934	0.000551	0.000470	0.000453	0.000535
15	0.000857	0.000520	0.000446	0.000418	0.000507
18	0.000734	0.000462	0.000399	0.000359	0.000452
21	0.000558	0.000374	0.000327	0.000269	0.000369
24	0.000363	0.000257	0.000233	0.000169	0.000258

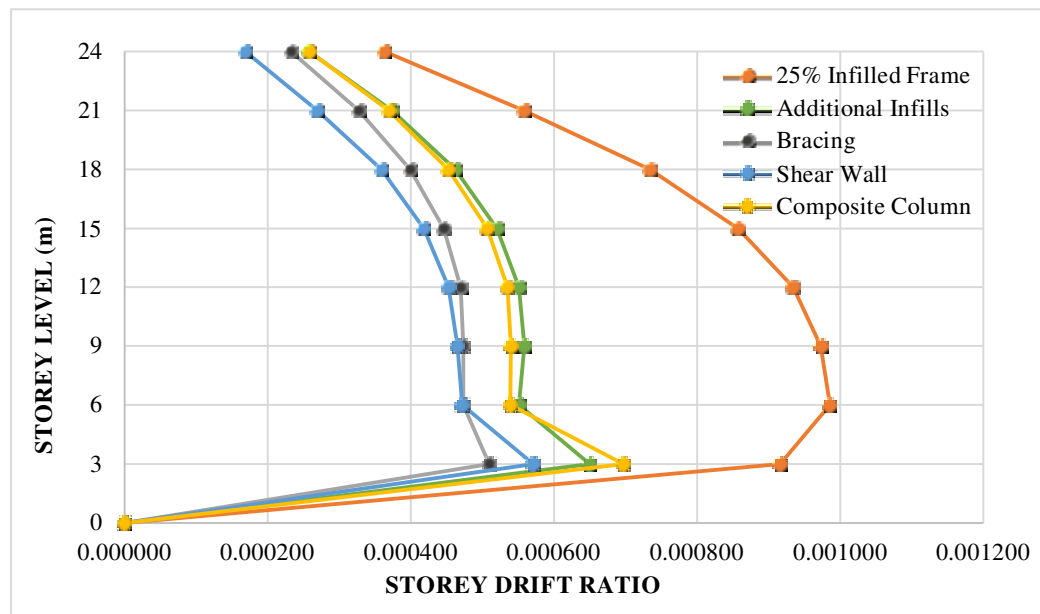


Figure 6.11: Storey drift ratio variation for 25% partial infilled frame with different methods adopted

It is observed that the maximum drift is due to the 25% partially infilled frame model.

The minimum drift is observed due to the addition of shear wall in the 25% partially infilled frame model.

6.2.4 FUNDAMENTAL TIME PERIOD

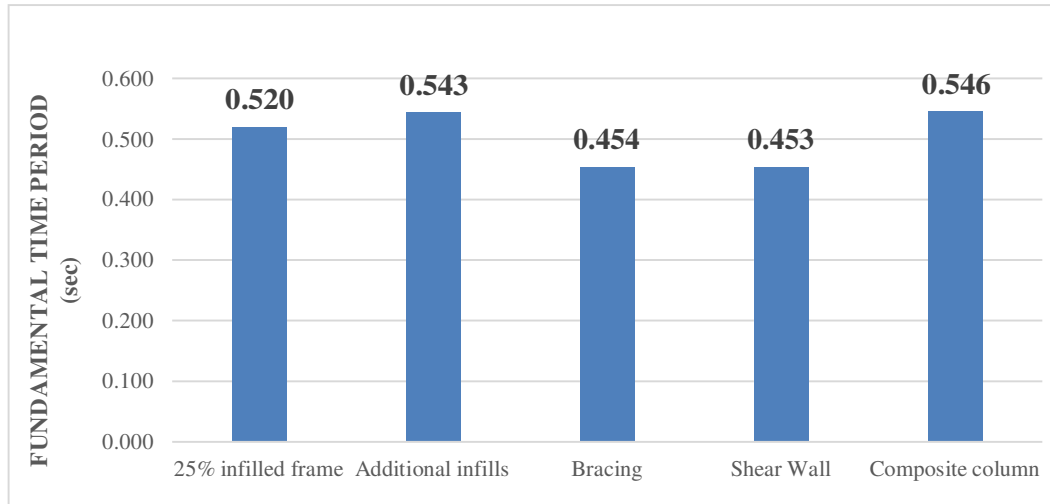


Figure 6.12: Time Period variation for 25% partial infilled frames with different methods adopted

According to the results, when compared to the 25% partially infilled frame model, the time period has increased by 4.42% and 5% for models with additional infills and composite column, and reduced by 12.69% and 12.88% for models with bracing and shear wall respectively.

6.3 RESULTS FOR 50% PARTIAL INFILLED FRAME

6.3.1 SHEAR FORCE IN THE COLUMN

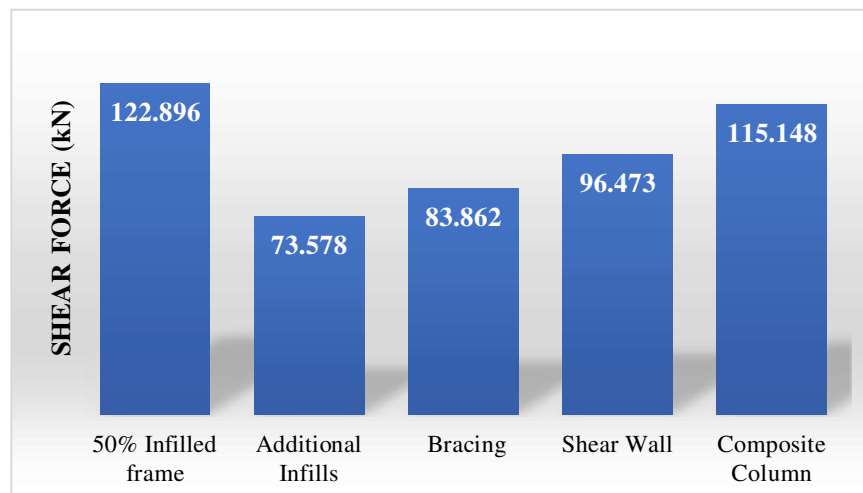


Figure 6.13: Shear Force variation for 50% partial infilled frames with different methods adopted

From the above findings, it is clear that the availability of various techniques aids in the decrease of shear force in the column with a 50% partial infilled frame. It should be noted

that compared to the 50% partial-infilled frame, there has been a reduction in the shear force for the provision of additional infill frame by 40.13%, bracing by 31.76%, shear wall by 21.5%, and composite column by 6.31%.

6.3.2 STOREY SHEAR AND BASE SHEAR

The variation of storey shear and base shear for models with 50% partial infilled frames with different methods adopted is tabulated in Table 6.7 and is graphically represented by Figure 6.14 and Figure 6.15.

Table 6.7: Storey Shear variation for models with 50% partial infilled frames with different methods adopted

Storey Level	50% Infilled Frame	Additional infills	Bracing	Shear Wall	Composite Column
3	5557.160	5747.73	5575.365	5606.21	5445.56
6	5506.448	5551.175	5524.725	5555.075	5396.018
9	5360.661	5347.085	5378.514	5407.821	5253.132
12	5066.026	5196.872	5082.969	5110.508	4964.491
15	4570.609	4748.539	4585.97	4610.865	4479.276
18	3822.477	3985.087	3835.399	3856.619	3746.672
21	2769.696	2908.59	2779.137	2795.5	2715.86
24	1360.333	1461.889	1365.066	1375.235	1336.025

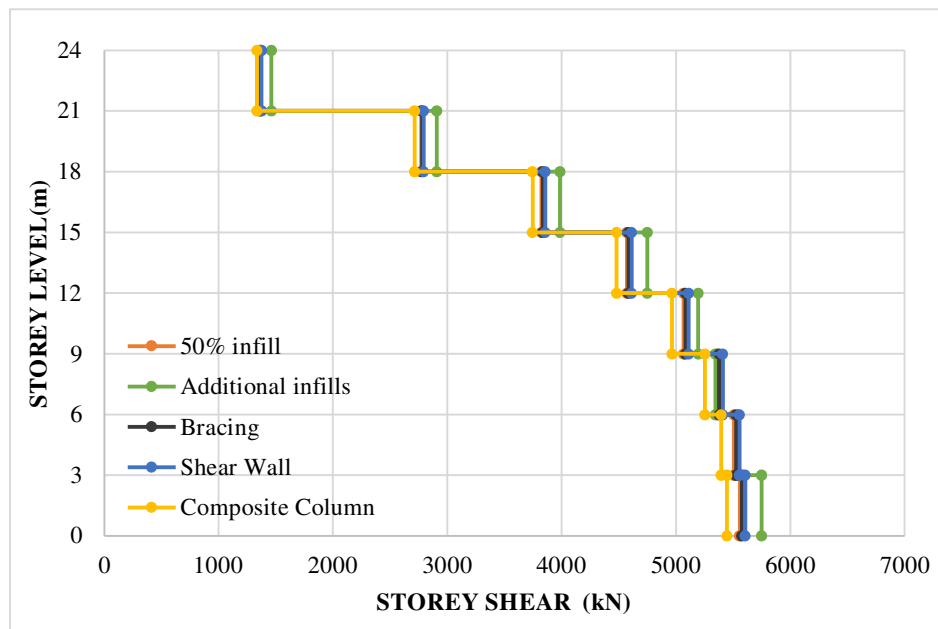


Figure 6.14: Storey Shear variation for models with 50% partial infilled frames with different methods adopted

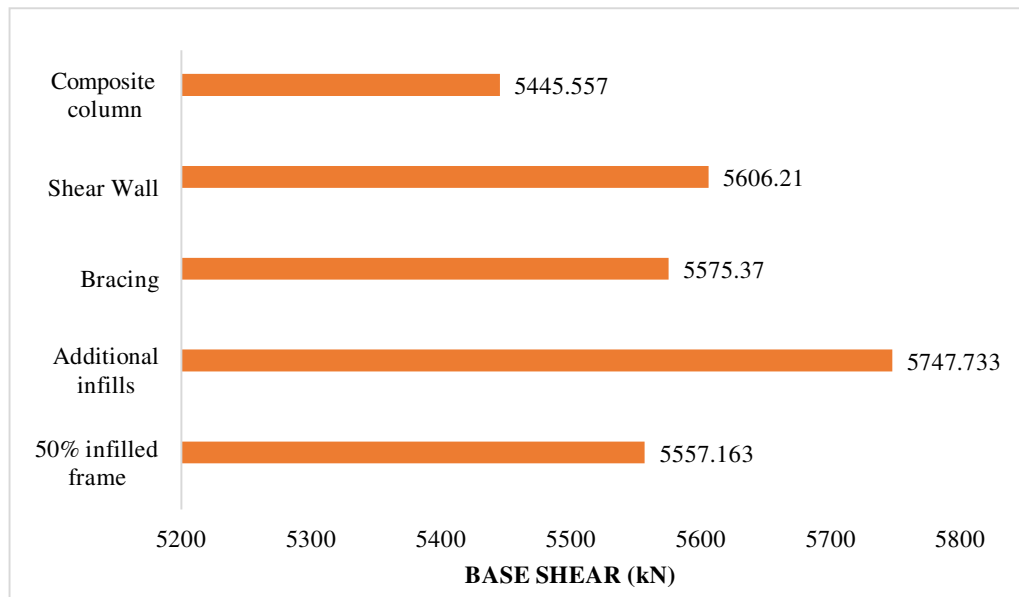


Figure 6.15: Base Shear Variation For 50% partial infilled frames with different methods adopted

From the results obtained it is noticed that the base shear value when compared to the 50% partially infilled frame, increases by 3.43 % for additional infill frames, 0.33% for bracing, 0.88% for shear wall and 2.01% for composite column.

6.3.3 STOREY DISPLACEMENT AND STOREY DRIFT RATIO

The variation of storey displacement and storey drift ratio for basic models is tabulated in Table 6.8 and Table 6.9 which is graphically represented by Figure 6.16 and Figure 6.17.

Table 6.8: Storey displacement variation for models with 50% partial infilled frames with different methods adopted

STOREY LEVEL (m)	Displacement (mm)				
	50% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.348	0.414	0.426	0.313	0.409
3	2.045	2.146	1.852	1.849	2.228
6	3.567	3.73	3.226	3.209	3.776
9	5.077	5.307	4.593	4.545	5.315
12	6.568	6.862	5.947	5.843	6.836
15	7.975	8.33	7.231	7.038	8.276
18	9.226	9.634	8.377	8.058	9.558
21	10.237	10.687	9.31	8.812	10.599
24	10.937	11.414	9.967	9.276	11.323

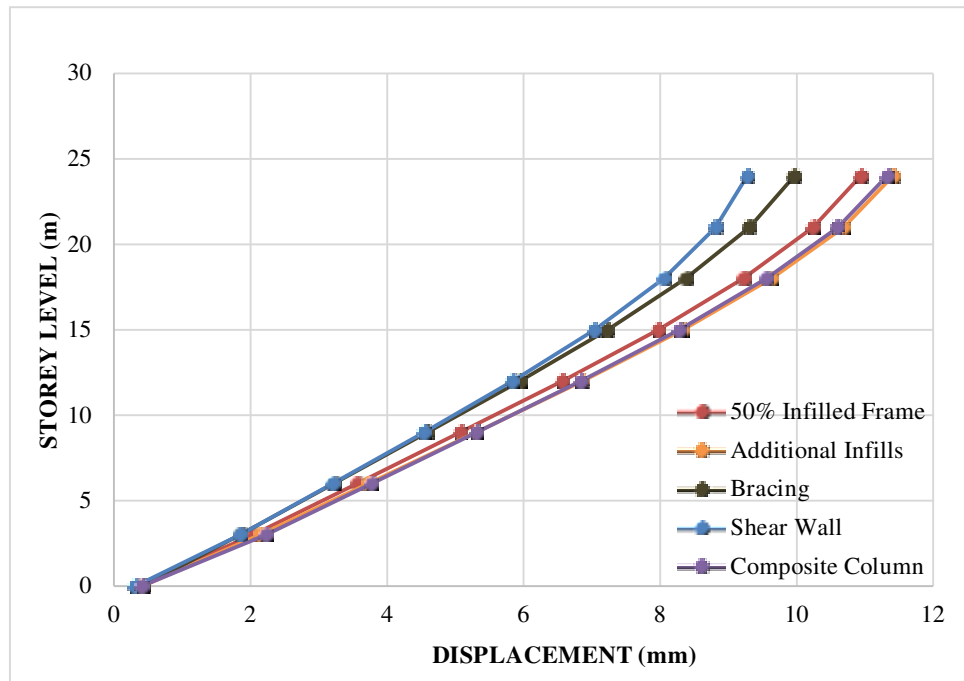


Figure 6.16: Storey displacement variation for models with 50% partial infilled frames with different methods adopted

The results show that when compared to the 50% partially infilled frame model, the maximum displacement for models with 50% Partially infilled Frame with Additional infills adjoining the column and composite column increased by 4.36% and 3.53% and decrease in models with bracing, shear wall by 8.87% and 15.21% respectively.

Table 6.9: Storey drift ratio Variation For models with 50% partial infilled frames with different methods adopted

STOREY LEVEL (m)	Storey Drift Ratio				
	50% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000721	0.000577	0.000475	0.000512	0.000606
6	0.000756	0.000528	0.000458	0.000453	0.000516
9	0.000750	0.000526	0.000456	0.000445	0.000513
12	0.000727	0.000518	0.000451	0.000433	0.000507
15	0.000673	0.000489	0.000428	0.000398	0.000480
18	0.000583	0.000435	0.000382	0.000340	0.000427
21	0.000450	0.000351	0.000311	0.000251	0.000347
24	0.000294	0.000242	0.000219	0.000155	0.000241

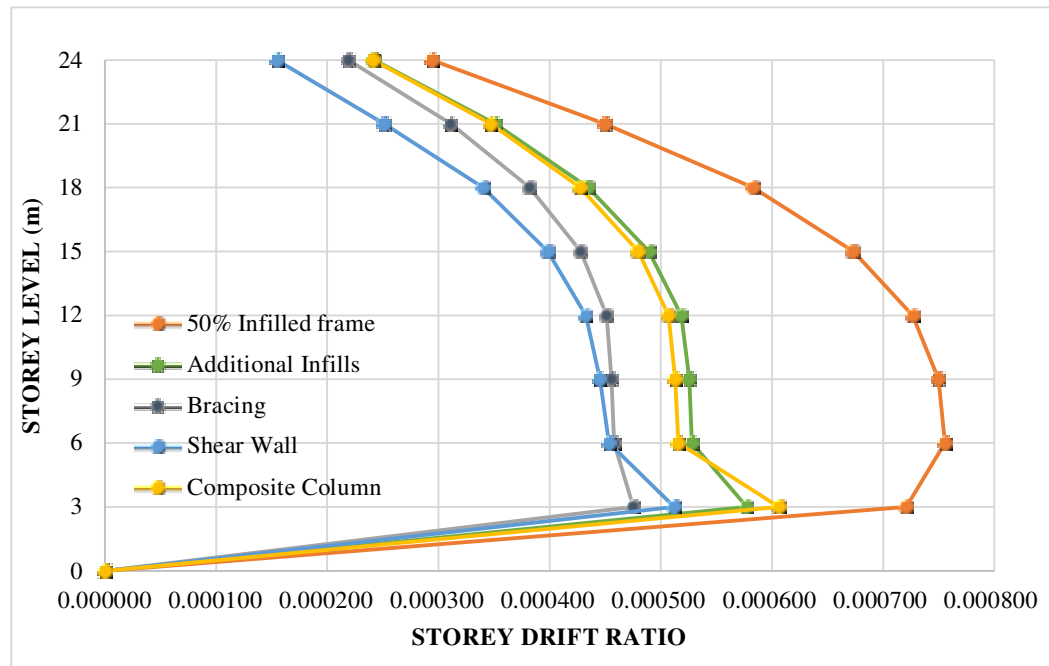


Figure 6.17: Storey drift variation for 50% partial infilled frames with different methods adopted

It is observed that the maximum drift is due to the 50% partially infilled frame model.

The minimum drift is observed due to the addition of shear wall in the 50% partially infilled frame model.

6.3.4 FUNDAMENTAL TIME PERIOD

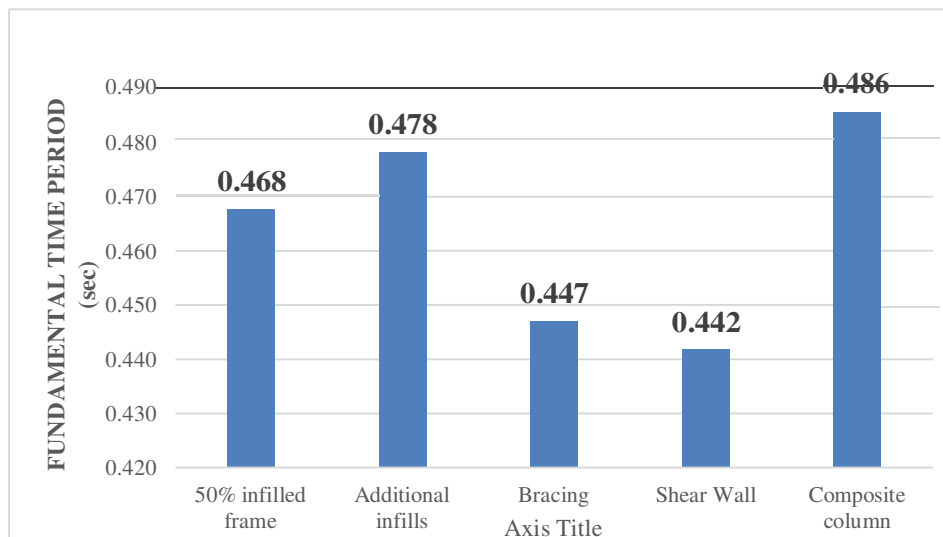


Figure 6.18: Time Period variation for 50% partial infilled frames with different methods adopted

According to the results, when compared to the 50% partially infilled frame model, the time period has increased by 2.14% and 3.85% for models with additional infills and

composite column, and reduced by 4.48% and 5.55% for models with bracing and shear wall respectively

6.4 RESULTS FOR 75% PARTIAL INFILLED FRAME

6.4.1 SHEAR FORCE IN THE COLUMN

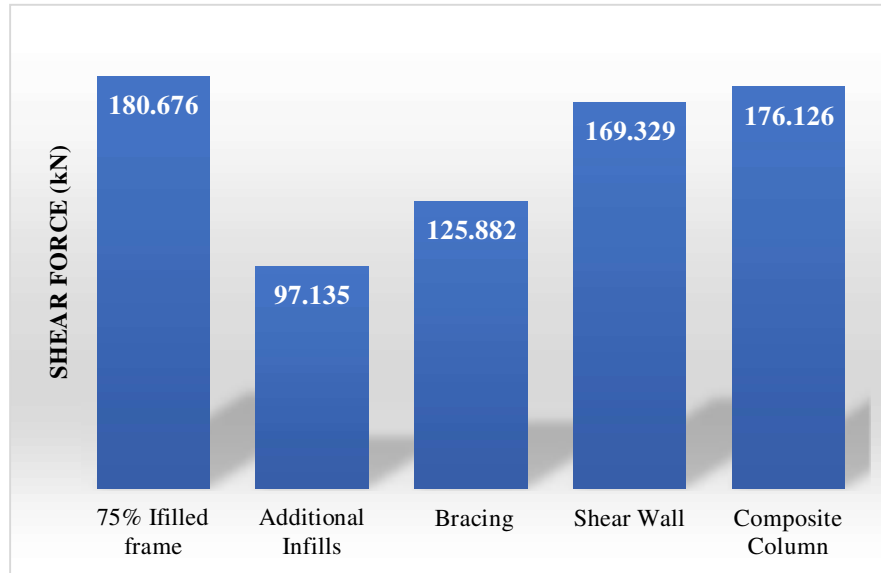


Figure 6.19: Shear Force variation for 75% partial infilled frames with different methods adopted

From the above findings, it is clear that the availability of various techniques aids in the decrease of shear force in the column with a 75% partial infilled frame. It should be noted that compared to the 75% partial-infilled frame, there has been a reduction in the shear force for the provision of additional infill frame by 46.23%, bracing by 30.33%, shear wall by 6.28%, and composite column by 2.52%.

6.4.2 STOREY SHEAR AND BASE SHEAR

The variation of storey shear and base shear for models with 75% partial infilled frames with different methods adopted is tabulated in Table 6.10 and is graphically represented by Figure 6.20 and Figure 6.21.

Table 6.10: Storey Shear variation for models with 75% partial infilled frames with different methods adopted

Storey Level	75% Infilled Frame	Additional infills	Bracing	Shear Wall	Composite Column
3	5795.430	5890.81	5813.83	5796.216	5684.02
6	5742.006	5840.57	5760.588	5743.455	5631.656
9	5588.474	5691.939	5607.173	5589.882	5481.171
12	5278.842	5388.34	5297.425	5280.389	5177.75
15	4758.881	4830.985	4776.926	4760.869	4668.278
18	3974.362	4095.813	3991.261	3977.215	3899.644
21	2871.056	2996.675	2886.012	2875.32	2818.735
24	1394.734	1522.14	1406.761	1401.075	1372.437

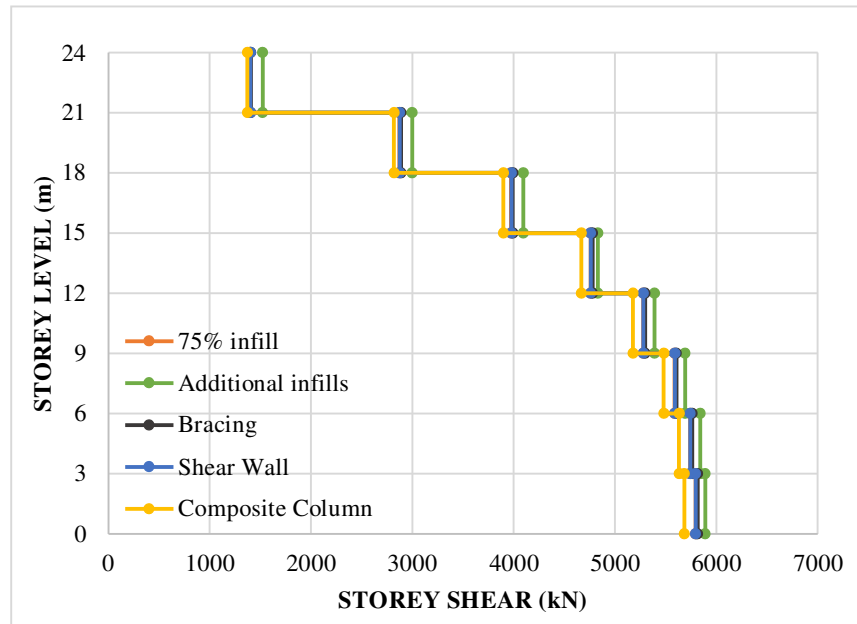


Figure 6.20: Storey Shear variation for models with 75% partial infilled frames with different methods adopted

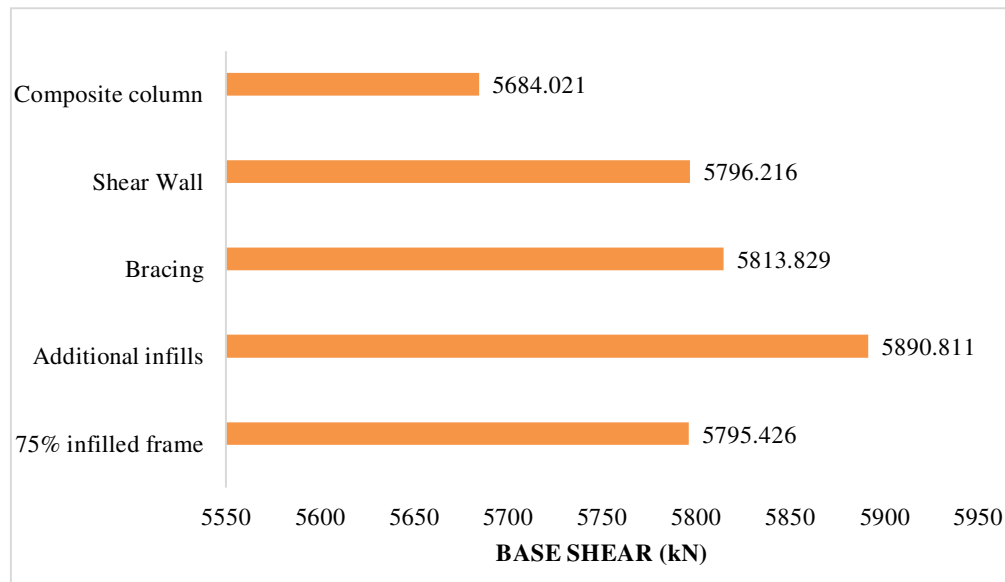


Figure 6.21: Base Shear Variation For 75% partial infilled frames with different methods adopted

From the results obtained it is noticed that the base shear value when compared to the 75% partially infilled frame, increases by 1.65% for additional infill frames, 0.32% for bracing, 0.13% for shear wall and 1.92% for composite column.

For additional infills since the mass of the structure is increased by adding the infills adjoining to the column, increase in the base shear is observed

In Bracing, steel angle sections are added in the second and fourth bay of the models. Shear wall of size less than the masonry infill is placed orthogonally on the central bay of the model. Therefore, no much increase in the mass is observed. The Sections of the composite column are reduced, thereby reducing the mass of the structure. Hence, a considerable decrease is observed.

6.4.3 STOREY DISPLACEMENT AND STOREY DRIFT RATIO

The variation of storey displacement and storey drift ratio for basic models is tabulated in Table 6.11 and Table 6.12 which is graphically represented by Figure 6.22 and Figure 6.23.

Table 6.11: Storey displacement Variation For models with 75% partial infilled frames with different methods adopted

STOREY LEVEL (m)	Displacement (mm)				
	75% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.326	0.494	0.534	0.43	0.605
3	1.907	2.028	1.781	1.747	2.061
6	3.301	3.506	3.117	3.028	3.468
9	4.689	4.984	4.459	4.292	4.869
12	6.062	6.444	5.787	5.522	6.258
15	7.361	7.825	7.042	6.655	7.575
18	8.519	9.055	8.157	7.619	8.752
21	9.459	10.051	9.06	8.328	9.712
24	10.115	10.742	9.692	8.752	10.385

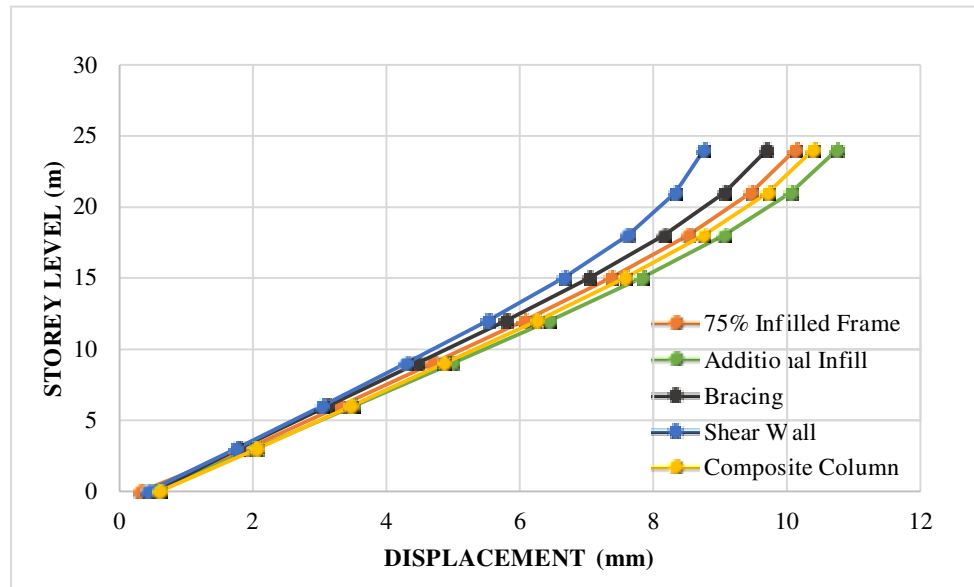


Figure 6.22: Storey displacement Variation For models with 75% partial infilled frames with different methods adopted

The results show that when compared to the 75% partially infilled frame model, the maximum displacement for models with 75% Partially infilled Frame with Additional

infills adjoining the column and composite column increased by 6.19% and 2.67% and decrease in models with bracing, shear wall by 4.18% and 13.47% respectively.

Table 6.12: Storey drift Variation For models with 75% partial infilled frames with different methods adopted

STOREY LEVEL (m)	Storey Drift Ratio				
	75% Infilled Frame	Additional infill	Bracing	Shear Wall	Composite Column
0	0.000000	0.000000	0.000000	0.000000	0.000000
3	0.000480	0.000511	0.000416	0.000439	0.000485
6	0.000501	0.000493	0.000445	0.000427	0.000469
9	0.000500	0.000493	0.000447	0.000421	0.000467
12	0.000491	0.000487	0.000443	0.000410	0.000463
15	0.000462	0.000460	0.000418	0.000378	0.000439
18	0.000408	0.000410	0.000372	0.000321	0.000392
21	0.000325	0.000332	0.000301	0.000236	0.000320
24	0.000222	0.000230	0.000211	0.000141	0.000224

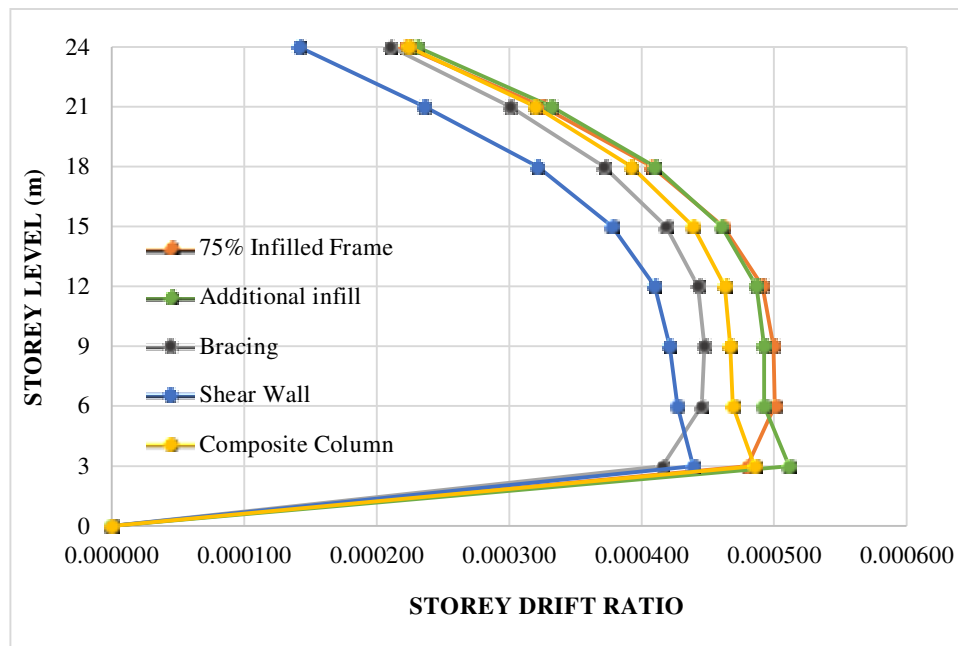


Figure 6.23: Storey drift ratio variation for 75% partial infilled frames with different methods adopted

It is observed that the maximum drift is due to the 75% partially infilled frame model. The minimum drift is observed due to the addition of shear wall in the 75% partially infilled frame model.

6.4.4 FUNDAMENTAL TIME PERIOD

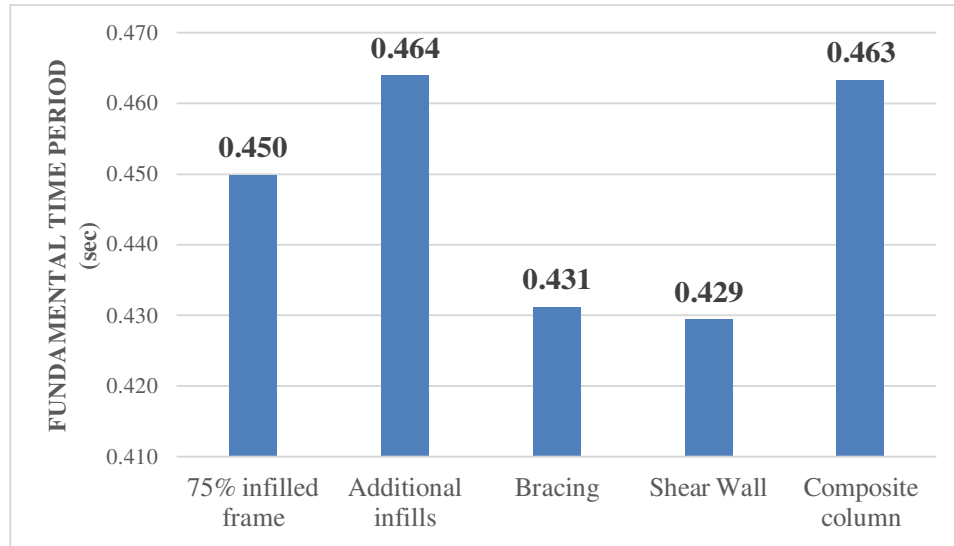


Figure 6.24: Time Period variation for 75% partial infilled frames with different methods adopted

According to the results, when compared to the 75% partially infilled frame model, the time period has increased by 3.11% and 2.88% for models with additional infills and composite column, and reduced by 4.22% and 4.67% for models with bracing and shear wall respectively.

CHAPTER 7

CONCLUSIONS

In the present analytical study, a G+7 storied building model with varying percentage of masonry infills are considered as the basic models. The aim is to mitigate the short column effect in the columns due to the partial infilled masonry. Therefore, several common methods such as providing additional infills to the adjoining columns, bracing, shear wall, composite column are provided in the models with partial infills. The results are obtained from the response spectrum analysis. With the help of various parameters like shear force in column, storey shear, base shear, storey displacement, storey drift and time period the following outcomes can be listed.

The results of partial infill frames with varying percentage of infills reveal that maximum shear force in the structure with 75% infill is 835.85% greater as compared to fully infilled frames. Similarly for structure with 50% and 25% infill, it is greater by 536.54% and 283.82% respectively. The magnitude of increase in the shear force for Partial infill frames make it vulnerable for failure due to short column effect. This behaviour confirms with similar investigations on short column effect [21]

Partial infill structure with 25% infill masonry:

The increase in shear force in the columns is 283.82% when compared to fully infilled structure and 43.94% when compared to bare frame structure.

As compared to the fully infilled structure, the shear force is reduced for the four different types of structural forms. The percentage reduction in shear force was:

Structure with additional infill adjoining to the column = 47.65%.

Structure with Bracing = 40.89%

Structure with Shear Wall = 11.018%

Structure with Composite column = 14.56%.

The other parameters when compared with that of fully infilled structure indicate that the base shear increases and storey drift ratio decreases for all the four types of structural forms. The storey displacement are higher for Structure with additional infill (4.8%) and Structure with Composite column (3.36%), whereas lower in the case of Structure with Bracing (10.67%) and Structure with Shear Wall (15.71%). Similarly, Time

period of the building is higher for Structure with additional infill (4.42%) and Structure with Composite column (5%), whereas lower in the case of Structure with Bracing (12.69%) and Structure with Shear Wall (12.88%).

Partial infill structure with 50% infill masonry:

The increase in shear force in the columns is 536.54% when compared to fully infilled structure and 138.7% when compared to bare frame structure.

As compared to the fully infilled structure, the shear force is reduced for the four different types of structural forms. The percentage reduction in shear force was:

Structure with additional infill adjoining to the column = 40.13%.

Structure with Bracing = 31.76%

Structure with Shear Wall = 21.5%

Structure with Composite column = 6.31%.

The other parameters when compared with that of fully infilled structure indicate that the base shear increases and storey drift ratio decreases for all the four types of structural forms. The storey displacement are higher for Structure with additional infill (4.36%) and Structure with Composite column (3.53%), whereas lower in the case of Structure with Bracing (8.87%) and Structure with Shear Wall (15.21%). Similarly, Time period of the building is higher for Structure with additional infill (2.14%) and Structure with Composite column (3.85%), whereas lower in the case of Structure with Bracing (4.48%) and Structure with Shear Wall (5.55%).

Partial infill structure with 75% infill masonry:

The increase in shear force in the columns is 835.85% when compared to fully infilled structure and 250.94 % when compared to bare frame structure.

As compared to the fully infilled structure, the shear force is reduced for the four different types of structural forms. The percentage reduction in shear force was:

Structure with additional infill adjoining to the column = 46.23%.

Structure with Bracing = 30.33%

Structure with Shear Wall = 6.28%

Structure with Composite column = 2.52%.

The other parameters when compared with that of fully infilled structure indicate that the base shear increases and storey drift ratio decreases for all the four types of structural forms. The storey displacement are higher for Structure with additional infill (6.19%) and Structure with Composite column (2.67%), whereas lower in the case of Structure with Bracing (4.18%) and Structure with Shear Wall (13.47%). Similarly, Time period of the building is higher for Structure with additional infill (3.11%) and Structure with Composite column (2.88%), whereas lower in the case of Structure with Bracing (4.22%) and Structure with Shear Wall (4.67%).

CONCLUSION IN NUTSHELL

- On comparing the partial infill structures with additional infills, bracings, shear wall, and composite column respectively, for different structural parameters, it is clear that the additional infills mitigate shear force effectively.
- In the models with additional infills base shear increases due to the addition of mass to the structure. The storey displacement and storey drift ratio are observed to be comparatively more but are within the permissible limit (0.004). Also, there is increase in the time period when compared to other models.

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Study Of Glass And Steel Fibre In Concrete

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Abstract—The main aim of this study is to test the ratios of glass fibre and steel fibre, when mixed together and to determine which ratio provides best concrete properties in various conditions. By the inclusion of these fibers cracks can be removed to a considerable extend. concrete is brittle in nature and weak in tension and is often subjected to shrinkage and creep. These factor have led to the development of fibre reinforced concrete. The fibre reinforcement concrete has so far been successfully used in slabs on grade, architecture panels, precast products, offshore structur, structures in seismic region, thin and thick repairs, crash barriers etc.

Keywords—Fibre, Steel, Glass, Concrete, Super plasticizer.

I. INTRODUCTION

concrete is most widely used man made material. It's applications in infrastructure development has provided the desirable properties like high compressive strength, stiffness, durability under usual as well as harsh environment conditions.

It is obtained by mixing cementing materials, water and aggregates, and sometimes admixtures, in required proportions.

The mixtures when placed in forms and allowed to cure hardens into a rock like mass known as concrete. One of the undesirable characteristics of the concrete as a brittle material is it's low tensile strength, and strain capacity.

Conventionally, this reinforcement is in the form of continuous steel bars placed in the concrete structure in the appropriate positions to withstand the imposed tensile and shear stresses.

Fibres, on the other hand, are generally short, discontinuous, and randomly disturbed throughout the concrete member to produce a composite construction material known as Fiber Reinforced Concrete (FRC).

Experimental research results have been shows considerable improvement in the post-cracking behavior of concretes containing fibers.

Therefore, compared to plain concrete, fiber reinforced concrete is much tougher and more resistant to impact.

In addition to strength characteristics, concrete should have adequate durability to perform in accordance with its intended level of functionality and Serviceability over an expected or predicted life cycle.

Durable concrete must potentially have the ability to withstand expected exposed deteriorative conditions.

Addition of steel fiber to concrete increases water and gas permeability, irrespective of the fiber amount or fiber length.

The plain concrete has been replaced by fiber reinforced concrete from past years.

The inclusion of fibres in the concrete decrease the Brittleness and advances the mechanical properties.

Steel Fiber Reinforced Concrete (SFRC) is defined as the concrete made with hydraulic cement containing fine and course aggregate and discontinuous discrete steel fibre.

In SFRC, thousands of small fibers are dispersed and distributed randomly in the concrete during mixing, and thus improve concrete properties. SFRC is being used to improve static and dynamic tensile strength, energy absorbing capacity and better fatigue strength. steel fibers are the strongest commonly available fibre, and come in different lengths and shapes.

Glass fiber is an inexpensive and corrosion proof fiber, but not as strong as steel. The design of glass fiber reinforced concrete proceeds from knowledge of its basic properties under tensile, compressive, bending and shear forces, coupled with estimates of behavior under secondary loading effects such as creep, thermal response and moisture movement

II. Problem Statment

Owing to the lower modulus of elasticity the FRP-RC beams exhibit lower serviceability performance compared to steel bars.

The rigid and brittle behaviour of FRP bars forces the FRP-RC beams to be designed as over reinforced making the failure by crushing of concrete.

The bond between the FRP bars and the concrete is affected by various factors.

III. Research/Project Area

As all of us know that concrete is brittle in nature and also we know that it is weak in tension.

The benefit of reinforcing technology using metal reinforcement as excessive tensile metal wires.

FRC is a concrete which have fibrous material in concrete that increases the structure integrity.

It is a comparatively new material in construction field.

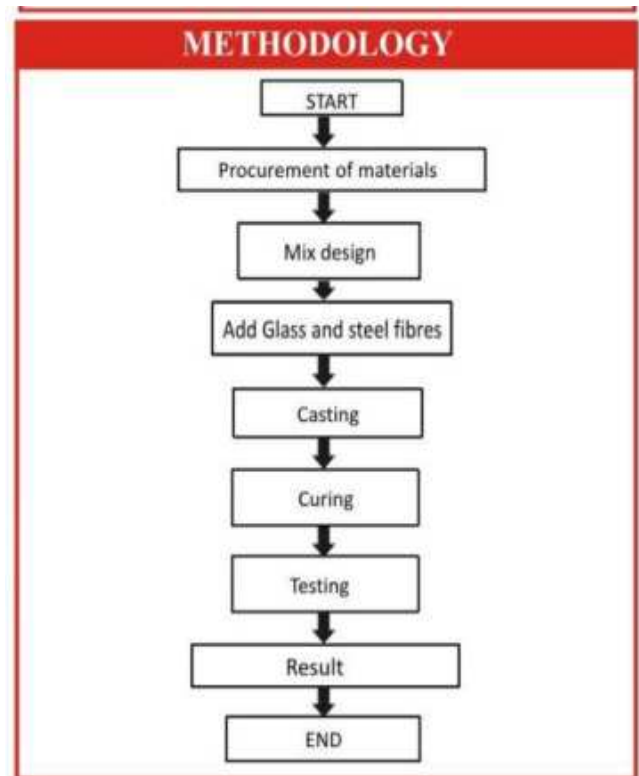
IV. Working Principal

- Research in going on the basis of percentage method.
- For this we worked on strength of each material I. e. glass & steel fibre.
- in this research we are used fibre like steel fibre and glass fibre to know the effect of those fibres in concrete

V. MATERIAL USED

According to IS:456:2000
cement OPC Grade 43, Specific Gravity-3.15
Fine Aggregates Size <4.75mm
Course Aggregates Size 10-20mm
are:-Steel (length 50mm, dia 0.5mm), Glass (Size 12mm)
Anti alkaline Top Admixture used is Glenium 51
(Polycarboic Ether Hyper Plasticizer)
Fibres used water (Temperature varied at late stages of experiment).

VI. EXPERIMENTAL PROGRAMME



METHODOLOGY

(a) STIPULATIONS FOR PROPORTIONING

- Grade designation: M30
- Type of cement: OPC 43 grade
- Maximum nominal size of aggregate: 20mm
- Minimum cement content: 320 kg/m³.....(From Table 5 of IS 456:2000)
- Maximum water-cement ratio : For M30 = 0.40
- Workability: 100mm (Slump)
- Exposure condition: severe
- Method of concrete placing : manual
- Type of aggregate : crushed angular aggregate
- Maximum cement content: 450 kg/m³
- Chemical admixture type: Super plasticizer
-

(b) TARGET STRENGTH FOR MIX PROPORTIONING : M30

$$F'_{CK} = f_{ck} + 1.65s$$

Where, F'_{CK} = target average compressive strength at 28 days,
 f_{ck} = characteristic compressive strength at 28 days,
 s = standard deviation

From table 1 standard deviation (s) = 4 N/mm²

Therefore, target strength = $30 + 1.65 \times 4 = 38.25 \text{ N/mm}^2$.

VII. ESTIMATION OF MIX DESIGN

Volume of concrete required for 12 numbers of cubecubes (15cm×15cm× 15cm) assuming 25% wastage .

(a) Volume of concrete = 1 m^3

(b) Volume of water =(mass of water /specific gravity of water) ×(1/100) =(140/1) ×(1/100) =0.41m³

(c) Volume of cement=(mass of cement/specific gravity of water) ×(1/100) =(350/3.15) ×(1/100) =0.111m³

(d) Volume of chemical admixture(super plasticizer) @2.0%by mass of cementitious material= $350 \times 2\% = 7 \text{ kg/m}^3 = (7/1.145) \times (1/100) = 0.006$.

(e) Volume of total aggregates =a-(b+c)=(1-0.111+0.140+0.006)
=0.742m³.

(f) mass of coarse aggregate=(e × volume of coarse aggregate × specific gravity of coarse aggregate × 1000= $0.742 \times 0.576 \times 2.84 \times 1000$
=1213.79kg/m³.

(g) Mass of fine aggregates=(e × volume of fine aggregate × specific gravity of fine aggregate × 1000) =830.56kg/m³.

VIII. PROJECT SETUP



(a) Design of concrete mixes as per Indian Standard method IS 10260: 2009:

- 1.The Indian standard code IS 10260: 2009 presents guidelines for the design of normal concretes.
- 2.The basic assumption made in the mix design is that compressive strength of workable concrete is high.
- 3.In this method, W/C cement ratio is selected depending on the grade of concrete and type of exposure.
- 4.Water content is selected on the basis of nominal coarse size aggregate and slump.
- 5.Volume of coarse aggregate depends on the zone of fine aggregate as per IS 383 and nominal maxi. size.
- 6.The batch weight of the material per unit volume is calculated by absolute volume method.
- 7.There are various other factors which affect the property of concrete such as the grade of cement, quantity of cement, water, aggregate size, and shape, etc.

Identify applicable funding agency here. If none, delete this text box.

(b) Cube casting and curing procedures:

Apparatus

- Cube Moulds: 150 x 150 x 150 mm
- Brick Towel, Wooden or Metal float
- Compaction equipment: Tamping rod

(c) Cube Preparation :

- Ensure that the test moulds are clean.
- Ensure that all the mould sides are at 90° angles with the base plate.

(d) Handling and demoulding of cubes

- Store cubes in a cool place for 24 hours.
- Store cubes indoors, out of direct sunlight, wind or extreme temperatures.
- The storage area should be free of vibration, with a relative humidity of at least 90% and a temp. of 22°C - 25°C.
- Demould /strip cubes 24 hours after manufacturing.
- Ensure cube sides are not scratched or damaged during demoulding.
- Then the specimens remove from the mould and curing in water for 28 days.
- After 28 days remove it from water

and left to air dry at room temperature condition.



(e) Procedure for Concrete Cube Compression Test

1. Remove the specimen from the water after specified curing time and wipe out excess water from the surface.
2. Take the dimension of the specimen to the nearest 0.2m
3. Clean the bearing surface of the testing machine
4. Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast.
5. Align the specimen centrally on the base plate of the machine.
6. Rotate the movable portion gently by hand so that it touches the top surface of the specimen.
7. Apply the load gradually without shock and continuously at the rate of 140 kg/cm²/minute till the specimen fails.
8. Record the maximum load and note any unusual features in the type of failure.



Cube Testing On UTM

IX. Result -

The main objective of this research is to compare mechanical properties of glass fiber reinforced concrete with Steel fiber reinforced concrete. So for that we need to perform the compressive strength test on cubes with respective additional fiber mix design.

Three specimens of each cubes were casted. Similarly for mix M30 only cement was partially replaced by 20% of Glass fiber crush and also Steel fiber crush. The casting of all specimens was completed within 2 days and the demolition is done after 24 hr of casting. After that cubes were put in curing tank for 28 days. After 28 days of curing the specimen were removed from tank and let too dry then got tested. The cube were tested on UTM for compression test.

(A) Readings of Compression test for Glass fiber reinforcement:

Mix	Fiber in Mix	Sr. No.	Load Kn	Stress Kn/m ²	Average
M30	20% of glass fibre	1	905.6	40.24	
		2	984.8	43.7	42.65
		3	990.3	44.01	

(B) Readings of Compression test for Steel fiber reinforcement:

Mix	Fiber in Mix	Sr. No.	Load Kn	Stress Kn/m ²	Average
M30	20% of Steel fibre	1	1203.2	53.47	
		2	1250.9	55.59	55.76
		3	1310.4	58.24	

X. Cost Estimation

Cost Estimation				
SL NO	Particulars/Softwares	Specifications	Quantity in No.s	Price in Rs
1	Cement	OPC cement of 43 grade	20 kg	250 rs
2	Coarse aggregate	20 mm crushed bold Rock	65 kg	180 rs
3	Fine aggregate	Sand of standard size	45 kg	100 rs
4	Super plasticiser	Addmixctue for workability	7 kg	90 rs
5	Steel fiber	Crushed steel wires	4 kg	380 rs
6	Glass fibre	Crushed glass fibre	4 kg	900 rs
7	Transport and lum sum		Lum sum	550 rs
Total Cost In Rupees				2450 rs

XI. CONCLUSION

A brief state-of-the-art report on fiber reinforced concrete is presented. Our understanding of fiber-matrix interaction, reinforcement mechanisms and performance characteristics is fairly advanced. Fiber reinforced concrete is a promising material to be used in the Middle-East for sustainable and long-lasting concrete structures. Its performance has already been proven in other hot and arid climates and in other chemically deleterious environments.

Fiber reinforced concrete pavements prove to be more efficient than conventional RC pavements, in several aspects Compressive strength for fiber reinforced concrete is seen to be improved. It can be clearly seen that strength at 28 days for CSFRC 1% is better than other cases hence recommended.

XII. FUTURE SCOPE

The cracks developing reinforced concrete members extend freely until encountering a reinforcing bar .

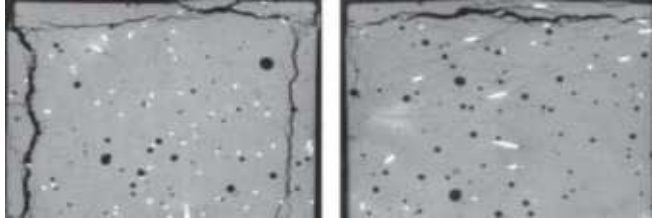
We need arrest the cracks to increase the life of structures.

The need of multi directional and closely spaced reinforcement for concrete arises here....

Fiber reinforced concrete FRC is a concrete mix that contains short discrete fibers they are uniformly distributed.

The fibers are classified into four types mainly such as steel,glass, synthetic and natural.

Orientation of these fibers are commonly in random.



XIII Acknowledgment

We would like to express our gratitude to all the individuals and organizations who have contributed to the successful completion of the study of Glass and Steel Fibre in concrete project. We extend our thanks to the research advisors and mentors for their guidance and support throughout the project. We are grateful for the resources and facilities provided by our institution, which facilitated the implementation and testing process. We also acknowledge the invaluable assistance from fellow team members who collaborated on various aspects of the project. Lastly, we

appreciate the participants who provided feedback and support during the testing phase.

XIV. References

The For studing the project we reffered some reference papers on internet.

We visited Wikipedia site.

Watched few videos related to this project topic.

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MARINE POLLUTION (OIL SPILLAGE) AND ITS REMOVAL

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ABSTRACT: Recent years have seen a tremendous increase in the need for studying and developing natural absorbents due to the huge negative environmental impact of oil spills. An assessment of the negative effects of oil spills in the past, the effects of oil spills on plants and animals, different methods adopted to control and clean them, including mechanical devices and sorbent materials, is presented in this paper. Additionally, it emphasized the importance of developing available materials in various parts of the world, particularly in tropical areas. As a result, sugarcane waste, corn waste, and tea waste are proposed as promising oil absorbent materials.

KEYWORDS: Marine Pollution, Oil Spillage, Activated Carbon, Adsorbent.

1) INTRODUCTION

All of the oceans on Earth are interconnected. In the year 2000, there were four perceived seas: Indian Ocean, Arctic, Pacific, and Atlantic. The International Hydrographic Organization established a brand-new ocean in the spring of 2000. Called the Southern Ocean, it surrounds Antarctica and reaches 60 degrees latitude. Additionally, there are numerous smaller ocean branches. Land frequently partially encloses seas. The South China Sea, the Caribbean Sea, and the Mediterranean Sea are the largest seas.

The risk of oil spills is rising as a result of the growing industrial activity in many parts of the world and the daily consumption of a large quantity of crude oil from numerous offshore and onshore oil fields and the transportation of crude and its product. One of the most widespread forms of pollution that has a negative impact on marine life and the ecosystem is the oil spill. Among all unique adsorbent, Bio-mass waste is liked as an oil tidy up innovation because of its Profile Debasement and lightness. This study examines the adsorption of raw petroleum by getting ready attractive enacted carbon utilizing sugarcane, corn, and tea squander. The pH, DO, BOD, COD, hardness, and turbidity of the water, as well as oil spillage characteristics, were collected, treated, and analyzed. Results showed that there was very little change in the pH, turbidity esteems but rather there was a slight expansion in the Body and COD qualities. On correlation with the three oil expulsion techniques, the adsorption utilizing the attractive enacted carbon - tea has higher assimilation limit.

2) OBJECTIVE

To learn about the different sorts of marine contamination.

Using magnetic activated carbon, sugarcane waste, tea waste, corn waste, and other waste, and absorption to treat the marine water contaminated by oil spills

To analyze the qualities of treated oil spilled water with the current qualities.

3) RELATED WORK

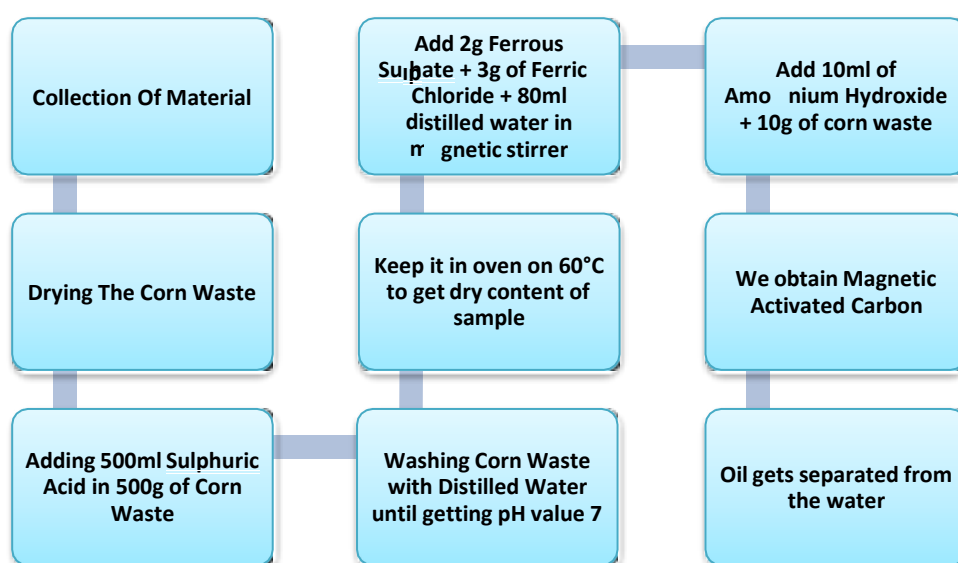
Major environmental issues abound in the vast, dynamic, and complex marine environment. There is proceeding with strain on the marine climate from clashing exercises including hydroponics, horticulture, fisheries, urbanization, modern turns of events, transportation, preservation and the travel industry. There are more and more legal challenges, and the scale and public opinion regarding individual development projects are unprecedented.

Most of the time, management in the marine environment is scattered, complicated, and poorly understood. A survey of logical and famous writing tracked down instances of fantastic, dubious and lacking undertakings in marine and seaside regions.

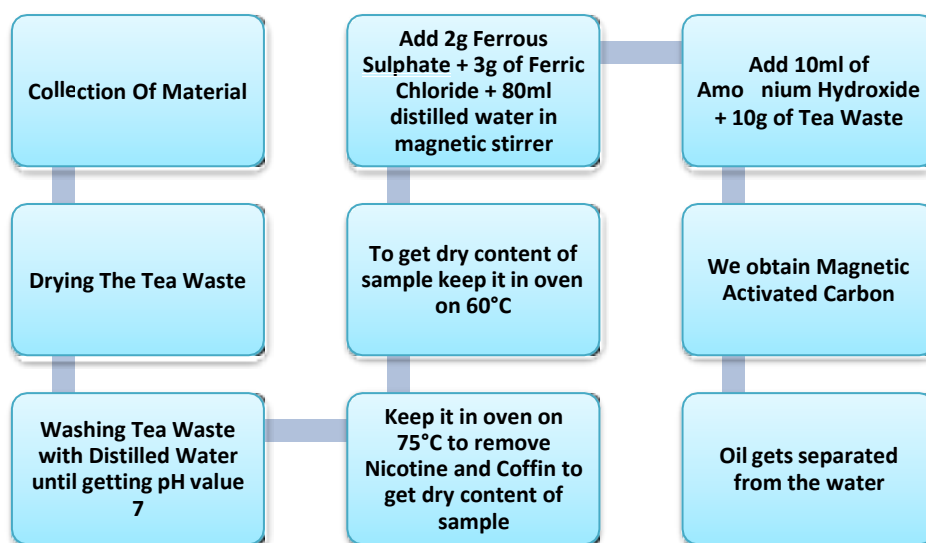
marine environment is a complex web of habitats and species intertwined by intricate physical and ecological processes that interact with humans and their activities on numerous levels. The open ocean, the deep sea, coral reefs, salt marshes, rocky shores, and other marine habitats are frequently grouped into ecosystems. despite the fact that they are all interconnected and the effects of one ecosystem on another. Biological system construction and capability are significant elements while surveying influences. Ecosystem services are the numerous benefits these habitats and communities provide to humans. The clearer of these are the fish, shellfish and different food sources that we eat, and the sporting or tasteful advantages we get from the ocean. In addition, a lot of coastal communities have deep spiritual and cultural ties to the sea. However, there are numerous additional services that are less obvious.

4) METHODOLOGY

1) Perform a sample test with sugarcane



2) Conduct a test on a sample using corn waste and tea waste



5) RESULT

1) Determination of Turbidity: -

Turbidity measured this way uses an instrument called a nephelometer. With the detector set up to the side of the light beam. More light reaches the detector if there are lots of small particles scattering the source beam than if there are few. The units of turbidity from a calibrated nephelometer are called nephelometric Turbidity Units (NTU). Sample is taken and kept in nephelometer to determine turbidity. Thus the turbidity value for sample is as follows.

SR.NO	SAMPLE	TURBIDITY (NTU)
1	Marine Water	6
2	Marine Water + Oil Mixing	8
3	After removing oil by using sugarcane waste	6.32
4	After removing oil by using corn waste	6.67
5	After removing oil by using tea waste	7

2) Determination of pH: -

The pH value of marine water indicates the negative log of hydrogen ion concentration present in marine water. Sample is taken in a beaker and then pH paper was inserted and pH was determined. The value of pH measured for adsorption is as follows.

SR.NO	SAMPLE	pH VALUE
1	Marine Water	7.44
2	Marine Water + Oil Mixing	6.56
3	After removing oil by using sugarcane waste	7.22
4	After removing oil by using corn waste	7.1
5	After removing oil by using tea waste	7.31

3) Determination of Biological Oxygen Demand (BOD): -

Biochemical oxygen demand (BOD) is a measure of organic pollutants, one of the causes of water pollution. In the organic carbon cycle, organic pollutants in water are oxidized by aerobic bacteria using dissolved oxygen.

SR.NO	SAMPLE	BOD (mg/l)
1	Marine Water	26
2	Marine Water + Oil Mixing	130
3	After removing oil by using sugarcane waste	90
4	After removing oil by using corn waste	115
5	After removing oil by using tea waste	80

- The BOD efficiency after treatment using sugar cane is 30.8 %.
- The BOD efficiency after treatment using corn waste is 11.53 %.
- The BOD efficiency after treatment using tea waste is 38.5 %.

4) Determination of Chemical Oxygen Demand

The chemical oxygen demand (COD) is the amount of oxygen consumed to completely chemically oxidize the organic water constituents to inorganic end products. It was carrying out to determine the organic oxidize able matters content of water samples.

SR.NO	SAMPLE	COD (mg/l)
1	Marine Water	234
2	Marine Water + Oil Mixing	550
3	After removing oil by using sugarcane waste	492
4	After removing oil by using corn waste	300
5	After removing oil by using tea waste	224

5) Determination of Dissolved Oxygen: -

Dissolved oxygen is a measure of the amount of oxygen dissolved in the water column, and is a fundamental requirement for the maintenance of balanced populations of fish, shellfish, and other aquatic organisms, in marine water. The value of the Dissolved Oxygen (DO) measured for adsorption is as follows.

SR.NO	SAMPLE	DO (mg/l)
1	Marine Water	4
2	Marine Water + Oil Mixing	3
3	After removing oil by using sugarcane waste	3.4
4	After removing oil by using corn waste	3.6
5	After removing oil by using tea waste	3.72

6) Determination of Hardness:-

The ability of the water to form lather with the soap solution. This is due to the presence of carbonates and bicarbonates of calcium and magnesium.

Hardness in mg/l of CaCO_3 = Volume of EDTA x 1000/Volume of sample. The value of the hardness measured for adsorption is,

SR.NO	SAMPLE	HARDNESS (mg/l)
1	Marine Water	4350
2	Marine Water + Oil Mixing	4370
3	After removing oil by using sugarcane waste	4365
4	After removing oil by using corn waste	4361
5	After removing oil by using tea waste	4355

6. CONCLUSION

- The characteristics of the water collected from the coast were examined. On a laboratory scale, oil spilled into marine water was treated with the help of the preparation of magnetic activated carbon.
- Attractive initiated carbon is ready with the utilization of three kinds of Bio-mass squanders, for example, sugarcane, corn and tea squanders.
- In the wake of treating the oil spilled marine water with attractive actuated carbon (ready with three sort of waste). The pH, BOD, and COD of the treated sample are compared to those of the untreated sample for analysis.
- The system's "use of Bio-Mass Waste" treatment of oil spilled marine water has been demonstrated. In this water lacking world it is so useful to treat the oil spilled marine water.
- In addition to drinking, the treated water can be used for domestic purposes.
- The successful development and implementation of guidelines and regulations for the control of ballast water depends on the early involvement of all parties who are interested. The transfer of non-indigenous species is a problem that affects society as a whole and not just the shipping industry.
- At the moment, turbidity may be the most reliable indirect sign that ballast water may contain living organisms. Automatic inline equipment that provides continuous readouts for subsequent computer storage or direct transmission to the shore can be used to monitor basic parameters of water quality.
- The refinement interaction of water might decrease the grouping of particulate matter including suspended particles, parasites, microorganisms, green growth, infections, organisms; and a variety of dissolved and particulate materials derived from surfaces with which rainwater may have come into contact.

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STUDY OF E- WASTE DISPOSAL

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Abstract— Waste electrical and electronic equipment (WEEE) is becoming major threat to the whole world. Its toxic emissions mixed with virgin soil and air and causing harmful effects to the entire biota either directly or indirectly. Direct impacts include release of acids, toxic compounds including heavy metals, carcinogenic chemicals and indirect effects such as bio magnification of heavy metals. Many private firms are involved in collecting, dismantling, separation and exporting e-wastes for recyclers. However, strict regulations are currently being followed as on approval of such firms such as e-steward certification by Basel action network in US, they also involved in public awareness programs; this review is based on collected information from various journal articles, websites etc

It consists of a wide range of elements and compounds including both valuable and hazardous materials. E-waste can contaminate the environment and threaten human health through its improper recycling and disposal methods. Moreover, E-waste represents a significant potential source of valuable materials to make the recycling of this waste economically fascinating. This chapter presents an overview of E-waste treatment technologies including sanitary landfill and recycling of precious metals, non metal elements, plastics, and glasses. The recycling of E-waste has become a significant issue because of the strange growth in the production of E-waste and increased awareness among people regarding environmental protection. Consequently, the primitive treatment technologies cannot reach the future obligations of industry because of the potential risk of environmental contamination, high cost, and low efficiency. An effective utilization of the reusable resources is therefore a prerequisite for developing new technologies to treat E-waste.

INTRODUCTION

E-waste is an abbreviation for electronic waste. The term is applied to discarded electrical or electronic equipment that is unfit for further use because of malfunctioning, lack of repair or spare parts, or is too outdated to be sold commercially efficiently. E-waste has a major impression on the environment. Every year millions of tons of e-waste enter landfills, and some of them end up in the waterways, seas , and oceans. The e-waste emits toxic substances such as mercury, lead, cadmium, polychlorinated biphenyls, benzene, and dioxins, polluting soil and water, threatening water and air quality, and harming the health of humans and the environment. What is e-waste: E-waste consists of devices and appliances that are no longer needed or are malfunctioning. It includes the materials that are no longer used or are obsolete.

PROBLEM STATEMENT

E Waste can be nand onsudefined as business cmer electronic equipmet that is not working, unwantedr has reached the end of its useful life. E Waste is a persistent and significant issue that is prevalent in today's technologically inclined society .E-waste is broadly divided into three types:

1. Cooling equipment such as fridges and freezers
2. Telecommunications and communication equipment
3. Consumer electronics devices (Phones, Laptops , Monitors, and TV's)

Each of these categories require a personalized method of disposal due to the differences in the materials that they constitute. In this proposal, we will highlight the types of

e waste that will be found in an educational community and what we can do to minimise it

An educational community is a significant source of E waste as we have a prevalent need of multiple electronic devices that are up to date and functioning properly. E-waste is not generated only by the personal devices of each of the students but also includes the large number of printers, fax machines, optical fibres (for wireless communication) and various other devices that are available for use for the general public. A typical college student, in their 4 years of undergraduate studies, have at least 2 electronic devices - smartphone and laptop. Along with that public printers and charging wires are used. With a laptop or smartphone, once their lifespan ends, they are typically either sold for spare parts or stay on a shelf in the house collecting dust. But old charging cables tend to find their way to the bottom of a dustbin where they prove to be environmentally hazardous. Looking at this example and magnifying it to other electronic devices we use in our daily lives, we can see how E-waste is a huge problem - and spread awareness on the detrimental effects of E-waste, within people over a range of velocities. Landslides may be triggered by earthquakes, rain, permafrost thaw, deforestation, and by other factors. Damaging wildfires, floods, volcanic eruptions, and earthquakes are often made worse by subsequent landslides. Submarine landslides, or surface landslides, that move into water may trigger tsunamis. Although landslides can result in significant human and economic losses, they also play a role in maintaining ecological diversity. A number of landslide mitigation techniques are explored.

OBJECTIVES OF PROJECT

The objective of e-waste management is to safely and responsibly dispose of or recycle electronic devices and components that are no longer in use. This helps to prevent pollution and conserve natural resources by reducing the need for mining new materials for new products. Additionally, many electronic devices contain valuable materials like gold, silver, and copper which can be recovered and reused through proper e-waste management.

METHODOLOGY

1) Recycling

Recycling is an essential element of e-waste management. Properly carried out, it should greatly reduce the leakage of toxic materials into the environment and

mitigate against the exhaustion of natural resources. However, it does need to be encouraged by local authorities and through community education. One of the major challenges is recycling the printed circuit boards from the electronic wastes. The circuit boards contain such precious metals as gold, silver, platinum, etc. and such base metals as copper, iron, aluminium, etc. One way E-waste is processed is by melting circuit boards, burning cable sheathing to recover copper wire and open-pit acid leaching for separating metals of value. India has emerged as fifth largest electronic waste producer in the world. Computer devices account for nearly 70% of E-waste, with the contribution of telecom sector being 12%, medical equipment being 8%, and electric equipment's being 7% of the annual e-waste production.

2) Repair

One of the factors which compound the e-waste problem is the diminishing lifetime of many electrical and electronic goods. There are two drivers (in particular) for this trend. On the one hand, consumer demand for low cost products mitigates against product quality and results in short product lifetimes. On the other, manufacturers in some sectors encourage a regular upgrade cycle, and may even enforce it through restricted availability of spare parts, service manuals and software updates, or through planned obsolescence. Consumer dissatisfaction with this state of affairs has led to a growing repair movement. Often, this is at a community level such as through repair cafés or the "restart parties" promoted by the Restart Project. The "Right to Repair" is spearheaded in the US by farmers dissatisfied with non-availability of service information, specialised tools and spare parts for their high-tech farm machinery. But the movement extends far beyond farm machinery with, for example, the restricted repair options offered by Apple coming in for criticism. Manufacturers often counter with safety concerns resulting from unauthorised repairs and modifications.

3 Landfilling

This refers to the practice of essentially digging a massive hole in the ground, filling it with waste and then covering it back up with soil. While the pits are lined with clay or plastic with a leachate basin to prevent toxic waste from leeching into the surrounding environment, some substances such as cadmium, lead, and mercury inevitably find their

way into the soil and groundwater, causing contamination.

4 Acid Bath

Soaking electronic circuits in powerful sulphuric, hydrochloric, or nitric acid solutions separates metals from the electronic pathways. The metals can then be recycled and used in the manufacture of new products. However, the highly hazardous acid waste needs to be very carefully disposed of to prevent it from finding its way in...

5 Burning

Commonly referred to as smelting. Although the process is quite dangerous, if done correctly, it can be done very cleanly and produces the most valuable of the metals in the most efficient way

6 Dumping:

This involves filling old containers, making a hole in the ground, and dumping the material there. Usually, the location is not chosen carefully and may contain several contaminants. ➤ Disposal: Several companies in the UK offer a collection service and disposal, or do it for you, either in a safe manner or with others who are less careful

CONCLUSION

The disposal of electronic waste is hazardous to people and the environment. In addition, it is a significant source of pollution. However, if you recycle electronic waste properly, there will be many benefits. The disposal of electronic waste can also pose a health risk to humans. Although most electronic wastes can be recycled, only a limited amount of electronic waste can be recycled. Thus, it is necessary to ensure that electronic wastes are recycled appropriately and safely. For instance, certified electronic waste facilities can safely dispose of electronic waste. In addition, the certified electronic waste facilities are equipped with the equipment required to recycle the electronic waste. As a result, the certified electronic waste facilities will reduce pollution in the environment and keep humans safe. Therefore, you can rest knowing that you safely dispose of electronic waste.

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Rain Water Harvesting

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Abstract—

Water's subsequent in enlargement of weights on the allowed freshwater assets. Old technique for damming waterway and transporting water to urban zone has its own issues of everlasting inconveniences of social and political. Keeping in mind the end goal to save and take care of our day by day demand of water prerequisite, we have to think for elective savvy and generally less demanding mechanical techniques for monitoring water. Rain Water reaping is outstanding amongst other techniques satisfying those necessities.

Keywords – Rain, Borewell, Rainwater.

I. INTRODUCTION

The term Rainwater Harvesting is usually taken to mean the immediate collection of rainwater running off surfaces upon which it has fallen directly. This definition excludes run-off from land Watersheds into streams, rivers, lakes, etc.

It includes water that is collected within the boundaries of a property, from roofs and surfaces.

The Rainwater harvesting is the simple collection or storing of Water through scientific techniques from the areas where the rain falls.

It involves utilization of rain water for the domestic or the agricultural purpose.

The method of rain water harvesting has been into practice since ancient times.

II. AIM & OBJECTIVE

A. Aim & Objective

Aim - Feasibility of rain water harvesting.

Objectives: -

- 1) To modify and develop the Rain Water harvesting system.
- 2) To make aware about our product.
- 3) To implement our product in various states of India.

B. Ways Of Water Harvesting

- 1) Capturing run-off from rooftops, roads.
- 2) Capturing run-off from local catchments.
- 3) Capturing seasonal flood water from local streams.
- 4) Conserving water through watershed. management. It involves utilization of rain. Water for domestic or agricultural purpose.

III. ADVANTAGES & DISADVANTAGES

Advantages: -

- 1) Reduces Flooding & Erosion.
- 2) Reduces Water Bills.
- 3) Reduces Demand On Ground Water.
- 4) Can Be Used For Non Drinking Purposes.

Disadvantages: -

- 1) Supplies can be contaminated by bird/ animal droppings on catchment surfaces and guttering structures unless they are cleaned / flushed before use.
- 2) Poorly constructed water jars/containers can suffer from algal growth and invasion by insects, lizards and rodents.
- 3) They can act as a breeding ground for disease vectors if they are not properly maintained.

A. Ways Of Water Harvesting

- 1) Surface Run Off Harvesting: -

It Is A Method In Which Rainwater Flowing As Surface Runoff Is Caught & Used For Recharging Aquifers By Adopting Appropriate Methods.

- 2) **Roof Top Rain Water Harvesting:** -
In Rooftop Harvesting, Roof Becomes The Catchment & The Rainwater Is Collected From Roof Of The House/Building. It Can Be Either Stored In Tank Or Diverted To Artificial Recharge System

B. Techniques Of Rain Water Harvesting

- 1) **Storage Of Rainwater On Surface For Future Use:** -
It is a method in which rainwater flowing as surface runoff is caught and used for recharging aquifers by adopting appropriate methods.
- 2) **Recharge To Ground Water:** -
The collected rainwater is transferred to the ground through suitable means for recharging the depleting aquifers.



C. Process

A rainwater harvesting system has three main stages:

1. **Collecting & transporting rainwater:**

This is done through catchment areas & conduits. The catchment of a water harvesting system is the surface which receives rainfall directly. It can be a paved area like the terrace or courtyard of a building. Conduits are the pipelines that carry rainwater from the catchment or rooftop to the harvesting system.

2. **Filtration:** A filter unit is a chamber filled with filtering media to remove debris and dirt from water before it enters the storage tank or recharge structure.

Identify applicable funding agency here. If none, delete this text box.

3. **Storage in tanks for reuse /**

recharging the groundwater levels: The harvested water can now be stored in storage tanks for immediate usage, which are designed according to the water requirements of the society. Existing non-potable water storage tanks in the society can also be used to store the harvested rainwater. The collected rainwater can also be used to recharge the groundwater levels by using structures like dug wells, bore wells, recharge trenches and recharge pits.

D. IMPLEMENTATION OF RAIN WATER HARVESTING

Rainwater harvesting (RWH) system is a technology that focuses on sustainability and support the sustainable environment development. The implementation of RWH systems provides many environments and financial benefits. Some of the environment benefits of RWH system are the reduction of surface runoff, reduce the burden of soil aquifer, and provide the availability of clean water. This study analyzed the RWH system implementation benefits both in environment and financial side. The financial benefits of RWH system implementation are calculated based on a number of rainwaters that can be used to replace the need for clean water. The environment benefits defined by the reduced of main water tap use and the reduced of generated roof runoff volume. This study used a simple RWH system that uses the roof as a catchment area, the pipeline as a distribution system, and tank as the storage system. The water use is for domestic potable and non-potable for a household with up

to four occupants in Bandung. The catchment area is taken 70 m². A water balance model for various scenarios was developed to calculate the algorithm of the system. The costs taken in RWH system include the construction, installation, maintenance and operational costs. The analysis shows that the implementation of RWH systems provides advantages over the use of conventional systems. It can save clean water use up to 54.92% and provide runoff reduction up to 71.53%. RWH system applied requires

Additional costs approximately only 0.66% from the value of the house. It was found that it is possible to achieve payback in RWH system implementation under several scenarios.

E. How To Create Rooftop Rainwater Harvesting System for Your Client

- Check the roof surface first. Whether it is suitable to collect quality rainwater.
- Install gutter meshes to prevent blocking gutters from leaves and debris.
- Fit gutter outlets.
- Install first flush water diverters to prevent the first flush of most contaminated rainwater from entering the tank
- Install tank screen to keep mosquitoes and pests out.
- Select the right size of the water tank. Consider annual rainfall, roof catchment area, and water usage.
- Fit insect-proof screen to the end of all pipes and to tank overflow outlets.
- Install a pump system to distribute the water inside and outside of the premises.
- Fit insect-proof screen to the end of all pipes and to tank overflow outlets.
- Fit a water level indicator to help monitor water usage.

IV. DESIGN, PROCESS & IMPLEMENTATION

➤ Design Of Recharge PIT:

1) The recharge pit should be filled with the metal, to recharge slit free water.

2) Hence the materials to be filled in the pit are 60 mm metal, 40 mm metal, 20 mm metal, fine sand. The material should be filled depth wise in the pit. The coarser material should be filled at the bottom and finest on the top. The uppermost fine sand layer can be separated from the 20mm metal layer by using non corrosive wire mesh. It will help for the yearly maintenance. Depth of material for recharge pits:

Material to be filled	% Depth of material	Depth (in m)
60 mm metal	30%	0.45m
40 mm metal	30%	0.45 m
20 mm metal	20%	0.30 m
Fine sand	20%	0.30 m

➤ Result And Discussions:

Design of the rainwater harvesting system of GECA campus is

done using Geographic Information System (GIS).

For Catchment 1: Runoff potential for one storm of two hours = 5, 09,018 litres

For recharge, Size of recharge pit (1 and 2) is taken as = 10 m X 10m X

1.5 m % of runoff from rainfall obstructed and recharge in pit = 58.9% = 2,99,811 litres

For Catchment 2 :

Runoff potential for one storm of two hours = 2, 36,232 litres For recharge, size of recharge pit (3) is taken as= 5 m X 5 m X 1.5m

% of runoff from rainfall obstructed and recharge in pit = 15.87% = 37,490 litres

Total annual runoff potential from catchment area considered (1 and 2): 1, 19, 24,000 litres

Total annual recharge through pits: 53, 96,816 litres

Filter material for filling the recharge the pit is decided as 60mm metal (30% depth), 40 mm metal (30% depth), 20 mm.

Approximate expenditure for:

Recharge pit 1: Rs. 1,

44,637.5/-Recharge pit 2: Rs. 1,
44,637.5/-

Recharge pit 3: Rs. 37,409.375/-

Approximate expenditure for underground storage tank (5m X 5m X 1.5 m) (Optional) is Rs. 1, 82,052.875/-
Recharge pit/ underground tank can be connected to bore wells for bore well recharge.

CONCLUSION

In This Roof Top Rain Water Harvesting Project There Is Small Baby Steps To Be Take Care Of & A lot Of Benefits Can Be Aailed. Water harvesting improves the use of available water from precipitation and run-off by concentrating it for immediate use and storage. The control systems that are implemented can divert water to decrease erosion and flood risk. Under climate change, water harvesting will improve resilience to stresses from droughts and extreme rainfall. Water harvesting can also recharge depleted groundwater sources.

ACKNOWLEDGMENT

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I would like to take this opportunity to express my gratitude to all of my group members Aditya & Aniket.The project would not have been successful without their cooperation and inputs. I Would Also Like To Thank Sai Construction For Sponsoring This Project & Letting Us Work At Their Site “ Sai Shruti “ At Indapur,Dist – Pune – 413108.

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Abstract- Retrofitting is a technique of modification of existing structure to make them more resistant to seismic activity, ground motion or soil failure due to many reasons such as earthquake, bad quality of workmanship, design, environmental effects, etc. This project addresses methods of Analysis & methods of retrofitting. The safety of non-engineered structures against many reasons is a great concern because most losses of lives during earthquakes have occurred in such buildings. It is used to improve the structural capacities including strength, stiffness, ductility, stability of a building found to be deficient. Retrofitting is a special challenge if the structure is a historically significant. So many expansive methods are available for retrofitting & choice is a challenge. The fibre reinforced polymer composites has embraced by construction industry as alternate of repairing & strengthening of rcc structures. The research summarise the methods of retrofitting & behaviour of rc elements after they retrofitted with FRP.

(**Keywords**—RC, Retrofitting, FRP)

I. INTRODUCTION

A . Genaral Concept :

In the current scenario, deterioration of rc structures is a worst problem. Many buildings are informally constructed in a traditional manner without formal design by qualified Engineers or Architects. Such buildings involve stone, brick, concrete blocks, rammed earth, wood posts and thatch roof or combination of some or all the above materials. They are built with mud, lime or cement mortar. Some times combination. of mortars having a mix is also used., The safety of these non-engineered buildings against earthquakes is of great concern especially because because most losses during earthquakes occurred in such a buildings.

Modification of existing structure to make them more resistant to seismic activity,ground motion or soil failure due to many reasons such as earthquake bad quality of workmanship design environmental effects and etc. The purpose is to make the building safer and less prone.

Retrofit strategy refers to options of increasing the strength, stiffness and ductility of the elements or the building as a whole. In retrofitting, the structure must be designed so it is in keeping with its purpose of use and is both safe and durable, with consideration given to the ease of retrofitting construction and post-retrofitting maintenance,as well as overall economy and environment-friendliness.It aims to strengthen a structure to satisfy the requirements of the current codes for seismic design. In respect , seismic retrofit is beyond conventional repair or even rehabilitation, refer to the goals, objectives and steps such as condition assessment of the structure, evaluation for seismic forces The extent of modification has to be determined based on the principle of introducing sufficient anchorage of all elements, providing bracing to vertical load carrying members in order to avoid premature mode of failure and to ensure continuity of all structural components in a building. The seismic resistance of buildings is lowered with passage of time due to material property degradation and structural strength loss.

Many options for retrofitting a structure are possible; the ones which are used traditionally for a long time now such as Addition Of New Shear Walls. Addition Of Infill Walls, Addition Of Wing (Side) Walls, Addition Of Buttresses, Jacketing Of Reinforced Concrete Members, Propping up, Steel collars, Casing, Building up, Bonding Steel Plates or Steel Jacketing. However, with increase in research and introduction of new materials and technology there are new ways of retrofitting the structure with many added advantages. Introduction of Fibre Reinforced Composites being one of them.

TERMINOLOGY

Buildings decay due to weather, lood effects and foundation settlement etc. The types of intervention necessary to enhance the performance of the building can be broadly grouped under three categories Repair, Restoration and Strengthening..

REPAIR:

The purpose of repairs is to rectify the observed defectrs and bring the building to reasonable architectural shape so that all services start functioning Repairs do not improve structural strength or stability. I t may hide the structural defects. Outwardlyand it may appear good. It may suffer from structural weakness.

Repairs include following interventions:

i) Patching cracks and plastering, ii) Fixing doors, windows, broken glass panes. i) Setting right electrical installation, wiring etc. iv) Fixing services such as gas line, plumbing services including water pipes, sewerage line etc. v) Rebuilding non- structural walls, partition walls, plastering etc. vi) Re-fixing roof tiles vii) Repair to flooring and correcting slope for drainage etc. viii) Providing decorative finishes, white washing, ix) Painting wood work. x) Attending to root leakage during rain etc.

Restoration:

The main purpose is to structurally treat the building with an aim to restore its original strength. This intervention is undertaken for a damaged building if one is sure that the original strength provides an adequate level of safety for future earthquake disaster

Some of the common restoration techniques are:

- i) Removal of a partition or defective wall and rebuilding it with richer mortar
- ii) Crack scaling using epoxy to regain the strength of a structural component.
- iii) Adding wire mesh on either side of a cracked component, crack stitching etc, with a view to strengthen

STRENGTHENING IS NOTHING BUT RETROFITTING.



Fig. Retrofitting-for structures by Strengthening

GOALS AND PRINCIPLES :

1. Increasing the lateral strength and stiffness of the building, the ductility and enhancing the energy dissipation capacity.
2. Giving unity to the structure.
3. Eliminating sources of weakness or those that produce concentration of stresses
4. The retrofit scheme should be cost effective.
5. Each retrofit strategy should consistently achieve the performance objective.
6. Many environmental and natural disasters, earthquake being the most affecting of all, has also produced a need to increase the present safety levels in buildings.

Performance objectives :

The goal is to protect human life, ensuring that the structure will not collapse upon its occupants or passers by, and that the structure can be safely exited. Under severe seismic conditions the structure may be a total economic write-off, requiring tear-down and replacement.

Structure survivability - The goal is that the structure, while remaining safe for exit, may require extensive repair (but not replacement) before it is generally useful or considered safe for occupation. This is typically the lowest level of retrofit applied to bridges Structure functionality. A high level of retrofit, this ensures that any required repairs are only "cosmetic" for example, minor cracks in plaster, drywall and stucco. This is the minimum acceptable level of retrofit for hospitals .

NEED OF RETROFITTING :

The retrofitting is one of the best options to make an existing inadequate building safe against future probable earthquake or other environmental forces, following are some deficiencies for which failure & damage is occurred.

BUILDING DEFICIENCIES The building deficiencies can be broadly classified as Local Deficiencies and Global Deficiencies.

Local Deficiencies : Local deficiencies lead to the failure of individual elements of the building. The observed deficiencies of the elements are summarized.

Columns - Inadequate shear capacity, b Lack of confinement of column core. Lack of 135° hooks, with adequate hook length, c. Faulty location of splice just above the floor, with inadequate tension splice length. d. Inadequate capacity of corner columns under biaxial seismic loads. e. Existence of short and stiff columns .

Global Deficiencies : Global deficiencies can broadly be classified as plan irregularities and vertical irregularities, as per the Code. The items left out are listed under miscellaneous deficiencies. Some of the observed irregularities are as follows.

Plan Irregularities a. Torsional irregularity due to plan symmetry and eccentric mass from water tank. b. Frequent re-entrant

comers c Diaphragm discontinuity due to large openings or staggered floors, along with the absence of collector elements. d. Out-of-plane offset for columns along perimeter.

Vertical Irregularities - Stiffness irregularity, soft storey due to open ground storey, b. Mass irregularity c. Vertical geometric irregularity from. set-back towers. d. In-plane discontinuity for columns along the perimeter of the building e. Weak storey due to open ground storey.

ADVANTAGES OF RETROFIT :

Strengthening or Retrofitting Versus Reconstruction

Replacement of damaged buildings or existing unsafe buildings by reconstruction is, generally, avoided due to a number of reasons, the main ones among them being

a) Higher cost than that of strengthening or retrofitting. In most instances. however, the relative cost of retrofitting to reconstruction cost determines the decision. As a thumb rule, if the cost of repair and seismic strengthening is less than about 50 percent of the reconstruction cost-the retrofitting is adopted.

b) Preservation of historical architecture, and

c) Maintaining functional social and cultural environment
This shall also require less working time and much less dislocation in the living style of the population. On the other hand reconstruction may offer the possibility of modernization of the habitat and may be preferred by well-to-do communities.

III. LITERATURE SURVEY

Author Name - Minakshi V. Vagbani, Sandip A. Vasanwala, & Atul K. Desai

Title - Advanced Retrofitting Techniques for RC Building

Publication Year- 2014

Technology Used - the different retrofitting techniques available and its suitability for particular conditions. Jacketing is excellent for column but it may not be too effective for beam or slab Finally, selection criteria for retrofitting technique are briefly discussed. A higher degree of damage in a building is expected during an earthquake if the seismic resistance of the building is inadequate. The decision to strengthen it before structural system of deficient building should be adequately strengthened in order to attain the desired level of seismic resistance.

Author Name - Dr. Gopal Rai

Title - New and emerging technologies for retrofitting and repairs

Publication Year- 2018

Technology Used - To meet up the requirements of advance infrastructure new innovative materials/technologies in civil engineering industry has started to make its way. Any technology or material has its limitations and to meet the new requirements new technologies have to be invented and used.

Author Name - Giuseppe Oliveto & Massimo Marletta

Title - Seismic Retrofitting of RC buildings using traditional and innovative techniques.

Publication Year- 2005

Technology Used - After an introduction which explains why there are so many vulnerable structures in areas of high or moderate seismic hazard around the world, the authors consider the specific case of Eastern Sicily. The paper proceeds with an illustrative description of the seismic action and then addresses the problem of evaluating the seismic resistance and vulnerability of engineering structures. The application of the methodology presented to reinforced concrete buildings in Eastern Sicily clarifies the concepts discussed. In particular, the concepts of seismic resistance, seismic vulnerability and seismic over-resistance become easily understood and appreciated.

Author Name - Amlan K. Sengupta, Chemuru Srinivasulu Reddy, Badari Narayanan V T and Asokan A

Title - Seismic Analysis and Retrofit of existing multi-storeyed buildings in India - An overview with a case study

Publication Year- 2019

Technology Used - The paper presents a review of the existing retrofit strategies that are applicable for multi-storeyed residential reinforced concrete buildings addressed in the project. It also presents a case study of a three storeyed building, located in an urban area in earthquake zone III. After the earthquake in Bhuj, Gujarat, in 2001, there has been a concerted effort to address the seismic vulnerability of existing buildings in India. This paper is part of a project, whose aim is to evolve methodologies to assess the seismic vulnerability of reinforced concrete three- to ten- storeyed, residential and commercial buildings and to propose retrofit measures for the structurally deficient buildings .

Author Name - E. Brühwiler ,Ecole Polytechnique Fédérale de Lausanne

Title - Rehabilitation and strengthening of concrete structures using Ultra-High Performance Fibre Reinforced Concrete

Publication Year- 2012

Technology Used - An original concept using Ultra-High Performance Fibre Reinforced Concrete (UHPFRC) for the rehabilitation and strengthening of concrete structures has been developed and validated by means of site applications.

IV . PROPOSED METHODOLOGY

METHOD OF ANALYSIS -

components of seismic evaluation methodology:

The evaluation of any building is a difficult task, which requires a wide knowledge about the structures, cause and nature of damage in structures and its components, material strength etc. The proposed methodology is divided into three components:

1] **Condition Assessment** based on :

(i) data collection or information gathering of structures from architectural and structural drawings.
(ii) performance characteristics of similar type of buildings in past earthquakes,
(iii) rapid evaluation of strength, drift, materials structural components and structural details. This component of methodology is primarily based on ATC-14 project and is used basically for undamaged existing structures.

2] **Visual Inspection/Field Evaluation** based on observed distress and damage in structure Visual inspection is more useful for damaged structures however it may also be conducted for undamaged structures.

2] **Non-Destructive Evaluation (NDE)** is generally carried out for quick estimation of materials strength, determination of the extent of deterioration and to establish causes remain out of reach from visual inspection and determination of reinforcement and its location. NDT may also be used for preparation of drawing incase of non- availability.

METHODS OF RETROFITTING

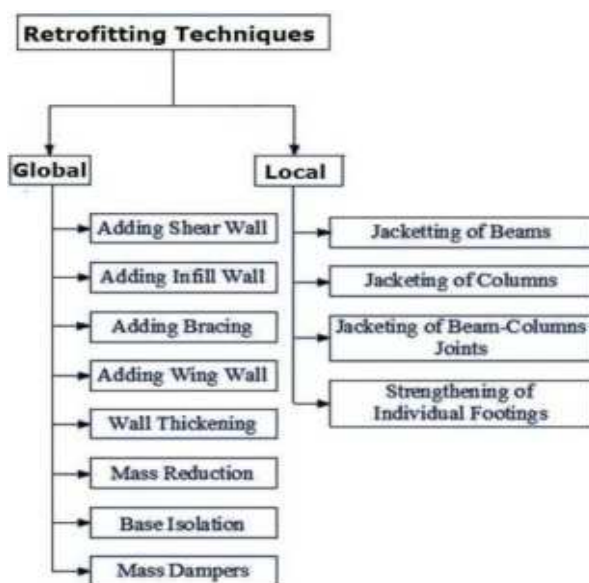


Fig. FLOWCHART

SELECTION OF RETROFITTING METHOD :

In selecting the retrofitting method, the current status of the existing concrete structure as determined through inspection, the performance of the structure, the performance required of the structure after retrofitting. the conditions for retrofitting construction work, the ease of maintenance. economy and other factors shall be considered include the effectiveness of the various retrofitting methods with respect to the required performance improvements, the viability of execution of the retrofitting work, the impact of the retrofitting work on the surrounding environment.



Fig.Retrofitting of a bridge



Fig. Structural-Damage

NEW EMERGING TECHNIQUE :FIBRE REINFORCED POLYMER (FRP)-

Concept Of FRP :

To retrofit or strengthen a sound structural member to resist increased loads due to changes in use of the structure or to address design or construction errors.

Composite material made of fibers in polymeric resin. Le all fibers & resins used to create the composite laminate Commonly used forms of FRC viz. Pre cured CFRC (Carbon Fibre.Reinforced Composite), Glass Fibre Reinforced polymer Composites (GFRC) rebar, glass fibre roll, etc.

-All applicable resins are used to bond it to the concrete substrate .

Fibre Reinforced Polymer (FRP) composites comprise fibres of high tensile strength within a polymer matrix such as vinylester or epoxy. The role of FRP for strengthening of existing or new reinforced concrete structures is growing at an extremely rapid mainly to the ease and speed of construction, and the possibility of application without disturbing the existing functionality of the structure. FRP composites have proved to be extremely useful for strengthening of RCC structures against both normal .

CHALLENGES AND TECHNICAL ISSUES

-The main concern with FRP composites is long-term durability because the materials do not have sufficient historical performance data in bridge applications. There is a concern among bridge engineers for the long-term integrity of bonded joints and components under cyclic fatigue loading There are concerns with improper curing of the resins and moisture absorption and/or ultraviolet light exposure of composites that may affect the strength and stiffness of the structural system. Certain resin systems are found ineffective in the presence of moisture, In the case of a glass fibre composite, moisture absorption may affect the resin and allow the alkali to degrade the fibres.

-It is not recommended to use these system as compressive reinforcement. While FRP materials can support compressive stress, there are numerous issues surrounding the use of FRP for compression, Microbuckling of fibre can occur if any resin voids are present in the laminate, themselves can buckle if not properly adhered or anchored to substrate

-The high strength, high fatigue resistance, lightweight, and corrosion resistance of composites are highly desirable characteristics for bridge applications. Currently, these new materials are a direct technology transfer from the aerospace industry, and they are far more advanced than those required by civil applications. Most of the advanced composite. materials that are cured at high temperature produce high quality components and possess excellent characteristics.



Fig. Carbin Fibre Reinforcement

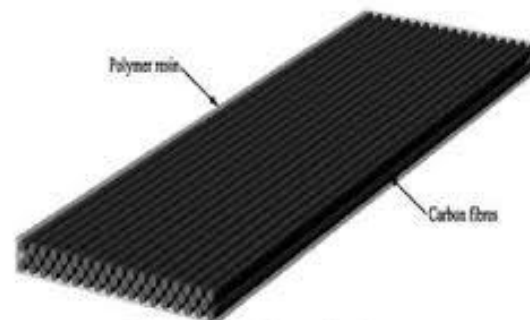


Fig. Carbon Fibre components



Fig. Glass Fibre

CONCLUSION :

Many environmental and natural disasters, earthquake being the most affecting of all, has also produced a need to increase the present safety levels in buildings. The understanding of the earthquakes, world over, is increasing day by day and therefore the seismic demands imposed on the structures get revised frequently. Similarly, the design methodologies value with the growing research in the area of seismic engineering and certain popular old design philosophies, such as multi storey structures, are no longer considered acceptable for earthquake resistant design. Many of the existing lifeline structures were analyzed, designed and detailed as per the recommendations of then prevalent codes. Such structures, pose a need to undergo re-evaluation process, say, every ten years. Such structures frequently may not qualify to current seismic requirements and therefore, retrofitting of the solution.

Any technology or material has its limitations and to meet the new requirements new technologies have to be invented and used. With structures becoming old and the increasing bar for the constructed buildings the old buildings have started to show a serious need of additional retrofits to increase their durability and life.

The retrofitting is one of the best options to make an existing inadequate building safe against future probable earthquake or other environmental forces.

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STUDY AND SUGGESTIVE MEASURES OF LANDSLIDES

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Abstract— The term landslide refers to several forms of mass wasting that include a wide range of ground movements, such as rock falls , deep seated slope failures, mudflows and debris flows .Landslides can occur underwater in coastal and onshore environments, in which case they are called submarine landslides . Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting slope stability . Typically, pre-conditional factors build up specific surface or sub-surface conditions that make a slope prone to failure, whereas the actual landslide often requires a trigger before being released.

INTRODUCTION

The investigation and study of landslides is to find suggestive methods to reduce their damages. This objective is possible by different ways such as landslides hazard zonation for determining the hazardous areas and providing recipes and regulations for appropriate uses of these areas or for keep away from them. It can be also earned by studying a one landslide and presenting ways to control it. Most of earth sliding problems occurred along roadways and railway route. The number of unusual incidents like soil slides, rock fall, soil mixed boulder slide, spread along the track causes extensive damages to the track structure and human lives. Thousands of passenger travel by railway which passes through deep cuttings along its route with gentle to steep slopes, loose rock and also some soil part and extreme climatic conditions.

LITERATURE SURVEY

A. *The following research papers were referred and studied in detail. They were found to be relevant to the present study .*

Kishor Kumar, P. Subramanya Prasad (Rockfall and Subsidence on Mumbai-Pune Expressway) (International Journal of Geoengineering Case Histories ©, Vol. 2,29 October 2010, Issue 1,Pg.2, line 7- 11) stated that the hill slope geometry at Adoshi tunnel site is such that rock blocks fall directly onto the expressway. There is no space or slope

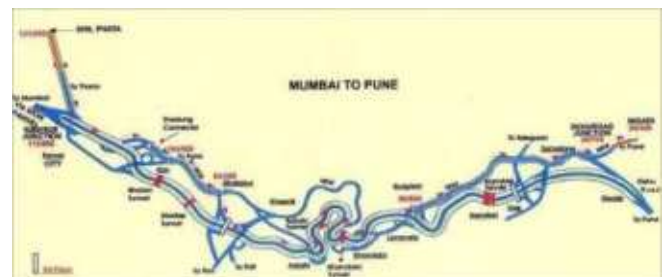
bench on the side of the expressway and the hill; as a result, there is no reduction in the momentum of the detached rock when it plummets toward the expressway at this location. This direct fall makes the impact more dangerous and more potentially fatal when rock blocks impact a running vehicle. Such incidences are particularly frequent during the rainy season

Review of Literature Survey .

- High density of joints.
- Presence of a prominent joint/fracture between the two separate layers of basalt.
- Weak sub-horizontal layer dividing two basaltic layers, day lighting on the face of the slope and continuously getting weathered and eroded resulting in failing of overlying jointed rock mass.
- A smooth joint surface or sheet joint acting as a sliding surface through which most of the material slides down in various situations.
- Loose overburden with big boulders.
- High precipitation (2000mm annual) with high intensity.

SCOPE OF STUDY

- 1) Study of area prone to rock falls along with existing field conditions like geology, topography, morphology, etc. in the study area.
- 2) Finding out the probable and most significant causes for the present disasters.



- 3) Carrying out laboratory tests to find out geotechnical parameters of the rock samples.
- 4) Design mountain slopes identified for the study and delineating the critical sections.
- 5) Study of various remedial techniques and suggesting best suitable measures for the prevention in the study area.

Abbreviations

Landslides affect many regions around the globe. There are many types of landslides – occurring in a variety of materials and traveling over a range of velocities. Landslides may be triggered by earthquakes, rain, permafrost thaw, deforestation, and by other factors. Damaging wildfires, floods, volcanic eruptions, and earthquakes are often made worse by subsequent landslides. Submarine landslides, or surface landslides, that move into water may trigger tsunamis. Although landslides can result in significant human and economic losses, they also play a role in maintaining ecological diversity. A number of landslide mitigation techniques are explored.

REMEDIAL MEASURES

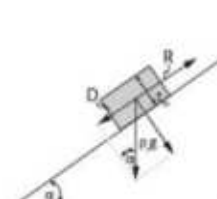
- **Remedial measures not implemented due to low feasibility**
- **Restraining Structures**

Restraining structures such as masonry walls, concrete retaining walls, gabion/sausage walls are generally used to control slope stability problems where the height is less than 4 meters. In case of the Mumbai Pune Expressway, the rock slopes have a height of even more than 30 meters. Also the road width at the highway is restricted by steep valleys and hence, the restraining structures cannot be constructed at the cost of the road width. Construction of rigid structures requires a great deal of manual and skilled labour, expensive planking and formwork leading to stopping of vehicular traffic. They are very costly as concerned with cost/m of the project. (Ref: IS 14680:1999 Landslide Control- Guidelines Pg.8)

- **Construction of piles.**

The Piles for remediation are metal beams that are driven into the soil or placed in drill holes. They are driven into the competent bedrock layer below the landslide occurs. But the necessary condition for driving the piles is that the material in which it is driven should be elastic in nature. Then the piles hold the entire material as a block. The pile construction in the strong basaltic rocks is itself so difficult and it will induce fractures and cracks in the basaltic layers leading to a weak material. Hence the construction of piles in basaltic rocks is not feasible. (Ref: IS 14680:1999 Landslide Control- Guidelines Pg.8)

Factor of safety



$$FS = \frac{R}{D} = \frac{C}{t_m (\rho_r g) \sin(\alpha)} + \frac{\tan(\phi)}{\tan(\alpha)} - \frac{m(\rho_r g \tan(\phi))}{(\rho_r g \tan(\alpha))}$$

D are driving forces
 R are resisting forces
 ϕ is the internal angle of friction
 α is local hillside gradient
 C is cohesion
 t_m mean landslide thickness
 ρ_r density (rock)
 ρ_w density (water)
 m The ratio of saturated thickness to total landslide thickness

Geological Investigation

The ground conditions in the study area are dominated by basalt, which is an extrusive rock created by the outpouring of volcanic magma. The magma cools quickly, allowing only small crystals to form. Basaltic lava flows for great distances before solidifying. Successive eruptions of basalt have formed the Deccan plateau region of southwest India, including the current study area. The area is conspicuously uniform, consisting of series of Deccan Trap flow (Upper Cretaceous to Lower Eocene age), which are occasionally intruded by a number of basic intrusive. The basalts are mainly capped by lateritic.

NECESSITY OF STUDY

Prediction of rockfall hazard is very complex because a number of factors contribute to mass movements. The understanding of this phenomenon requires a large number of input parameters and analysis techniques which are also costly and time consuming. In the present study a scientific approach has been taken to evaluate the triggering factors which cause rockfall and save the human population in the affected areas. For a long time, rockfalls have had disastrous consequences causing enormous economic losses and affecting the social fabric, due to the complexity in prediction of the hazard as a result of a number of contributing factors.

(Types of technique to avoid landslides)

SR NO.	HAZARDS TYPE	TECHNIQUE
1	ROCK SLOPE PROTECTION	1.GROUTING 2. PROVISION OF ROCK COLLECTING TRANCES
2	PASSIVE PROTECTION SYSTEM	1. TRANCHES AND ROCK FENCES 2. ROCK FALL PROTECTION
3	EMBANKMENT	1.SURFICIAL REVETMENTS 2.TIE BACK ANCHORS
4	BENCHING OF SLOPES	1.PROVISION OF ROCK FALL FENCES 2.PROTECTION SHADES
5	WALL	1.LIVE CRIB WALL 2.VEGETATED ROCK GABIONS

(Affected area of tunnel)



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Design of Paving Tile using Industrial Waste Bagasse

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Abstract— The massive sugar industries release high amount of bagasse in the surrounding and study reveals that the bagasse possesses good binding properties so in this project an attempt is made to reduce cement content used during paving tiles production by replacing them with industrial waste Bagasse. During this experimental study, bagasse is used as replacement for cement. Various mix design for paving tiles will be considered and the experiments that will be conducted on paving tiles will be Compressive strength Test, Flexural test, Abrasion test & Water absorption test. Designing paving tiles using industrial waste bagasse is a great way to promote sustainability and utilize renewable resources. Bagasse is a byproduct of sugarcane processing and can be an excellent alternative to traditional paving materials such as concrete or clay.

• Introduction

Bagasse is the fibrous residue that remains after sugarcane or other similar plants have been crushed to extract their juice. It is a byproduct of the sugar and ethanol production industries. Bagasse consists of plant fibers, such as cellulose and lignin, and is typically discarded as waste. However, bagasse has gained attention as a valuable resource due to its potential for various applications. Here are a few uses of bagasse:

1. Energy Generation: Bagasse is commonly used as a biofuel for the production of heat and electricity. It can be burned in boilers to generate steam, which powers turbines to produce electricity. This helps reduce reliance on fossil fuels and promotes renewable energy.
2. Construction and Packaging: Bagasse can be processed and molded into various construction materials and packaging products. For example, it can

be transformed into biodegradable disposable plates, cups, and food containers.

3. Industrial Absorbents: Bagasse can be converted into absorbent materials for industrial applications. Its high porosity and absorbent properties make it suitable for absorbing oil spills, moisture, and other liquids.

It's important to note that bagasse utilization helps reduce waste and contributes to a more sustainable and circular economy. By finding innovative uses for bagasse, we can reduce environmental impact and maximize the value of this agricultural residue

The fibrous residue of sugarcane after crushing and extraction of its juice, known as 'bagasse', is one of the largest agriculture residues in the world. Literature illustrates the versatility of sugarcane residue usages; through its conversion inclusive but not limited to paper, feed stock and biofuel. The utilization of these waste materials in the manufacture of concrete provides a satisfactory solution to some of the environmental concerns and problems associated with waste management. Agro wastes such as rice husk ash, wheat straw ash, hazel nutshell and sugarcane bagasse ash are used as pozzolanic materials for the development of blended cements. Few studies have been reported on the use of bagasse ash as partial cement replacement material in respect of cement mortars. In this project, the effects of bagasse ash as partial replacement of cement on strength and durability properties of hardened concrete paver blocks are studied.

1.2 Effects and Advantages of Sugarcane Bagasse Ash:

Ordinary Portland Cement (OPC) is recognized as a major construction material throughout the world. Researchers all over the world today are focusing on ways of utilizing either industrial or agricultural waste as a source of raw materials for construction industry. This waste utilization would not only be economical, but may also result in foreign exchange earnings and environmental pollution control. Industrial wastes, such as blast furnace slag, fly ash and silica fume are being used as supplementary cement replacement materials. therefore it is possible to use sugarcane bagasse ash as cement replacement material to improve the quality and reduce the cost of construction materials such as mortar, concrete pavers, concrete roof tiles and soil cement interlocking block

A few studies have been carried out on the ashes obtained directly from the industries to study pozzolanic activity and their suitability as binders, partially replacing cement and the results proved to be beneficial. The test results indicate that bagasse ash is an effective mineral admixture, with 20% as optimal replacement ratio of cement. When pozzolanic materials are added to cement, the silica present in these materials reacts with free lime released during the hydration of cement and forms additional calcium silicate hydrate as new hydration products, which improves the mechanical properties of concrete formulation. Partial replacement of cement by sugarcane bagasse ash increases workability of fresh concrete; therefore use of super plasticizer is not necessary. The density of concrete decreases with increase in sugarcane bagasse ash content, therefore low weight concrete is produced in the society with waste materials. The rate of bleeding is reduced and better of-shutter finish is possible without affecting the aesthetics. Improved long term strength and durability performance is observed by replacing cement partially with bagasse ash. Lower shrinkage, lower porosity, lower permeability, better resistance to chloride ingress and sulphate attack and lower heat of hydration in thick sections are some of the advantages for using bagasse ash in concrete paver blocks⁵ Adding sugar cane bagasse ash as a replacement for cement may provide additional enhancements in resistance to chloride ion penetration and water-proofing properties. Reduced alkali silica reactivity is studied by partially replacing cement with sugarcane bagasse ash. The chemical composition of bagasse ash indicates that there is zero lime content and reduced carbon

content. The use of sugar cane bagasse ash as a partial replacement of cement has a beneficial effect to protect the steel rebar from corrosion because it reduced the pore size in the cement paste, which minimized the ingress of aggressive ions into concrete. Another advantage of using this material is the fact that India, especially Tamil Nadu, already has a well-established and growing sugarcane ethanol industry. It also places a significant advantage on the environment, particularly, as the pollution caused due to the manufacturing of cement continues to be criticized from a sustainability perspective. The compressive strength tends to be less at the early stage but increases at later stage, meaning that the bagasse ash can be used as an effective replacement material for cement. In this study the attempt is made to study the use of bagasse ash in production to paver tiles.

Name of content	Percentage
Cellulose	45-55%
Hemicellulose	20-25%
Lignin	18-24%
Ash	1-4%
Waxes	<1%

Table.1: Chemical Composition of Bagasse

One of bagasse's primary uses is in the paper industry.

The method of using bagasse for paper production was invented by Clarence Birdsong in a small laboratory in 'Hacienda Paramonga', a sugar mill in Peru. With this promising discovery at hand, the company bought an old paper mill in New Jersey and shipped bagasse there from Peru in order to test the method's reliability on an industrial scale. The method developed in 1937 and the first paper manufacturing machines were designed in 1938 in Germany.

It wasn't until 1950 that the first successful commercial production of newsprint produced from bagasse was demonstrated by the 'Noble & Wood Machine Company'. The demonstration took place before 100 industrial representatives and officials from 15 different countries. The demonstration proved to be extremely successful. This was mainly due to the economic importance of paper in

countries which did not have easy access to wood.

4.1 MATERIAL

Materials which are used to produce paving tile are:

1. Cement
2. Bagasse ash
3. Crush Sand
4. Fine Aggregate
5. Water

1.2 MIX DESIGN

Concrete mix design is the process of choosing suitable ingredient of concrete and determining their relative quantities with the object of producing as economically

as possible concrete of certain minimum properties, notable workability, strength and durability

M20 grade concrete has a notional cement-to-sand-to-aggregate-to-water ratio of roughly 1:1.5:3, with the water-cement ratio being kept between 0.4 and 0.6. It is composed of a mixture of cement, sand (fine aggregates), and coarse aggregate.

M20 concrete mix ratio: M20 concrete is a 1:1.5:3 mixture of cement, sand, and aggregate, where cement makes up one part, sand makes up 1.5 parts, and aggregate or stone makes up the remaining three parts.

The following data is assumed as per the mix design calculation of M20 grade

Characteristic compressive strength: 20Mpa

Cement type: OPC 53 grade

Exposure condition: Moderate

Specific gravity of cement: 3.15

Specific gravity of fine aggregates: 2.70

Fine aggregates sieve analysis: conforming to zone II of table IS 383

RAW MATERIALS/MOULDING/TESTS:

- Collection of raw materials:
 1. Bagasse ash was brought from AJINKYATARA SUGAR FACTORY SATARA.
 2. Cement was brought from SAHYADRI TREADRES KODOLI SATARA.
 3. Fine aggregates was brought from DESAI STONE CRUSHER SATARA.
 4. Crush sand was brought from DESAI STONE CRUSHER SATARA
- The process of molding was done at KETAN CERAMICS MIDC SATARA.
- The assessment of suitability of such eco-friendly composite tiles was done by tests as follows -
 1. Compressive Strength Test.
 2. Water Absorption Test.

PROCEDURE:

1. Material Preparation:
 - Bagasse was obtained from sugar mills.
 - Bagasse was cleaned and all type of impurities or contaminants were removed.
 - Bagasse thoroughly dried to reduce moisture content.
 - Other raw materials such as cement, aggregate, sand was also obtained and prepared.
2. Mixing and Binding:
 - All raw materials was mixed thoroughly till it bind it properly.
 - Experiment with different ratios of bagasse to binder was done to find the optimal mixture that provides strength and stability.
3. Molding and Shaping:
 - The molding process was done at ketan ceramics.
 - The mixed material was placed in mold.
 - Pressure was applied to compact the bagasse-binder mixture evenly within the mold.
 - The tiles was leaved to set and cure for a specific period of time.
4. Finishing and Surface Treatment:
 - After tiles was hardened, it was removed from the molds.
 - The surface of the tiles was smoothen by using sanding or polishing techniques to ensure a uniform and attractive finish.
5. Testing and Quality Control:
 - The tests was obtained on finished tiles to ensure they meet

required standards.

- Readings was taken for each respective tests.

- Necessary adjustments was done to manufacture best tile based on the test results.

MIX PROPORTION

Mix Proportion for Tile :

Tile No	Cement (gm)	Bagasse Ash(gm)	Crush Sand(gm)	Fine aggregates (gm)
T1	950	50	1500	3000
T2	900	100	1500	3000
T3	850	150	1500	3000
T4	800	200	1500	3000

RATIO – 1:1.5:3 FOR M-20

RESULT

1. The various tests like compressive strength test, water absorption test were performed on various proportion of tiles and we get the best mix design for manufacturing of tiles.
2. The test results obtained are as of follows:
3. The results of compressive strength
4. presented in Table. The test was carried

out to obtain compressive strength of paving tile at the age of 7 and 28 days.

5. The tiles were tested using Compression Testing Machine (CTM) of capacity 2000KN available in structures lab. The maximum compressive strength is observed at 20% replacement of bagasse ash.

Replacement of Bagasse Ash	Compressive Strength	
	7 days	28 days
5%	8.92	-
10%	10.90	-
15%	12.1	17.0
20%	13.92	21.18

6. The results of water absorption test presented in Table. The test was carried out to obtain water absorption of paving

tile at the age of 7 and 28 days.

Replacement of Bagasse Ash	Water absorption (%)
% Used	28 days
5%	-
10%	-
15%	8.6
20%	7.8

Conclusion

The result of study shows that there are good prospects of using bagasse Ash. M-20 grade paving tile is casted and its compressive strength is determined. The combination of 0%, 10%, 15% and 20% cement replacement Mix is prepared by using bagasse ash. Compressive Strength of paving tile increased with increasing percentage mix give good compressive strength.

When bagasse Ash replaces cement in concrete it has been observed that its 15% and 20% mix gives good compressive strength. Cement is a versatile building material which is largely used in

construction. When cement is replaced by these material up to 20%. From the study conducted, it was clearly shown that bagasse ash, are pozzolanic material and can contribute to the sustainability to the construction material.

1. The manufactured tile found suitable as per IS codes as IS 12894 (2002) , IS 4101 (Part 3) (1985) and IS 13801 (1993)
2. From test conducted its clear that we can use these products at any type of residential and commercial building.

The product have low cost of manufacturing.

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A Research on Green Building's in India

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Abstract: At present, we all are aware of how Green House Effect, resource depletion, environmental degradation is increasing day by day in our planet. Earth is badly in need of sustainable development by reducing pollution, reducing dependence on natural resources, reducing Global Warming etc. Else, after almost 200 years, there will be no life on Earth as predicted by Professor Stephen Hawking. It will be similar like any other planets where it is impossible to live. Even the smallest changes that we can make will help to promote a better Earth as similar to butterfly effect. The developed countries are more advanced in their technologies and rules to have ecofriendly constructions. Whereas the developing countries are not so much aware of this fact. The studies and the research works in these countries are also way far behind as compared to the developed nations in the world. But exceptionally, India being a developing country, it is quite advanced in this aspect and have a good rank when compared to all other countries. Aim of ecofriendly constructions or green building projects is to reduce the significant impact of construction industry on the environment. There are certain criteria on the basis of which a building is rated and certified. It assures that the building would follow those criteria throughout the life of the building. Government of many states in India provides incentives for such kind of constructions. Green buildings not only save nature to a great extent but also save the inhabitants by providing an healthy environment to live in. This paper will make people know about the Green Building Movement in India and how Green Buildings are designed so that they can save the Earth from degradation. The Green Building rating system and their process of certification are mentioned in this paper. One who reads, would also get to know about the barriers faced to have ecofriendly constructions in India and the rank of the country in producing sustainable built environment when compared to all other countries.

Index Terms: eco-friendly, efficiency, Green Building, rating, recycle, reuse, resource, sustainable development

1 INTRODUCTION

IN India, the Green Building Movement was adopted by the Confederation of Indian Industry (CII) in 2001. They formed the Indian Green Building Council (IGBC) which is actively involved in promoting the Green Building concept in India. Their vision is, —To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025. The Green Building movement in India started gaining momentum since 2003, from just about 20,000 sq.ft in 2003 to 450 crores sq.ft green footprint in India today [13]. A green building is one, which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building. It is also known as a sustainable or 'high performance' building. There are various systems in the form of design standard or practice code worldwide to enhance the use of green building design. Usually their performance is based on certain sustainability criteria which are combined to assess the design effect. These criteria, in general, focuses on sustainable sites, water efficiency, energy and atmosphere, material and resources, indoor environmental quality.

2 CRITERIA FOR GREEN BUILDING CERTIFICATION

2.1 Sustainable sites

Site selection and design play important roles in both reducing greenhouse gas emissions and helping projects adapt to the effects of climatic change. When planning a green building project, design and construction professionals will consider strategies to maintain an environmentally appropriate site. Strategies for sustainable sites include encouraging the development of an environmentally friendly transport plan, protecting and restoring the natural habitat, controlling storm water and reducing heat island effect.

Restore Habitat: Green building can promote biodiversity by promoting and restoring surrounding habitats or conserve existing natural areas. Areas to avoid include prime farmland, flood plain, critical habitat, public parks etc.

Storm Water Control: Stormwater runoff can cause flooding, pollution, and significantly, soil erosion. Thus, storm water management is an important feature of green building construction. It is a process to treat, collect, reduce storm

water runoff using plants, soils, microbes and engineered systems like underground detention tanks.

Heat Island Effect: It is the absorption of heat by hardscapes and it is radiated to the surroundings altering microclimate and wildlife habitats. A microclimate is a local atmospheric zone where the climate differs from the surrounding area. These changes can affect native species and biodiversity. To avoid these outcomes, green building construction projects can implement strategies like shading, vegetation and installing surfaces with high solar reflectance indexes etc. Use of high albedo roofing material or heat resistant paint or china mosaic or white cement tiles or any other highly reflective materials over the roof to cover at least 50% of the exposed roof area is essential. Shade-giving trees are to be planted to cover at least 75% of the open parking areas

2.2 Water Efficiency

We are going to face a Global water crisis in the near future according to U.S. Geological Survey. Urbanization, high population growth rates, climatic changes, lower precipitation amounts, higher temperature are the most important reasons behind ground water depletion. A hydrological study conducted by University of Arizona Cooperative Extension assess that, by harvesting rainwater, we will be able to minimize the devastating effects of droughts, rainfall runoff and non point source pollution. Rainwater collection also allows ground water accretion. Although rain water is non potable, it can be safely used for lawn irrigation, toilet flushing and washing cars. In residential buildings, the majority of water (between 50% and 80%) falls into the grey water category and can be collected for reuse. Grey water system can be introduced to save water. Grey water system is a method of collecting water that has been used for one purpose and then recycle it to use for other purpose. Green constructions ensure that water is harvested, used, purified, reused during entire construction period and also minimize water wastage and increasing recycling methods by installing mechanisms throughout the building life cycle. IGBC Green Buildings rating system encourages use of water in a self-sustainable manner through reduce, recycle and reuse strategies. By adopting this rating programme, green buildings can save potable water to an extent of 30 - 50%.

2.3 Energy and Atmosphere

Improving energy efficiency is one of the easiest ways to save money and improve the sustainability of a building.

Climate approach passive design: Passive strategies such as shading, natural ventilation can reduce the demand on active mechanical systems. After observing that which part of the building receives sunrays during afternoon and incorporate shading strategies is an usual practice. Applying window film with an solar heat gain coefficient less than 0.3 helps in blocking the Sun's heat. Selecting light colors for roofing and exterior painting helps to reflect heat from Sun as dark color absorbs heat. Doors and window position and sizes should be designed such that it will allow air flow so that air conditioner is used as less as possible. Effective window placement can provide more natural light and lesser need for

electric light during the day. Green building should also incorporate energy efficient lighting (e.g. LED lights), low energy appliances, high efficiency pumps and filters. Properly maintaining building and associated systems will ensure optimal energy efficiency.

Renewable Energy: Onsite generation of Renewable Energy through Solar power, Wind power, and Hydro power can reduce the impact on resources. Substituting renewable energy for conventional energy can substantially reduce emissions of GHGs (Green House Gases) and other pollutants. Obtaining electricity from on-site sources can produce significant cost savings. Through IGBC Green Buildings rating system, buildings can reduce energy consumption through energy efficient - building envelope, lighting, air conditioning systems, etc. The energy savings that can be realized by adopting this rating programme can be to the tune of 20 - 30%.

2.4 Material and Resources

Though green building materials often called green materials require high initial cost for making a building but leads to low energy consumption expenses and a low maintenance cost which results in decrease in the overall cost of the building [26].

Reuse and Recycling of materials to reduce waste production: Green buildings emphasize on the resource usage efficiency and also press upon the three R's - Reduce, Reuse and Recycle. Reusing elements of a previously constructed building can help in sustainable development and in waste management. Vintage brick salvage, wood wastes, materials from abandoned buildings, old docks etc. can be reused in construction of new building. Some building materials include a number of ingredients where certain components may come from recyclables (e.g. of materials with recycled content include cement, rebar, paint etc.). during the construction phase, one goal should be to reduce the amount of material going to landfills. The waste generated during construction should be segregated based on its utility and should be sent for recycling. Well-designed buildings also help to reduce the amount of waste generated by the occupants as well, by providing onsite solutions such as compost bins to reduce matter going to landfills.

Regional materials: The goal of using regional materials is to support the use of indigenous resources, help the local economy and reduce the transportation impacts.

Rapidly Renewable Materials: Extracting certain raw materials can have an impact on biodiversity of the area. The renewable materials have the ability to grow back, but it takes time to re-establish ecosystems. In the meantime it may increase green house emissions and affect the other species. For this reason, it is important to use rapidly renewable materials that mature in 10 years or shorter life cycle such as bamboo, wool, cotton insulation, linoleum, wheat board, straw board, cork etc.

Durable materials: Products should stand for a long time and require little maintenance. This will save time, money and energy on repairs at a later date

Water efficient materials: Water Conservation can be obtained by utilizing products, materials and systems that help to reduce water consumption in buildings and landscaped areas, and increase water recycling and reuse. Other materials that should be used are high reflective paints, high performance glass, low VOC adhesives, ecofriendly chemicals, solar water heaters, efficient pumps & motors, timer based control on lawn sprinklers, LED lighting fixtures, efficient BEE labelled air conditioners and refrigerators etc. [10] Equipments used in the building are to be free from CFCs, Halons or any other ozone depleting substances

2.5 Indoor environmental quality (IEQ)

IEQ is designed to offer comfort, productivity, well being of occupants in buildings. Proper ventilations and air filtrations are included to ensure sufficient flow of fresh and clean air. Exhaust systems in bathrooms and kitchens should be adequately designed to maintain indoor air quality [32]. The materials used in the interior of buildings are also should be eco-friendly with zero VOCs (Volatile Organic Compounds). Other techniques are no smoking, fixing leaks, eliminate aerosols, pet cleaning, planting, car exhaust control etc. In the book 'Natural Capitalism' it is written that, 'Green buildings create delight when entered, serenity and health when occupied, and regret when departed.'

3 FEATURES OF SOME GREEN BUILDINGS IN INDIA [34]

Suzlon One Earth, Pune: Suzlon one earth is 100% powered by onsite and offsite renewable sources. The campus has 18 hybrid wind turbines that fulfil 7% of the total energy consumption, the rest of energy demand is met from offsite wind turbines. The structure is designed in such a way that it can get a maximum daylight exposure which helps in reducing artificial lighting consumption. The infrastructure within the campus is designed to enable water percolation and thereby control storm water runoff thus, contributing towards an increased water table level.

Rajiv Gandhi International Airport (RGIA), Hyderabad: The structure of the airport is planned in a way so as to consume less water, electricity and conserves natural resources. Within the campus of the airport, there is a green belt of about 273 hectares having numerous plants. RGIA has been successful in saving energy for nearly 3.97 million kWh and have reduced the carbon footprint by 3331 tons.

CII- Sohrabji Godrej Green Business Centre, Hyderabad: The building doesn't let out any waste and recycles it all within. It can be said that building is literally made up of only recycled materials.

Infosys Limited, Mysore: The 5 stores structure has been built keeping in mind a holistic approach to sustainability in five

key areas, including – Sustainable site development, Water savings, Energy efficiency, Materials selection and Indoor environmental quality. The smart mechanism and efficient equipments lead to 40% of less energy consumption.

Infinity Benchmark, Kolkata: The building is furnished with CO₂ monitor sensors, rainwater harvesting, waste water recycling system and humidification controls. The exterior of the building is made of brick wall block while the roof comprises of deck thick polyurethane foam for better insulation.

I-Gate Knowledge Centre, Noida: The building is built over 4,60,000 sq.ft. in Suburban Noida and is designed in a way that it captures 73% of daylight within the office. Nearly 50% of land is covered with grass which doesn't let wastes and sewage water go out.

Bank Of India, Goa: A world of eco-friendly lights and airconditioning, intelligent glazing, modern capsule lifts, and indoor fountains – this is what sums of this popular bank in Goa. The building uses Nano Misty Blue, softening colour glass manufactured by Saint Gobin Glass, India for producing the cool effect and saving energy. The glass has solar control and thermal insulation properties. The building is a complete package of modern look of today's bank.

Biodiversity Conservation India Ltd. (BCIL), Bangalore: The building was established with an aim of creating ecofriendly living habitats, especially in the urban space. It is a wonderful example of smart homes where one can turn lights off using mobile phones. The building has 44 interconnected rainwater percolation wells that lead to a 400,000 litre water tank. The building makes use of central reverse osmosis system to purify water without the use of chemicals. Grey water is directed to the gardens, toilets and for washing cars.

Olympia Tech Park, Chennai: This tech park has the lowest energy consumption, high natural lighting systems, 100 per cent water recycling and other environment-friendly practices.

4 MOST POPULAR RATING SYSTEMS IN INDIA

(A) GRIHA: GRIHA or Green Rating for Integrated Habitat Assessment, is the national rating system of India for any completed construction. It has been developed by TERI (The Energy and Resources Institute) and is endorsed by the MNRE (Ministry of New and Renewable Energy). It is an assessment tool to measure and rate a building's environmental performance. Griha is a point based rating system that consists of 34 criteria categorized under various sections such as site selection and site planning, conservation and efficient utilization of resources, building operation and maintenance, innovation etc. It helps with the improvement in the environment by reducing GHG (greenhouse gas) emissions, reducing energy consumption and the stress on natural resources, reducing pollution loads and waste generation [33]. Some GRIHA rated buildings are CESE (Centre of Environmental Sciences and Engineering) building

of IIT Kanpur, Suzlon One Earth in Pune, Fortis Hospital in New Delhi, Common Wealth Games Village in New Delhi [16].

(B) IGBC: Following the formation of the Indian Green Building Council (IGBC) in 2001, the membership quickly realised the need for measuring —green buildings. IGBC is the non profit research institute having its offices in CII-Sohrabji Godrej Green Business Centre, which is itself a LEED certified building [16]. Since it achieved the prestigious LEED rating for its own centre at Hyderabad in 2003, the Green building movement has gained tremendous momentum in India. Thus, IGBC adopted the LEED for India as an Indian partner of USGBC. It acts as a channel for registration of Indian projects under LEED programme. IGBC building rating system is quite similar to that of USGBC, but slightly modified to suit Indian conditions. The committee included architects, engineers, building owners, developers, manufacturers and industry representatives. This people and professions added a richness to the process and to the ultimate output. The green design field is growing and changing day by day. New technologies and products are coming into the market and innovative designs are showing their effectiveness. Therefore, the Rating System and the Reference Guide will evolve as well. Construction teams wishing to certify with LEED should note that they will need to comply with the version of the rating system that is mentioned at the time of their registration. LEED-certified buildings have 34 percent lower CO₂ emissions and consume 25 percent less energy. Water-efficiency efforts in green buildings are expected to lower the water use by 15 percent and save more than 10 percent in operating costs. Indian Green Building Council (IGBC) has launched several other products for rating of different typologies of buildings including homes, factories, schools, hotels, townships etc. IGBC started its own exam (known as IGBC AP exam) to identify Green Building professional and award them with IGBC-AP credential. Qualified individuals can be involved in projects registered under the 'IGBC rating programmes' like IGBC Green Homes, IGBC Factory buildings, IGBC Existing Buildings etc.

Some e.g. of LEED rated buildings in India are:

CII-Sohrabji Godrej Green Business Centre (Platinum), ABN Amro Bank in Ahmedabad (Platinum), Anna Centenary Library Building in Chennai (Gold), American Embassy School in Delhi (Gold), Birla International School in Jaipur (Gold), ITC Green Centre-Gurgaon (Platinum), Biodiversity Conservation India Limited (BCIL)-Bangalore (Platinum), Rajiv Gandhi International Airport-Hyderabad (Silver), Suzlon Energy Limited-Global headquarter in Pune (Platinum), Olympia Technology park-Chennai (Gold) [16]. As of September 2017, more than 4,300 projects utilizing green technology, accounting for approximately 4.7 billion sq.ft. of built-up area, are registered in India as per data shared by IGBC. Truly, this is only 5% of the total buildings in India. IGBC is actively involved in promoting green building movement in the country and hopes to rope in 10 billion sq. feet by 2022 [16].

(C) BEE: Bureau of Energy Efficiency (BEE) developed its own rating scale based on 1 to 5 star scale. More stars mean more energy efficiency. BEE has developed the Energy Performance Index (EPI). The unit of Kilo watt hours per square meter per year is considered for rating the building. The Government of India set up BEE on March, 2002 under the provisions of Energy Conservation Act, 2001. To energy efficiency, they establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at macro level. The Indian Bureau of Energy Efficiency (BEE) had launched the Energy Conservation Building Code (ECBC) on February 2007. The code is set for energy efficiency standards for design and construction with any building of minimum conditioned area of 1000 Sq. mts and a connected demand of power of 500 KW or 600 KVA. The energy performance index of the code is set from 90 kW·h/sqm/year to 200 kW·h/sqm/year. Any buildings that fall under the index can be termed as "ECBC Compliant Building" [28]. Reserve Bank of India's buildings in Delhi and Bhubaneswar, CII Sohrabji Godrej Green Business Centre and many other have received BEE 5 star rating [16]. Among all the buildings, Suzlon One Earth is the only building in India with the highest ratings from LEED (Platinum rating with 57 points which it obtained in 2010) and GRIHA (Five Star rating with 96 points)

5 IGBC CERTIFICATION PROCESS

The process includes the following steps [13]:

- Online Registration
- Feasibility Study
- Documentation
- Physical Audit
- Award of Rating

(A) Online Project Registration: Project teams who are interested in IGBC certifications for their project are required to first register with IGBC.

(B) Feasibility Study: Conducting a project feasibility study is one of the major steps in the process of getting an IGBC Green Certification. This empowers the project team to attain the goal of making building green. The broad areas evaluated during this study are sustainable site selection and planning, sustainable architecture and design, water efficiency, energy and atmosphere, material and resources, indoor environmental quality, innovation and development. Once it is decided to make the project green, the contractors then either have to hire a green building consultant or it is to be done alone.

(C) Documentation: It is the most critical step in achieving the desired green building rating. IGBC allows project documents to be submitted in 2 stages:

Preliminary Submission: This phase includes the mandatory requirements and the number of credits a project team aims for. The documents are received by a third party assessor appointed by IGBC. Further, IGBC provides review comments to the project team within 30 days.

Final Submission: This phase includes explanations for the preliminary review queries. The final submission review comments are also given within 30 days by IGBC.

A project team is required to satisfy all the mandatory requirements and minimum number of credit points in each section to achieve an IGBC Green Building Rating. IGBC offers developer-based projects to opt for precertification at the design stage, so that optimization of cost and resources can take place from initial stage. Moreover the developer can exhibit the proposed green features to the buyers. The documents needed for precertification are a brief narrative on project stating project type, number of floors, area etc. Drawings of section, plan, elevation in pdf format is needed. Other documents that are required includes parking plans, contract documents, detail of project design features which will be implemented, material test reports etc. This precertification rating has no relation with final IGBC rating. The final rating will depend upon the implementation of all design parameters detailed in preliminary document .

(D) Physical Audit: IGBC carries out an exhaustive physical audit of project through a third party assessor team. This audit ensures that project meets all the demands

Certified	Good Practices
Silver	Best Practices
Gold	Outstanding Performance
Platinum	National Excellence
Super Platinum	Global Leadership

for rating. In addition, IGBC gathers energy and water All IGBC rated green building projects in the MSME sector performance data annually from all the certified projects to shall be eligible for financial assistance at concessional confirm that they are able to achieve sustained rates from **Small Industries Development Bank of India** performance as envisioned at the design stage. **(SIDBI).**

(E) Award of Rating: After validating all the documents **Government of Uttar Pradesh** and submissions of the project team IGBC rewards a final A. Government of Uttar Pradesh (Housing and Urban rating to project. The different levels of ratings are: Planning Department): Additional 5% FAR free of charge for projects which are rated as Gold or

<u>Certified Level</u>	<u>Recognition</u>
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The IGBC commemoration and certificate are normally provided to the project at the —Annual Green Building Congressll.

6 GOVERNMENT INCENTIVES TO IGBC RATED GREEN BUILDING PROJECTS

IGBC is very closely working with several Central and State Government agencies to promote the green building movement in the country. Some of the Central and State Government agencies have given recognition to IGBCs' Green Rating Systems. The list of incentives provided are appended below :

The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, offers fast track environmental clearance for green building projects which are precertified/provisionally certified by IGBC.

Government of Punjab

- Department of Local Government (Town Planning Wing) offers an additional 5% Floor Area Ratio (FAR) free of charge for projects which are rated Gold or above by IGBC.
- Department of Housing and Urban Development, Government of Punjab offers an incentive of additional 5% Floor Area Ratio (FAR) free of charge and 100 % exemption of building scrutiny fee for projects which are rated Gold or above by IGBC.

Urban Development Department, Government of Rajasthan offers additional 7.5%, 10% and 15% FAR free of charge for projects which are rated Silver, Gold and Platinum respectively by IGBC.

Government of West Bengal

- Government of West Bengal (Department of Municipal Affairs - Kolkata Municipal Corporation) additional 10% FAR for projects which are Precertified / Provisionally Certified as Gold or above by IGBC.
- Government of West Bengal (New Kolkata Development Authority) additional 10% FAR for projects Precertified / Provisionally Certified as Gold or above by IGBC.

- Additional 5% FAR free of charge is offered by the Greater Noida Industrial Development Authority (GNIDA) in Uttar Pradesh for projects which are rated as Gold or above by IGBC.

Pune Municipal Corporation (PMC) and Pune Metropolitan Region Development Authority (PMRDA), Government of Maharashtra offers an additional FAR of 3%, 5% and 7% for Green Buildings rated as Silver, Gold and Platinum respectively by IGBC.

Public Works Department (PWD), Government of Maharashtra has mandated that the renovation of existing buildings and the development of all new government buildings in Maharashtra shall be carried out as per the suitable IGBC Green Building Rating system.

Government of Andhra Pradesh

- Industries & Commerce Department offers 25% subsidy on total fixed capital investment of the project (excluding cost of land, land development, preliminary and preoperative expenses and consultancy fees) for

buildings which obtain green rating from IGBC. This incentive is applicable for MSME and large industries.

B. Municipal Administration and Urban Development Department offers the following incentives to projects obtaining the rating from IGBC:

- i. 20% Reduction on Permit Fees.
- ii. If the property is sold within three years, one-time reduction of 20% on Duty on Transfer of Property (Surcharge on Stamp Duty) on the submission of Occupancy Certificate issued by the Local Authority.

Government of Himachal Pradesh (Town & Country Planning Dept) offers an additional 10% FAR for projects which are granted Gold / Platinum rating by IGBC.

Urban Development and Housing Department, Government of Jharkhand offers an additional FAR of 3%, 5% and 7% for Green Buildings rated by IGBC as Silver, Gold and Platinum respectively.

Government of Haryana (Town & Country Planning Department), as per amendment in chapter 6 of the Haryana Building Code 2017 on 8 May 2018, offers an additional FAR (Floor Area Ratio) of 9%, 12% and 15% for Green Buildings rated as Silver, Gold and Platinum respectively by IGBC.

7 BENEFITS OF GREEN BUILDINGS

The green buildings reduce certain negative impacts through more effective planning, design, construction, and operation based on the guidelines of green standards. Savings on energy costs and maintenance costs make green building especially attractive to owners. Moreover it provides the users to have good health condition, comfort and an improved overall quality of life. Thus, Green building construction is advantageous in social, economical and environmental aspects. These advantages are mentioned in the following

- Conservation of scarce national resources.
- Reduction in energy consumption without sacrificing the comfort levels. Energy savings could range from 30 - 40 % (as mentioned in National Building Code), which directly reduce energy bills.
- According to National Building Code (NBC), green buildings save material to about 25- 40% compared to conventional buildings.
- Reduction in destruction of natural areas, habitats, biodiversity etc. and prevent soil loss from erosion.
- Reduction in air and water pollution (with direct health benefits).
- Reduction in water consumption. Water is saved around 36 - 40% as mentioned in NBC.
- Limited waste generation due to recycling and reuse.
- Increase in user productivity.
- Enhanced image and marketability.
- Enhancing and protecting the health and well-being of the occupants.
- Heighten aesthetic qualities.
- Optimize life-cycle economic performance.

8 BARRIERS FOR GREEN BUILDING CONSTRUCTION IN INDIA [30],[1]

While green building practices are increasingly being adopted in India, there are few challenges and barriers too. They are as follows:

- Even today, a large section of Indian users is unaware of green buildings.
- Developers already go through a tedious process of multiple approvals and are apprehensive of the additional burden of green compliances in the list of approvals, which can potentially cause more delays.
- The lack or inadequacy of mandatory laws to enforce large-scale implementation of green buildings norms is not helpful.
- There are very few incentive plans, and those that exist vary across states and even cities, depending on different governing bodies.
- In India, architects, engineers, contractors and workers possess less skills and the knowledge required for green buildings construction.
- The initial cost for green building construction definitely involve a higher cost than the conventional ones.

9 THE POSITION OF INDIA IN THE WORLD IN GREEN BUILDING CONSTRUCTION

According to the US Green Building Council (USGBC) data, outside United States, India stands in third position (after Canada and China), in annual ranking of the top 10 countries for LEED.

10 CONCLUSION

If trees are cut off to clear up the plot for building construction, the same number of trees are to be planted elsewhere. Only this mentality of mankind can save the Earth from destruction. The condition of our planet at present is alarming. The anthropogenic activities mainly lead to such a condition. Scientists are keep on working for invention of technologies which have less or no negative impact on Earth. The researchers state that building construction is one of the main causes of environmental degradation. They are responsible for a huge amount of harmful emissions, accounting for about 30 percent of greenhouse gases, due to their operation, and an additional 18 percent induced indirectly by material, exploitation and transportation. Globally, buildings are responsible for nearly 40 percent of energy use (including 60 percent of electricity use), 40 percent of waste generated (by volume), and 40 percent of material resource use. In cities, buildings occupy 50 percent or more of land area. Buildings are responsible for not just a large percentage of the world's water use, but a large percentage of wasted water as well. In order to mitigate the effect of buildings along their life cycle, Green Building (GB) has become a new building philosophy, which uses more environmentally friendly materials, implements strategies to save resources and energy, lowers waste generation, improves indoor environmental quality, reduces harmful gas emissions etc. This might lead to

environmental, financial, economic, and social benefits. For instance, savings in operation and maintenance costs in GBs can be realized through the installation of high-efficiency illumination and insulation systems or through a suitable material.

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Minimizing Traffic Congestion Problems by Using IoT Technologies

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Abstract— Rapid urbanization is a challenge for organizations that manage the city's infrastructure and are responsible for comfort and safety. As the number of cars is increasing, traffic is becoming more intense, which results in traffic congestion and traffic accidents. Internet of things (IoT) is the system that is used to control the road traffic by using sensors or any cloud based algorithm. In this paper we will proposed various IoT technologies which can be used in day to day life to avoid traffic congestion problems. A review of the literature on this issue leads to some interesting conclusions.

Keywords— Traffic Congestion, IoT, Travel Delay, Detectors, Smart Traffic Light, RFID, Drone Service, Public Transits.

I. INTRODUCTION:

Many major cities are facing a variety of problems due to overcrowding and an unexpected increase in private transportation. Congestion is a condition characterized by slower speeds, longer travel times, and increasing traffic volumes. Congestion on city streets has increased dramatically since the 19th century. Traffic can be divided into repeat and non-repeat. During rush hour, traffic is normal as there are many vehicles. On the other hand, changing events such as rain, employment events, and special events causes traffic jams. Building new roads or widening roads is a temporarily relieve to congestion.

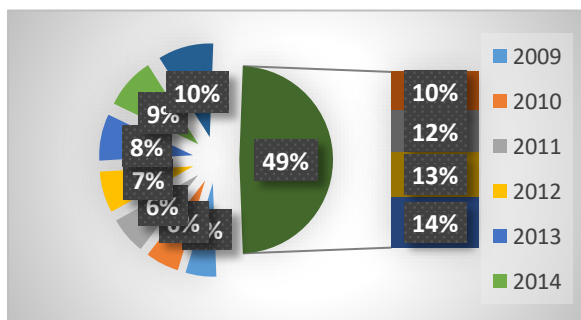


Fig-1. Registered motor vehicle in Delhi

Building new roads is not always a good thing for a variety of financial, environmental and political reasons. In fact, there is little demand for fast and smooth driving, including driving on this road.

Traffic in developing countries like India remains the same. They differ in shape and form. Two-wheelers, three-wheelers, four-wheelers and heavy vehicles such as buses and trucks travelling on the same road immingled with each other without any lane discipline. One-way driving on dirt roads and other vehicles causes traffic jams.

Meanwhile traditional traffic control system is insufficient to control congestion. Therefore cities needs some modern solution to tackle these problems by using intelligent traffic system which could be achieved by using IoT (internet of things).

Smart traffic management and information systems are needed to reduce and increase public transport demand over time amid growing traffic and traffic problems in major Indian cities.

II. TYPES OF CONGESTION:

- 1) **Repeating Traffic Congestion** - Recurring congestion is defined as traffic resulting from the normal volume of business operating in a typical geographic area. From a layman's point of view, this could be acceptable as "driving on a normal day unless something bad happens on the road". Basically, this description is based on the concept of "expected movement ", unless an "abnormal situation" occurs. On weekdays, it is expected that the opening hours on the outskirts of the downtown expressway will be higher than in the middle of the day. Also, more traffic is expected during the day than at night. Friday mornings tend to have less traffic, and Fridays in the fall tend to be worse.
- 2) **Non-Repeating Traffic Congestion**- "Non-repeating traffic congestion" was defined for this study as "unanticipated or unusual traffic caused by an event that was unanticipated and flash relative to other analogous days". Non-repeating traffic congestion can be caused by many factors, including
 - 1) Lane blocking accidents and impaired vehicles.
 - 2) Other lane blocking events (for example, ruins in the roadways).
 - 3) Construction lane closures.

III. IMPACTS OF CONGESTION:

Traffic involves queues, slow speeds and long travel times, which increases cost savings and has multiple impacts on urban areas and residents. Road traffic also has many cyclical impacts, including impact of border traffic on environment and resources, impact on quality of life, stress, safety, impact on road users. The more serious social benefits of ground road transport are listed.

- Traffic means wasting precious time and wasting health. Traffic time can be effectively used for productive work.
- Traffic patterns that stop and move suddenly consume more energy in urban areas and add carbon to the area, increasing pollution levels in urban areas.
- The low speed of a vehicle at the bottleneck of a log on the road causes displacement of nitrogen oxides and some hydrocarbons, a major cause of the chemical manifestation known as printing.
- Traffic generates a lot of noise (more than 90 dB), which makes the area undesirable

Rapid urbanization has caused a number of problems, including increased traffic. Delhi's traffic is \$9.6 billion, or about 12% of GDP and peak traffic is 129%. Mumbai costs \$4.48 billion, 135% traffic and Bangalore \$5.92 billion and 162% traffic. Kolkata had the highest peak hour traffic with 171% and the lowest costs at \$1.97 billion.

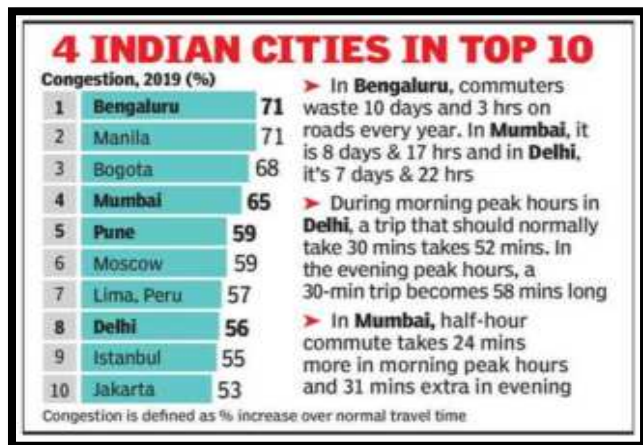


Fig.2- Congestion percentage in different cities

Congestion at intersections and highways degrades air quality and threatens public health. Automobile exports have become a major cause of air pollution in many regions, including greenhouse gases (GHGs), carbon monoxide (CO), volatile organic emulsions (VOEs), particulates matters (PMs) and hydrocarbons.

IV. FACTORS AFFECTING CONGESTION:

- A. **Population-** The increase in the number of cars on densely populated roads is one of the reasons for the

increase in car traffic. Demand increases with population growth and financial growth. Some vehicles also increase the daily mobility of villagers. Thus, an increase in the number of vehicles and an increase in the output of goods are directly related.

- B. **Infrastructure-** As the number of vehicles increases, the road does not increase. An empty street with alleys on each side can be ten times more unacceptable as the population grows. Authority always ignores double-aisle transitions.
- C. **Alternate Path** - Alternate paths are also an explanation for this problem. Roads have limited extent of extension due to low cost planning and poor planning constraints. The route should follow the course you currently have. So fewer lanes contribute to more traffic.
- D. **Lack of Public Transports-** The lack of public transport or the poor quality of public transport also leads to traffic problems. When means of transport such as buses and cars are increasingly scarce, people have to use their own transportation to get to work
- E. **Tailback-** A tailback is a disturbance that limits the movement of vehicles for a period of time on the road. Traffic congestion problems are divided on the basis of different situations

The main congestion sequences are:

1. **Fixed congestion** - Issues such as deviations, narrowing of road spans, ramps, exits and stair entrances are some of the ways.
2. **Dynamic Congestion** - The distribution of nonstop business inflows in general due to vehicle delays is defined as a dynamic congestion problem in road traffic. By way of illustration, heavy equipment is towed by a truck or a long convoy or large vehicles. Many reports indicate that tailback problems are the main cause of congestion.

V. MEASURES FOR CONGESTION CALCULATION:

To attack the problem of, colourful measures have been developed for the identification and quantification of traffic by colourful experimenters. These measures can be helpful for chancing the degree of business traffic and the performance of the thruway. We're grading these measures

into three corridor Trip time grounded, speed- grounded, and position of service grounded.

Trip time grounded -Trip time is time required to go through a section of a road by a vehicle, this time used as a parameter in business traffic studies. Urban Link's performance evaluation was conducted grounded on trip time. Some measures related to trip time are listed below.	
Delay	Delay is used to quantify business traffic. Delay is defined as redundant trip time to taken driving a vehicle against their prospects. Lomax et al. (1997) represented detention as the difference between free-inflow trip time (FITT) and average trip time (ATT) i.e. Therefore detention can be calculated by using equation . Delay = ATT-FITT
Planning time index (PTT)	PTI is the rate relation between the free-inflow trip time and the 95th percentile trip time (95TT) (1). As trip time increases, PTI also increases. Therefore, PTI should bear the minimal value for better business operation.
Congestion index (CI)	CI measure is the rate relation between the detention and FTTT. Then detention is the difference between ATT and FTTT. For better business operation, ATT for the commuters should be minimal (1).
Travel time index	TTI is the rate relation between ATT and FTTT (1). For better business performance, the TTI should be minima
Speed Grounded Speed is the most generally used measure of performance for thruway and business traffic. Speed can be calculated in several ways, first, grounded on average trip time combined with the length of the corridor understudy. Average trip speed = length of corridor/ average trip time	

VI. LITERATURE REVIEWS:

Pavan Kumar et.al (2016) conclude on reliable traffic forecasting methods and different types of traffic control algorithms. They also offer crowd visualization technology that will assist in flexible lane selection to avoid traffic jams. This article uses three methods to describe traffic congestion: fixed, mobile, and hybrid. **Dr. Vaishali Mahavar et.al, (2018)** propose that the development of smart traffic lights depends on several determinants such as real-time business status, traffic, traffic and dwell times, stone business metrics, crowded and choose from three routes. All of these variables are taken into account when improving traffic lights and are styled appropriately to avoid problems. In this article,

different schemas are given for all the different cases. There is also pressure to deploy smart traffic lights in our major cities. **Bhaskaran Raman, (2004)** proposed that road transport systems are found in developing countries. In this issue, the author describes India's road traffic problems such as traffic jams, detours, three delays and traffic accidents, making a decisive transition and concluding that the results easily indicate the rail system, with its limited speed and highway availability by vehicle type, official means of transport. **A.Mansoori, Achar, (2018)** presented the efficient use of smart roads and the use of IoT traffic systems is a unique concept that makes drivers safer than ever. The authors argue that the main purpose of smart roads is to provide safety, use less electricity and reduce traffic congestion. This can be applied using advanced technologies such as ultrasonic sensors, cameras, mobile sensors, and more. Traffic is a growing problem in India, leading to wasted energy, wasted time and pollution. This project introduces new low-cost technologies for smart roads. Various technologies have been introduced to reduce obstacles to traffic. **Chandra and Sikdar, (2006)** wanted to simplify the analysis of mixed vehicles in which different types of vehicles on the same road segment are converted through passenger car units (PCUs) into first passenger cars. **Kalaga Ramachandra Rao, (2013)** explains that overcrowding is one of the major problems facing most countries and, therefore, many measures have been taken to reduce congestion, making overcrowding a waste of time. time and energy, pollution and stress, which reduce output and imposes costs on society. **Prasad N.V, (2009)** suggested measuring the city's traffic congestion. In this study, the authors reveal that business circulation is one of the major problems that most space politicians face, and therefore many measures have been taken to facilitate it. good for traffic. He concludes that the results readily show that business traffic wastes time and energy, and causes pollution and stress. , which reduces productivity and causes costs to society.

VII. IOT TECHNOLOGIES TO TACKLE TRAFFIC CONGESTIONS PROBLEMS:

• DETECTORS:

- a) **Infrared Detector (IR Detector)**- An IR detector is a light-based detector used for color functions such as distance and object detection. Infrared detectors are used as distance detectors on most mobile phones [3].



Fig.3- IR Sensor

There are two types of infrared detectors: emitter and reflector. A transmitting infrared sensor has an infrared emitter (usually an IR LED) and an infrared sensor (frequency printed diode) mounted on opposite sides so that the detector detects an object as it passes between them. Another type of IR sensor is the reference IR sensor. In this case, the probe and sensor are mounted close together in the direction of the object. If an object appears in front of the detector, the detector will detect it. Different functions of IR sensors are used in mobile phones, robots, industrial assembly, automobiles, etc.

- b) **Aural Detector**- The aural detector is used to measure (sensor) space and convert this information into a digital signal that can be translated by a computer or an observer.



Fig.4- Aural Detector

The movement of vehicles produces audible energy or audible sound from various sources inside the vehicle and in the trade of car tires on the surface of the road. Using a microphone system, the voice sensors are designed to pick up these sounds somewhere within the track. When the vehicle passes through the acquisition area, the signal processing algorithm detects an increase in sound

power and generates a vehicle presence signal. When the vehicle leaves the acquisition area, the noise level decreases below the acquisition limit and the vehicle's presence signal disappears. Hearing sensors can be used to measure speed, volume, seating, and presence [2].

- c) **Piezoelectric Detectors**- Piezoelectric detectors convert mechanical energy into electrical energy.



Fig.5- Piezoelectric Detectors

When used for vehicle counting, the detector is placed in a trench dug in the pavement. When the car passes a piezoelectric sensor, it squeezes and activates a clear electrical signal-an electrical signal. The signal size can be measured by distortion. When the car is off, the voltage drops. This voltage variation can be used to describe and calculate a vehicle. Computer devices connected to icons are mounted squarely along the road

- d) **Inductive Loop Sensors (ILS)** – Inductive loop sensors are currently the most widely used for vehicle detection. Its main application is in bends involving advanced signal monitoring systems as well as on highways for traffic monitoring and accident detection.

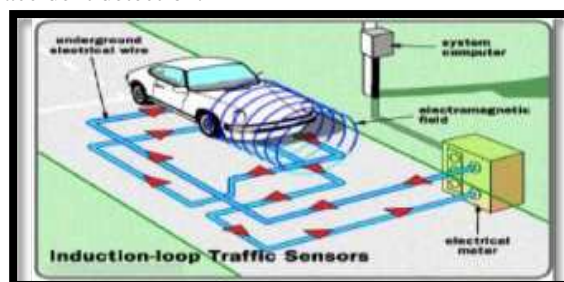


Fig.6- Inductive Loop Sensor

ILS usually takes the form of one or more irregular lines drawn over a paved area. The circuit is connected to a sensor element that records the change in circular inductance (the change in the detector's magnification field) as the vehicle passes it. ILS can be used to describe the presence or passage of a vehicle. It can also be used to measure speed (using two wheels for short distances) and assist vehicles [2].

- **RFID:**

Radio Frequency Identification (RFID) uses an electromagnetic field to automatically detect and track signals attached to an object. An RFID system consists of a bit radio transponder, a radio receiver and a transmitter. When an electromagnetic test is initiated from a nearby RFID receiver, the tag transmits digital data (usually a set of forces involved) to the receiver. This number can be used to track energy assets [2].



Fig.7- RFID Technology

RFID markers are used in numerous diligence. For illustration, an RFID label attached to an machine during product can be used to track its progress through the assembly line, RFID-tagged medicinal can be tracked through storages, and implanting RFID microchips in livestock's and speed enables positive identification of vehicles.

- **DRONE SERVICES:**

This is one of the best business traffic reduction ideas using smart metro technology. With the rise of IoT-enabled drones, the great jobs needed by inspectors, large delivery specialists or city officials in the cockpit can now be done with cameras. Driverless. Smart cities perform small tasks and experimental tasks that drones cannot handle. This quickly reduces the number of vehicles on the road, especially during rush hour



Fig.8– Drone Services

- **SMART TRAFFIC LIGHTS:**

Smart traffic light or smart traffic light is a transportation business management system that combines traditional traffic lights with sensors and artificial intelligence to intelligently route vehicles and vehicles. They could be part of a larger intelligent transportation system. Smart

traffic lights use data from detectors, cameras, GPS and other devices to understand traffic patterns and the number of vehicles, hikers and pedestrians approaching the intersection [3].



Fig.9 – Smart Traffic Light

By reacting quickly to situations in real time, traffic lights can efficiently navigate city centres, shorten travel times, reduce traffic, reduce carbon emissions, and improve improved safety for drivers, hikers and cyclists. Smart traffic lights can prioritize cars and buses, helping to reduce traffic congestion by encouraging people to use public transport.

- **PUBLIC TRANSITS:**

Public Transit is a locally available form of travel that allows others to travel together along designated routes. Good examples of public transits modes include shared taxis, trains, buses, bullet trains, airlines, and coaches that dominate inter-urban public transport. The scope of benefits that public transits offers is not limited to only reducing traffic, but many other factors are improved by combining this system. Here are some:

- (i) Public health
- (ii) Sustainability
- (iii) Mobility and accessibility to megacities
- (iv) Profit growth
- (v) Community participation

Public transits generates significantly less air pollution per passenger than a motor vehicle. In addition to reducing air pollution, public transport is also more energy-efficient for each remote passenger, contributing to a reduction in the total amount of energy required for transport. APTA says public transportation in the United States is responsible for saving 4.2 billion gallons of gas each time. Public transits can accommodate more people in a much smaller space than private vehicles, which reduces business vehicle traffic, reduces air pollution from pedestrians, and helps drivers avoid stress.

VIII. RESULT AND DISCUSSION:

• *Result:*

S.No.	Location	Duration	Traffic Volume	Traffic Consumption			
				Cars	Autos	2-Wheelers	Buses
1.	Barakhambha Road	4 Hours	820	326	186	230	78
2.	Janpat	4 Hours	465	465	173	220	29
3.	Outer Circle (Connaught Place)	4 Hours	386	386	223	264	62
4.	Sansad Marg	4 Hours	703	246	116	232	109

Table 2: Congestion Level during Peak Hours

S.No.	Location	Traffic Volume(V)	Capacity(C)	V/C ratio	Congestion Level
1.	Barakhambha Road	820	1064.93	0.77	Heavy
2.	Janpath	887	1304.41	0.68	Moderate
3.	Outer Circle (Connaught Place)	935	1508.06	0.62	Moderate
4.	Sansad Marg	703	1464.58	0.48	Low

Volume to Capacity:

The V/C ratio makes it possible to estimate the relative level of congestion on a segment of roadways. Traffic engineer have developed the following categories:

V/C ratio > 1 = **Severe Congestion**

V/C ratio 0.5 to 0.74 = **Moderate Congestion**

V/C ratio 0.75 to 1 = **Heavy Congestion**

V/C ratio < 0.5 = **Low or No Congestion**

Table 3: Speed Reduction Index during Free Flow and Congestion

S.No.	Location	Average speed during free flow	Average Speed during Congestion	Speed Reduction Index
1.	Barakhambha Road	60 km/h	36 km/h	0.4
2.	Janpath	60 km/h	24 km/h	0.6
3.	Outer Circle (Connaught Place)	65 km/h	34 km/h	0.48
4.	Sansad Marg	67 km/h	30 km/h	0.553

Formula used:

Speed Index = (1-(Avg. Speed during free flow / Avg. Speed during Congestion))

The SRI ratio is multiplied by 10 to keep the value between 0 to 10.

• *Discussion:*

The main emphasis of this study is to incorporate various technological devices in order to eradicate the existing of congestion level on selected areas of New Delhi. We took the initiative to go to the mentioned locations and extensively carried out three experiment and on the basis of the proposed data we framed out the level of congestion and the significance factor responsible for it cause. Traffic Volume, Vehicular Speed and capacity of a road were the chief factors in assessment. We were able to extract the following details from the given location

- **Barakhambha Road** – Heavily Congested during Peak Hours
- **Janpath** - Moderate Congested during Peak Hours
- **Outer Circle (Connaught Place)** - Moderate Congested during Peak Hours
- **Sansad Marg** – Low Congested during Peak Hours

IX. SUMMARY & CONCLUSION:

- Congestion reduction measures affect the entire transport system, with the rise of major cities around the world becoming a major cause of air pollution. It is expected that measures aimed at reducing traffic congestion will also have an impact on air traffic pollution.
- In this paper, we have proposed the effectiveness of hitting a traffic problem with minimal mortality. The proposed paper focuses on using of IoT techniques in our day to day life to minimize congestion problem. In this paper we have proposed the IoT technologies such as Detectors, Rfid, Drone services, Smart commercial lights and Public transport, which will eliminate and eliminate system degradation like mining cost, dependence on environment, etc. These technologies are sustainable in nature as they need to be installed one time and later on they need to be updated. In this way we can use the hard earned taxpayer's money in different field rather than using it in minimizing congestion problem. Using IoT technologies not only saves money but it also reduces manpower in field as everything is connected to the traffic management centre.
- If we use the above solutions, we cannot only reduce congestion level in metropolitan cities but make our cities more accessible and smarter.

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UNDERSTANDING HIGHWAY FAILURE AND RECOMMENDING ITS MAINTENANCE (A Case Study of Delhi – Kolkata Highway)

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Abstract— For the development of a country, transportation infrastructure plays a very important role. The purpose of this paper is to examine the pavement failure types and to select the best maintenance to overcome it for Delhi – Kolkata Highway earlier known as (Old NH-2). There are many kind of failures that a pavement go through such as, Potholes, Raveling, Rutting, Shear failure etc. The main reasons for failure in flexible pavement are heavy loads, poor drainage facilities and heavy rainfall. Due to pavement failures people faces many problems in their day to day life. Pavement failures not only create problems to people but it also increases cost of maintenance. The present studies identifies that the classifications of faults in flexible pavements with their source along with the way to correct it with associated maintenance procedure.

Keywords—Highway Failure, Highway Maintenance, Flexible Pavement, Rigid Pavement, Potholes, Cracks, Raveling, Rutting, Repair.

I. INTRODUCTION:

Transportation plays a vital role in social, economic and industrial development of a country. Because of this transportation is categorized in three ways such as, airways, waterways and roadways. The main aim of this paper is to examine the various failures in a flexible pavement along with their causes of formation and how we can tackle it with maintenance procedure guidelines. It is visible that people nearest transportation is the road transportation. This type of transportation is needed for the connectivity of villages to cities or cities to different parts of states, but if this transportation pavement is damaged then it could to leads to serious problems. Pavement damaged can results in cracks, potholes, depression, rutting etc. Causes of these failures in pavement may be due to poor drainage facilities, poor construction materials, or severe rainfall. [1]

Based on the requirement pavements are classified into two categories which are flexible pavement and rigid pavement. [4]

1. **Flexible Pavement** – These type of pavement are mainly made up of various type of materials. Each layers receives the load from the upper layer and then the load is distributed equally to the rest of the layers. In this way stress is reduced in flexible

pavement. Under the load of tyres these type of pavement bends. [7]

2. **Rigid Pavement** – These type of pavement is constructed from cement concrete or slabs of reinforced concrete. These pavement are designed to provide sufficient strength to resist the vehicular loads from the traffic. It distributes the vehicular loads to wide area of subgrade as it has high modulus of elasticity and rigidity. [7]

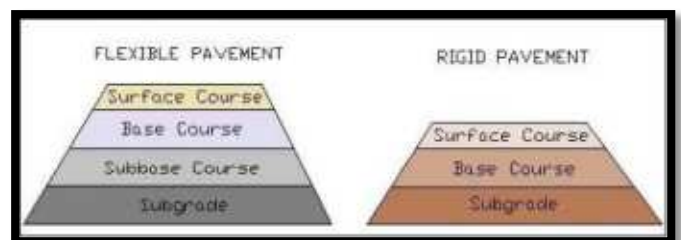


Fig.1- layers of flexible and rigid pavement

In India mostly flexible pavement is considered for construction. When the roads are constructed, there is the high need of maintenance so that it could be used by people for longer period of time. Another reason is that in India there is a harsh climate so, maintenance is required to prevent these road from getting damage during single season.

A flexible pavement failures is by formation of potholes, cracks on the bituminous surface.

II. LITERATURE REVIEW:

Golla rama Kishore,K Ramu, (2020) suggested proper design, maintenance and proper drainage system should be made for the betterment of roads and with relevance to safety of the users. They also focus on frequency of maintenance. If there is a damage in the road so, road should be repaired. The methods in this paper includes highway planning and designing which involves the stages such as highway development, geometric design and factors which affects these designs. Apart from that they also discussed about the various types of highway pavement failures along with their

maintenance. They also talked about the various types of maintenance processes that should be taken into consideration while applying these processes on maintenance works which include shoulder, bridge, traffic control devices and so on. **Shivam Khare Tanuj Verma, (2018)** presented decrease in serviceability results in the pavement failures which cause cracks, ruts etc. If these issues are not taken into consideration then it could lead to serious problems. Main objective of their paper is to provide good maintenance to the pavement so that it could be in good condition for future use. Objective of their paper includes, identification of the defect along with its causes and type of maintenance to be used for the smooth movement of traffic. The limitation or research gaps in the research manuscript is that they don't focus on the practical part as they only considered theory as the base of their study. **Ashpaq Majeed Naik, (2018)** have proposed three tasks for the pavement failure analysis. First task is to check the pavement visually and investigate the types of failure. Second task is to determine the cause for the failure and third task is the solution for the problem. Factors that are considered are traffic volume, environmental issues etc. **Mehedi Hasan, Mohd. Abdus Sobham, (2020)**, as Rajshahi city has about 186.64 km of paved roads according to 2011 census but only 23% of road length are in failure condition. In this paper they had investigated the failures that are present in the flexible pavement along with their causes and maintenance. They also emphasize on the various causes which result in pavement defects, that includes heavy traffic, poor mix and so on. This study also proves that maintenance procedure is 60% similar to the conventional procedure. Data is collected by field investigation. As a result, from their field investigation they have spotted various types of failure in different areas of Rajshahi City. They also categorized their maintenance types according to their failure conditions. As per their conclusion Rajshahi city which is situated in Bangladesh is followed by urgent and routine maintenance. The limitation or research gaps in the research manuscript is that they focus on types of maintenance but they don't focus on the methods that can be used to solve these failure problems. **Hnin Ei Ei Khaing, Dr. Tin Tin Htwe, (2014)** described proposed the various methods to improve the pavements life. According to him routine maintenance, periodic maintenance and urgent maintenance are the various ways that can improve the life of a pavement. The work is focusing on failure patterns, visual maintenance by using various types of methods such as IRC Formulas, Soil Mechanics of three layered system. Visual maintenance works includes routine, periodic, urgent maintenance along with this, visual maintenance also includes maintenance regarding bituminous and asphalt pavement. As a conclusion their main objective is to improve the pavement of Magway-Yangon highway (Myanmar). They also evaluated thickness overlay by using IRC formula. As a result the maximum overlay can be achieved is 6 in and 12 in as maximum overlay for granular. **Parveen et al.** emphasize that sides of the roads should not be neglected from things such as, hidden signs, potholes, and damaged edges, improper design etc. as it could lead to the serious accidents sometimes. In this paper they had investigated the failures that are present in the flexible pavement along with their causes and maintenance. In their investigation they had taken an alignment of 10 km which includes 8 km of flexible pavement and 2 km of rigid

pavement in Fatehpur district, Uttar Pradesh. They also emphasize on the causes of defects in pavement which includes heavy traffic, poor mix and so on. This study also proves that maintenance procedure is 60% similar to the traditional procedure. Data is collected by field investigation. As a result, from their field investigation they have spotted various types of failure in different areas of Fatehpur district. They also categorized their maintenance types according to their failure conditions. As per their conclusion Fatehpur district which is situated in Uttar Pradesh is followed by urgent and routine maintenance. The limitation or research gaps in the research manuscript is that they focus on maintenance type but they don't focus on the methods that can be used to solve these failure problems. **Praveen Kumar, Ankit Gupta et al, (2010)** provides the remedies to minimize the pavement failure. There are many reasons responsible for pavement failure. Applying the maintenance procedure on the pavement can result in enhancing the life of a pavement. This paper describes the pavement failure and their problems experienced in India. Based on the experience various prevention techniques were described in this paper for enhancing the life of a pavement. The work is focusing on pavement performance models for the maintenance work. They also highlight the importance of pavement models for forecasting service life of pavement and their strength. Pavement models include surface characteristic models, models based on environmental factor, pavement rating models and so on. The limitation or research gaps in the research manuscript is that there is not a specific constant as it changes according to need. These types of models are not suitable during seasonal traffic.

III. FACTOR AFFECTING & CAUSES OF PAVEMENT FAILURE: [2]

1. Materials used are defected
2. Defects in quality control and construction method during construction
3. Improper drainage system
4. Movement of heavy load vehicles or increase in load repetition because of rise in traffic volume
5. Improper compaction of pavement layer during early stages of construction
6. Factors such as rainfall, increase in table of water etc.

For fixing the problems related to the pavement failure following procedure is carried out such as: sealing, cutting, filling etc. maintenance of the pavement is classified into three heads: [5]

1. **Routine Repair** – Which involves filling of potholes, patch repair work, shoulder repair, repairing of road signs etc.
2. **Periodic Maintenance** – Which are renewals of wearing course of pavement surface and maintenance of various items.
3. **Special Repair** – Which are widening of roads, damage caused by environmental factors, reconstruction of pavements etc.

Flexible pavement is the pavement which has low flexural firmness and flexible response when loaded. In flexible pavement distortion can be seen in final layer. (Figure -1) shows the different layers of flexible and rigid pavements

IV. METHODOLOGY:

Due to heavy rain or moving of heavy loaded vehicles on the pavement Delhi – Kolkata Highway damaged at various places which developed pavement distress in the highway. Many failures such as potholes, cracking etc., were formed. To overcome this problem maintenance is carried out with high frequency. Some of the pavement failure along with their maintenance are discussed below. [4]

Table -1 Pavement Failures and their Maintenance

S.no	Type of Failure	Description	Remedial Measure
•	Potholes	This type of failure is the most common failure that a pavement has. This type of failure is present everywhere in the pavement. Structural failure and roughness of the road were created. Rainwater and the movement of heavy load vehicle were the causes of formation of these types failure.	Filling are some operations that are considered into action for potholes having low depth. Otherwise premix filling is considered if the potholes frequency is more
•	Alligator cracking	This type of failure is commonly seen on the pavement which occurs due to pavement layer materials relative movements. Repeated use of heavy vehicles results in fatigue failure or moisture variation can cause swelling or shrinkage in pavement. Another causes for this failure is due to improper construction of	For different types of alligator cracking different type of maintenance is required such as, for normal alligator cracking carpeting is use but for the effective alligator cracking patching is required.

		base course, that results in the cracking of the surface course.	
•	Block cracking	Another type of failure than can be seen in pavement is block cracking. Unstable base and poor construction are the causes of formation of these kind of failure.	Seal coat can be used to prevent from these kind of failure
•	Slippage cracking	This type of cracking created roughness on the road. Unstable wearing surface and bad drainage are the causes of formation of these cracking.	For repairing these types of cracking carpeting and sealing coat methods are taken into consideration.
•	Transverse cracking	This type of cracking is mainly forms due to poor mix design or movement of heavy load vehicle on the pavement	For the solution surface dressing such as carpeting is used for repairing these types of cracks
•	Longitudinal cracking	This type of cracking is mainly forms due to poor mix design or movement of heavy load vehicle on the pavement	For the solution surface dressing such as carpeting is used for repairing these types of cracks.
•	Raveling	This type of failure in pavement is responsible for creating roughness. It happens when the pavement binder doesn't have the strength to hold the aggregate and process of compaction is not done properly at the time of construction.	For solving these types of issue surface treatment is required.

• Corrugation and Shoving	These types of failure are responsible for creating roughness and elevated portion in the pavement. It is caused due to improper design mix, severe traffic and unsuitable binders etc.	These types of failure may be repaired by premix filling, rolling and sealing.
• Depression	Another type of failure is the depression in the pavement which is caused by severe rainfall and poor drainage facility.	This type of failure is cured by removing affected portion from the surface layer and replacing it with the premix filling material.
• Rutting	This type of failure is occurred due to movement of heavy load vehicles and the poor construction procedure, which results in the filled water ruts that causes vehicle hydroplaning.	The affected portion should be replaced with premix. Later on sealing is applied on the premix for repairing the pavement.

1. **Flexible overlay over flexible pavement** – for the design traffic and the existing condition of subgrade total pavement thickness is required. For finding the total design thickness CBR method of pavement design is considered by IRC. The existing thickness of the pavement is found from the test pits dug on the pavement.

$$h_o = h_d - h_e$$

where,

h_o = overlay thickness required

h_d = total design thickness required

h_e = total thickness of existing pavement

2. **Rigid overlay over rigid pavement** – when a rigid pavement is constructed on old rigid pavement, it acts as a monolithic one, as the slabs of both old and new pavement don't make a perfect bond. This problem can be solved by making the old surface rough or by placing thin layer of bituminous material between the slabs.

For calculation of overlay:

$$h_o = (h_d^a - x h_e^b)^n$$

where,

h_o = overlay thickness required

h_d = total design thickness required

h_e = total thickness of existing pavement

values of a,b,x and n depends on the type of pavement and method of overlay

V. STRENGTHENING OF PAVEMENT [1]:

For the successful maintenance of pavement, it is essential that they have adequate stability to withstand the design traffic under prevailing climatic and subgrade conditions. Strengthening may be done by providing additional thickness of the pavement adequate thickness in one or more layers over existing pavement, which is called **overlay**.

Types of Overlay [7]:

- Flexible overlay over flexible pavement
- Rigid overlay over rigid pavement
- Rigid overlay over flexible pavement
- Flexible overlay over rigid pavement

Table 2 – Rigid Overlay Design Factors

Agency	Existing Pavement Condition		X					
Crops of Engineers and, PCA	Good Condition		<table><tr><td>1.00</td></tr><tr><td>0.75</td></tr><tr><td>0.35</td></tr></table>			1.00	0.75	0.35
	1.00							
	0.75							
	0.35							
Initial Cracking								
Badly Cracked								
Agency	Construction Method		a	b	c			
Crops of Engineer	Poured directly on Old Pavement		1.40	1.40	1/1.4			
	Levelling Course		2.20	2.00	1/3			
PCA	As(1) above		1.87	2.00	1/2			
	As(2) above		2.00	2.00	1/2			

3. **Rigid overlay over flexible pavement** – calculation of thickness for rigid overlay is done by rigid pavement which is laid down. Therefore, K value is obtained by conducting plate bearing test on flexible pavement.

4. **Flexible overlay over rigid pavement** – when we provide flexible overlay on rigid pavement, the wheel load is distributed to larger area. Further due to bituminous overlay a temperature differential is decreased in rigid pavement. The life of a rigid pavement may be increased considerably by a suitable designed and constructed bituminous overlay placed at the right time.

$$h_f = 2.5 (F h_d - h_e)$$

where,

h_f = overlay thickness required
 h_d = design thickness of rigid pavement
 h_e = total thickness of existing pavement
 F = factor depending upon modulus of rigid pavement

VI. STUDY AREA:

Delhi – Kolkata Highway is the busiest highway in India. It starts from the Delhi and ends in Kolkata. Length of the highway is around 1645 km. A survey of 20 km is done for determining the various types of failure that are present in pavement and their maintenance procedure to overcome it.

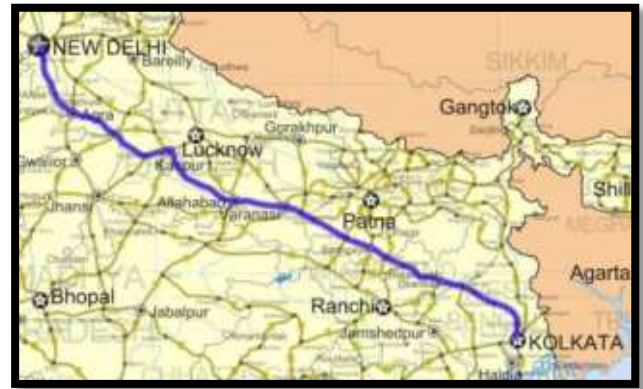


Fig.2 – Map of study area

VII. RESULTS AND ANALYSIS:

All the maintenance processes are sorted in the maintenance categories from the data obtained from the various form of failures. All the maintenance data is obtained from the authorities.

Table-3 shows the failure category with their frequency of maintenance

Failure	Failure occurrence (location)	Maintenance
Potholes in pavement	12	Urgent maintenance
Cracks in pavement	14	Routine maintenance
Raveling in pavement	6	Periodic maintenance
Corrugation and shoving in pavement	8	Urgent maintenance
Rutting in pavement	8	Periodic maintenance
Depression in pavement	7	Urgent maintenance

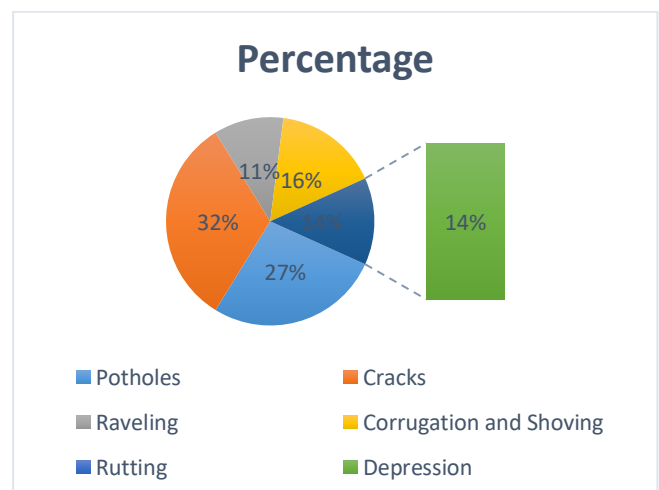


Fig.3 – Occurrence of failure

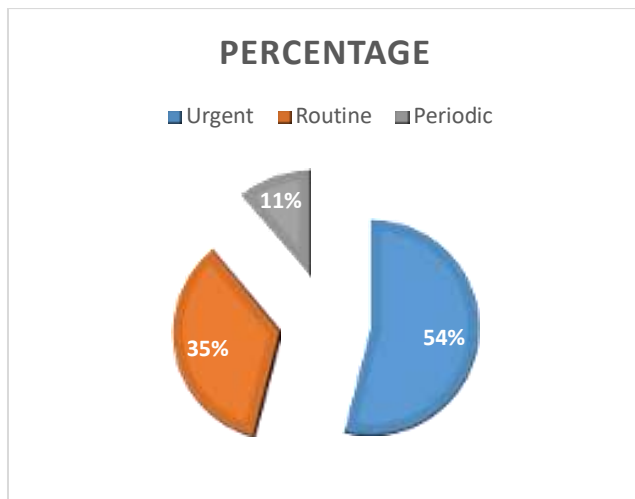


Fig.4 – Frequency of Maintenance

VIII. CONCLUSION:

Based on the study for different types of faults in pavement. Following conclusions are made:-

1. The main reasons which causes failure in a flexible pavement is due to the weather conditions such as heavy rainfall, quality of material used, heavy traffic load on the pavement and air in subgrade which causes dampness.
2. The study shows that the maintenance is to be carried out is routine but at some areas it should be urgent. In Delhi – Kolkata Highway, urgent maintenance should be carried out for the flow of traffic, otherwise it could leads to traffic jam as it is the one of a busiest highway of India.
3. Therefore, for good life of a pavement proper maintenance, standardization as well as strengthening is required but if these things are not controlled properly, then it could result as a repeated road maintenance again and again for the same road.

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Use of Cargo Stations in Cargo Transportation

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ABSTRACT

Developing technology also has great effects on social life. In the pace of daily life, it has become very important to be able to reach the needed posts instantly. Cargo companies, which always prioritize quality and customer satisfaction in their services, shape their services according to the needs of their customers within the changing life conditions. Thanks to the cargo station delivery implemented with this in mind, shipments will now be able to be reached without time limits in many areas such as university campuses, student dormitories, shopping centers, large markets, metro and train stations, and large secure sites in cases where it may be difficult for the shipments to reach the recipient.

Keywords: Cargo transportation, smart cargo delivery, cargo stations

1. Introduction

While technological developments continue, a new technology enters human life every day. The change and development process of technology, which closely affects human life, has been a matter of curiosity by experts. There are many technological products that people use and benefit in their daily life. One of them is the Kargomat technology known as cargo stations. Kargomat is a new delivery method applied in the delivery of products after the purchases made by the consumers (Akoğlu & Fidan, 2020). As the use of Kargomat offers a contactless delivery option, it is thought that it will increase due to a widespread network during and after the pandemic period. In the researches carried out during the pandemic process, it is seen that the tendency of people to contactless shopping and delivery has increased even if they are not infected with the virus. Developing technology also has great effects on social life. For orders whose destination information and product type are suitable for Kargomat delivery via e-commerce sites, packages can be left at the relevant cargo station by using the cargo stations delivery option, without having to wait for cargo at home or at work. Thus, orders can be safely received 24/7 after they are left at the cargo station (Atmaca & Turgut, 2015).

2. Cargo Transportation

The word cargo is a word used in the meaning of "load", which has entered our lexicon from Western Languages. It is used in this sense in daily conversations, without any distinction of volume, weight or packaging. When examined as a logistics term, it refers to "the material in the parcel and package, which can be at most 30 ds/kg in a single piece sent by individuals or organizations to each other". The process of transporting them is also briefly called Cargo Transportation. Materials in drums (Doğan, 2013), barrels, tanks, sacks or on pallets are excluded from this definition due to their packaging types. Shipments of 31 ds/kg or more in one piece are out of the scope of cargo due to their weight and volume and are considered as "load-goods". Cargo Transportation is a suitable service model for your small number of shipments that need to be distributed to many destination centers and for your shipments whose destination centers are districts (Deniz & Gökmerdan, 2011).

Cargo information is given to the process of receiving any material, product or goods from one place to another. Cargo outputs, weight, volume, distance between the place of delivery and the place to be sent are based on operations. Cargo items are carried out by sea, rail or air, taking into account different points. Shipping functions began with postal operations at the beginning of the twentieth century. Cargo consumers are a sector that continues to develop depending on

the technological opportunities available today. Cargoes are divided into some categories as general cargoes and special cargoes (Göncü, 2010).

3. Cargo Stations

In recent years, cargo and logistics sectors have come to the fore as the main driving force of developments in the e-commerce sector and high growth rates. In particular, the increase in mobile device penetration, the widespread use of card payment systems throughout the society and the completion of the development of the internet as a trade channel provide significant support to the growth of e-commerce platforms (Toraman, 2022).

While the smoothness of the delivery processes, which is as important as the quality of the product and after-sales support and is almost completely solved by outsourcing, becomes the most distinguishing factor at this point, the relations of e-commerce companies with their cargo service partners are getting deeper and more complex day by day. Cargo processes, which is one of the largest operations carried out by the e-commerce sector, which is expected to reach a size of 4 trillion dollars on a global scale in the coming year, and which enables the product and the end consumer to meet, is trying to adapt to the new era by meeting with the latest developments in technology (Şeneras, 2022).

According to the report published by the World Economic Forum in 2018, the logistics sector, which is one of the sectors with the highest technology adaptation and turns many opportunities provided by technology from international transportation to storage processes into an advantage, is the last step of logistics processes that directly concerns 90 percent of the global e-commerce sector. In the door-to-door delivery processes, it cannot benefit from technological solutions sufficiently. Considering that the needs of the e-commerce sector, which is growing by 20 percent on an annual basis, will grow at high speed in the coming years, it is of great importance that the weak relationship of consumer cargo processes, which is the last leg of logistics, with technology is developed as soon as possible (Jeganathan & Naveenkumar, 2018).

It is an electronic locker system where no fee collection is required for delivery, which does not include controlled delivery, reception and special service, and where registered domestic shipments, excluding qualified shipments, are left to be delivered upon request of the buyer or if they are not available at the address.

Thanks to this technology, buyers can easily and securely receive their shipments from Kargomats 24/7 (Brunner et al., 2007).

4. Conclusion

In recent years, information technologies, online services and mobile applications With the rapid development observed, there has been a significant growth in e-commerce. This growth had a significant impact in the field of cargo distribution. time and space e-commerce without limitation, the number of cargo shipments and trade volume increases. Even with this increasing cargo volume, logistics service providers They need to provide high quality, efficient and reliable services. Apart from global e-commerce, another factor affecting logistics service providers is very emergence of a large number of cargo and courier service operators and decreasing market share. Increasing competition among logistics service providers and increasing The number of cargo contributed to the development of new types of services. With this However, some of these changes are the last mile in distributors' supply chains. unsuccessful in solving the current problems they have to face in relation to and even deepened it. These problems are usually both delivery and collection of shipments to/from end customers It is about finding the most suitable solution in terms of cost and time for it was stated.

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The Importance of Disaster Logistics for a Sustainable Disaster Management

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ABSTRACT

The Kahramanmaraş-centered earthquake disaster that occurred on February 6, 2023 affected 11 provinces, namely Kahramanmaraş, Hatay, Gaziantep, Malatya, Elazığ, Kilis, Şanlıurfa, Osmaniye, Adıyaman, Adana and Diyarbakır. After the disaster, the delivery of the necessary equipment and the timely fulfillment of the needs are of critical importance for the survival of the people affected by the earthquake. It is necessary to ensure the flow of required materials to the relevant areas, to store, control and distribute them efficiently. Logistics is the most basic structure of aid efforts after disasters. Accordingly, the supply chain and logistics operations of a humanitarian aid organization will determine the success of an aid effort. Sustainable disaster logistics is a concept that includes the development of processes to gather people, resources, technical facilities, information and assist those affected and those in need by emergencies. In this study, the importance of disaster logistics in order to reduce the damages in a sustainable disaster management process is emphasized.

Keywords: sustainability, disaster management, disaster logistics

1. Introduction

Two major earthquakes occurred in Turkey on February 6, 2023, centered in Kahramanmaraş and Hatay. The earthquakes experienced caused a natural disaster that affected 10 provinces in Turkey. The effects of the earthquake, in which hundreds of thousands of people became homeless, are still felt all over the country. It is considered as the biggest natural disaster of 2023 for the earthquake region where aftershocks continue to show their effects. After the Kahramanmaraş earthquake, when the affected sectors are examined, logistics is at the top (Akbal, 2023). In this sense, it is important that logistics activities are effective and sustainable in terms of the country's economy and in the event of a disaster, in terms of delivering the needs of the individuals affected by the disaster. In the event of a natural disaster, where Turkey is mobilized for aid, aid shipments to earthquake regions are provided by land, sea and air. Logistics is one of the most fundamental processes for the disaster management approach to be successful. Reducing the loss of life and property after a disaster can be achieved through logistics activities. Failure to reach the right places at the right time for the post-disaster aid materials will cause the impact and severity of the disaster to be felt more, and minimizing the negative effects of the crisis environment only depends on the flawless execution of disaster logistics (Tetik & Albulut, 2023). Since disaster events occur unexpectedly and suddenly, disaster logistics activities are very difficult to perform. It is impossible to intervene in disasters and emergencies without logistics activities. For this reason, logistics operations are very important for disaster management activities and require a contemporary and different perspective (Ceren, 2023).

2. Sustainability

Sustainability is now a growing social concern that requires the right organizational attitude. In this context, logistics organizations play a very important role due to their importance in society. Designing, planning and operating a sustainable logistics system is a challenge for the companies involved. In order to overcome these challenges, companies need to manage their logistics structures effectively, taking into account their economic, environmental and social objectives. The complexity of the decision-making levels involved requires tools that can support decision-making, which poses significant challenges for the academic community (Ramos et al., 2014).

Decreased natural resources with rapid increases in consumption have led to an increase in economic sustainability research. The concept of sustainability is the balance of ecosystems, the preservation of natural diversity and the smooth functioning of ecosystems. The importance of logistics management systems for the sustainability structure is an indicator of the continuity of a product in the chain from the supplier to the end consumer (Christopher, 2011).

The concept of sustainability in logistics is to reduce the damage to nature. This is also very important when choosing a storage location. Because the chosen place should be determined in a way that will not harm the nature. The concept of sustainability in logistics refers to logistics practices compatible with nature. These applications can be an alternative to the fossil fuels used in logistics operations and can adapt to nature instead of logistics warehouses. For this reason, it is possible to define sustainable disaster logistics as a concept that includes bringing together people, resources, technical skills and knowledge to help those affected and in need of emergencies while developing systems and processes that do not harm nature (Van Wassen-hove, 2006).

Natural disasters (such as earthquakes, floods, and storms) cause enormous economic and human losses to various governments and communities each year. Leadership and confronting critical conditions have been an important topic discussed in all countries in recent years, and all countries should have the ability to lead and confront these terrible events (Seraji et al., 2019). In the short and long term, disaster areas and their inhabitants can suffer widespread economic and social destruction. Although some dangerous natural events are relatively small in scale, they can cause a major disaster if not managed well after the event. This can have devastating short- and long-term consequences for disaster areas and their inhabitants (Flanagan et al., 2011).

Macro-level logistics planning in emergencies; may include the transport of goods such as medical supplies and personnel, special equipment, forces necessary to conduct rescue operations and maintain order, and finally, food and other goods used in rescue operations. coordination center; decides on the quantities, types, destinations of auxiliary materials to be transported and the vehicles assigned to transport these loads. During planning, different types of vehicles (road, air, rail, etc.) and their capacities should be available at supply centers, demand centers or elsewhere. (Barbarosoğlu et al., 2002).

3. Disaster Management

Disasters are human-induced and natural events that negatively affect all living things in nature, cause physical, economic and social losses, disrupt the ecological system and create new catastrophic risks and continue to increase. According to the definition of AFAD, "a disaster is a natural, technological or man-made event that causes physical, economic and social losses in the whole society or in certain parts of the society, and stops or interrupts normal life and human activities. Disasters, natural disasters and man-made disasters General A disaster can be defined as "a traumatic event that cannot be resolved by local governments using normal procedures and seriously disrupts the functioning of a community or society, causing human, material, financial or environmental damage" (Adiguzel, 2019).

A disaster is a natural, technological and human-induced event that requires the coordinated action of many institutions and organizations, causes physical, economic and social losses for human rights, and affects societies or human communities by suspending or interrupting normal life and human activities. Events that occur as a normal function of nature such as earthquakes, floods, and volcanic eruptions are considered natural disasters and must cause loss of life and property in order to be classified as a disaster (Şipahioğlu & Şahin, 2002).

Natural disasters occur when extreme natural events, such as earthquakes, floods, or storms, cause loss of life, human suffering, or major property damage. It is considered a disaster in the CRED (Centre for Research on the Epidemiology of Disasters) database if at least one of the following conditions is met:

- Death of 10 or more people,
- 100 or more people affected, injured and lost their homes,
- The government's declaration of a state of emergency,
- Government requests for international assistance. (Strömberg, 2007).

If we look at disasters in terms of the results they cause, the most negative result is undoubtedly physical loss, loss of life and injuries. Also among the major losses are damaged or destroyed businesses and residences. Other consequences of disasters can be classified as economic, social and psychological (Altun, 2018). Deaths caused by disasters can be grouped into five main groups according to their causes. The first of these; These are deaths that occur

directly depending on the scale and degree of destruction of the event that caused the disaster, such as falling under the wreckage, drowning in water, poisoning, etc. Latter; It is the death of people who did not die immediately during the incident, but suffered a disaster such as garbage, due to delayed rescue. The longer the recovery, the shorter the survival time. Third; These are deaths caused by inadequate rescue operations, and to prevent these deaths, rescue teams must be well trained in the pre-disaster period. Fourth causes of death; These are situations in which death cannot be avoided even if timely and appropriately rescued from the hazardous environment after the catastrophic event. Finally, deaths due to service interruption. It is the death of people whose lives depend on the equipment due to disasters such as power cuts or oxygen equipment shutdowns (Laçiner & Yavuz, 2013).

4. Disaster Logistics

Disaster logistics is the process of planning, implementing and monitoring the efficient, cost-effective movement and storage of goods and materials and related information from the point of origin to the point of consumption to alleviate the suffering of victims. It includes various functions including procurement, preparation, planning, purchasing, shipping, storage, tracking and inspection, customs and clearance (Tomasini & Wassenhove, 2009).

Disaster logistics encompasses very different operations at different times and in response to various disasters. The common goal of all these operations is to help people survive (Kovács & Spens, 2007). It requires different techniques at different levels to manage disaster logistics. These are four different techniques:

- Strategic planning for high-level decisions such as supplier selection and establishment of communication protocols
- Preparation of decisions regarding the amount and location of auxiliary materials to be stored
- Pre-event response regarding decisions taken when an impending disaster such as a hurricane is detected.
- Post-incident response refers to what should be done immediately after a disaster occurs (Altay et al., 2009).

To summarize disaster logistics in a simple and understandable way:

I. Use the right material

- II. to the right person
- III. the right amount
- IV. of the right quality
- V. At the right time and
- VI. It has to be delivered to the right place. (Doğan, 2015).

5. Conclusion

Turkey is a country where significant earthquakes have been experienced from past to present. During a disaster, taking the necessary measures with a quick response ensures that material and moral damages are reduced. Reinstatement of material damages after the disaster is also one of the issues that need effective and quick effort, and it usually takes a long time to provide. A sustainable disaster management is the policies formed at all levels, the administrative decisions taken and the activities implemented in the region covering the various phases of the earthquake. Disaster management is carried out to control the effects of the earthquake; prevention, preparedness, response, mitigation, and recovery arrangements. The main purpose is to minimize the negative effects on the disaster victims by normalizing the negative and bad conditions caused by the disaster as soon as possible and at the highest level. When disaster management activities are examined, it is seen that 80 percent of them consist of logistics activities. For this reason, success in disaster management largely depends on the success of disaster logistics.

Disaster logistics activities include the safe supply, transportation, storage and distribution of the materials requested to meet the needs of the people affected by the earthquake. Rescue operations such as transporting equipment and machinery needed for debris removal, helping displaced people and aid workers are also included in the scope of disaster logistics. Despite the difficult and limited circumstances of the disaster, all logistics activities must be carried out quickly in the operation area. Although these activities take a long time, they are carried out under difficult conditions due to disaster conditions. In the creation of the system to be used in the preparation phase in order for disaster logistics to progress efficiently and effectively; Coordination between institutions, organizations and contributing institutions is extremely important. In order for disaster logistics to achieve a sustainable success, integrity and harmony between the political will that governs the state, local governments, security forces, media, universities, non-governmental organizations, professional chambers, trade unions, earthquake experts, international organizations and the public is required.

The economies of disaster areas and inadequate infrastructures in some areas make it difficult to conduct relief operations, creating major constraints on logistics activities. For example, the capacities of airports and ports, unsafe storage areas, inadequacy of loading equipment are some of these restrictions. Damage to highways, railways, bridges and tunnels reduces the efficiency of logistics activities. For this reason, alternative logistics plans with redundancy should be prepared as much as possible in advance.

The cost of transporting relief materials to the earthquake zone from where they are collected and supplied is quite high. Many of these materials may not reach those in need in a timely manner due to lack of information and training in collection, sorting, packaging, loading, receiving, temporary storage and distribution. What is delivered can often be distributed as damaged. Lack of proper storage facilities may cause food aids to deteriorate and damage goods and materials beyond use. Considering the steps taken from the collection of each material to its distribution, failure to deliver or damage to the aid materials in question causes great financial loss and a waste of effort. For these materials, both workforce and storage areas should be included in the logistics plans before the disaster.

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The role of logistics in dropshipping

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ABSTRACT

Dropshipping started to gain ground as an e-commerce business model in 2006, when online marketplaces began to become popular in the United States. Dropshipping has developed rapidly by 2020 and has turned into a very lucrative business model in the e-commerce industry in the process. Dropshipping is used as the main business model by 22-33% of active retailers. Dropshipping is also known as a retail execution method, as it works in the form of dropshipping, unlike traditional retail. Dropshipping is an e-commerce method used to keep stock, direct the order to the supplier and deliver the product from the supplier's warehouse to the customer. In this study, the concept of dropshipping is examined in general and its relationship with the concept of logistics is explained. Based on the growing popularity of dropshipping as an e-commerce business model, a research survey is planned to investigate the current state of dropshipping in the industry. The survey will aim to gather data on the benefits and challenges of dropshipping, as well as the strategies and tools used by retailers to manage their dropshipping operations. The survey will also explore the role of logistics in dropshipping and how it affects the overall performance of the business model. The findings of this survey will provide valuable insights for retailers and e-commerce businesses looking to adopt or improve their dropshipping operations

Keywords: Dropshipping, logistics, e-commerce

1. Introduction

There are many alternative ways to sell online. Dropshipping, which stands out among these ways, is one of the most popular sales operation techniques in recent years. Users who want to sell with dropshipping can make their online sales without the need for a physical product, warehouse or shipping. Dropshipping is a method that allows trading on all continents with little capital and good planning. Dropshipping is its accepted name all over the world. With this method, sellers supply their products through intermediary firms and deliver them to their customers in this way. The seller does not have to physically own the products, store them or deliver them to the customer by cargo (Göktaş, 2019). Dropshipping is to establish a sales chain between the supplier and the buyer. Thus, sellers can realize large sales in a short time to their target audience by just planning the operation. The main purpose of dropshipping is to direct the customer to the product they will buy and to carry out the sale without any problems. The orders received are forwarded to the supplier company, and the supplier company delivers the product or service to the buyer on behalf of the seller (Kavaklı & Yayın, 2018). In this sense, the seller not only gets rid of a huge workload by taking part in the marketing of the product throughout the process, but also protects himself from many risks of traditional trade. Moreover, the only physical tools that the seller will need to realize all these are a computer and an internet connection. The important thing is to plan the process well and to bring the right products and the right customers together (Singh et al., 2018)

2. Dropshipping

Dropshipping is the commercial activity in which brands sell their products on their own profit margins by agreeing with the suppliers. To do dropshipping, an XML link is first received. Then, products and services are displayed in virtual stores by integrating XML links with e-commerce sites (Hayes & Youderian, 2013).

Dropshipping is an e-commerce model in which e-commerce companies accept orders from customers but do not have a stock of products. In general, businesses sell through e-commerce sites or e-commerce marketplaces with the dropshipping method. In this sales method, brands agree with a supplier and integrate their products into e-commerce sites or e-commerce marketplaces with companies that provide XML. When the products are sold, businesses purchase their products from their suppliers and send them to the end customer (Amalia, 2023).

Dropshipping is based on bringing the right customer and the right product together. How this meeting will be realized depends on the planning of the chain to be established between the

supplier company and the e-commerce site or platforms. Many dropshipping entrepreneurs start with a detailed analysis and planning. In this context, the process starts by planning the steps such as market research, product selection, supplier company preference in detail (Syafii, 2013).

Market Research: Before starting sales planning, you should first conduct a detailed market research. The prominent needs during e-Commerce, the products frequently preferred by the buyers, the volume of these products in the market and the competitive rate will guide you to make an effective start (Zajac, 2014).

Product Selection: In the light of the data you have obtained after the market research, you should determine the products that you will place in your virtual shop and that you want to be an intermediary for sale. During the selection, you should consider the theme of your own store as well as the quality and popularity of the products, and create a product scale where you can manage the purchasing behavior of customers (Webb & Zhang, 1997).

Supplier Preference: After determining the products you want to sell, you can continue planning by choosing a reliable supplier who will deliver the products to the customer in the fastest and least costly manner (Kim et al., 2022).

Adding Products to the Site: After market research, product selection and supplier selection, you can move on to the most enjoyable part of the job. At this stage, you can make the products you choose ready for sale by adding them to your own site or to the shops you will create on large-volume online sales sites (Winiarski & Marcinkowski, 2020).

Order Receiving: At this stage, you can deliver the orders you receive through your own system to the supplier company, or you can choose to have the orders reach the supplier directly by using the advantage provided by some sites (Kazankaya, 2019).

Although most e-Commerce platforms do not require establishing a company for dropshipping, it is more advantageous in many ways to proceed by establishing a company for dropshipping. Since individual shipping and invoicing processes and tax procedures are not compatible with the flexible and active structure of the dropshipping method, sellers generally prefer to set up a company and store. Sellers who set up companies in countries such as America, Germany, England, especially for invoicing and taxation in international sales transactions; can make greater profits by taking advantage of the commercial advantages these countries provide for companies (Aktaş, 2022).

3. Logistics and Dropshipping

With dropshipping, some of the seller's storage, handling and transportation processes are eliminated. The disappearance of these processes also reduces costs. Businesses that reduce their costs, by lowering their prices, become more preferable to customers and gain an advantage over their competitors (Lasserre, 2004).

With these features, dropshipping can be seen as an effective business model for those dealing with e-commerce. However, for those who are interested in logistics, this business model is perceived as a process innovation. Therefore, this innovation can be added as a service option to the fourth or fifth party logistics services in the logistics processes of e-commerce companies. In other words, this innovation has become an option that logistics companies can use in the services they provide to e-commerce companies (Weiland, 2016).

From the perspective of sustainability and environmentalism, the reduction of logistics processes is also a beneficial approach for the world ecology. For this reason, dropshipping should not be considered only as a cost element. Thanks to dropshipping, businesses reduce transportation activities, use less packaging, invoices, etc. With the reduction of official documents, it gains an environmentally friendly and more sustainable approach (Skitsko, 2014).

4. Conclusion

Drop shipping companies do not need a warehouse. Since they do not have warehouse-like needs, companies do not have to deal with time-consuming transactions such as stock management. Since there is no such task as warehouse management, the salaries of the personnel who will work here are also up to the company. Since the products are sold on the same page by many companies and businesses, the rate of appealing to large target audiences is also high. Since there are no processes such as warehouse stock management and product packaging, the e-commerce site can be managed from anywhere with an internet connection, and product orders can be placed by communicating with suppliers. When dropshipping is started, no capital is required to purchase products. An e-commerce site can be established at low costs. E-commerce sites only pay the stock costs of the products they sell on their own sites to the supplier. It does not pay for a product it does not sell. Since the product packaging and cargo operations are also carried out by the supplier company, the e-commerce company does not have to pay any shipping fees. As a disadvantage, there are difficulties in selling at wholesale prices for Dropshipped products. A low rate of profit will result in a very low income level of initial sales. The low rate of profit makes it necessary for e-firms to make long-term

plans. In cases where the cargo costs are the responsibility of the e-commerce business, it causes an increase in the cost of products sold in pieces. There will be difficulties in product tracking services as there is no stock and storage. This may result in repeated complaints from customers. As a result, all these developments reveal how big a market e-commerce is.

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Food Sector globalization with respect to logistic importance in developing countries

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Abstract

Food systems suggest a flow of operations from cultivation to processing to distribution to consumption to meet the need for food. Supply chain service providers must take into account all the possible consequences of safety control failures as the globalisation of the food supply chain increases. The implementation of international goods distribution systems has expanded the scope and volume of agricultural product marketing. A supply chain that exposes a lot about the global organisation of production and consumption might be described as the food system. Throughout the presentation, we looked at the countries that import food to meet domestic demand, emphasising the role that food exports play in preserving and diversifying the world's food supply in the era of globalisation.

Keywords: Globalization, Food Sector, Logistic

1. Introduction

There is very little research has been done to cover this topic and address its particular challenges, or performance assessment, despite the fact that the food business is one of the most major global industries with enormous ramifications for the world economy. This essay aims to highlight the most pressing issues and suggest broad metrics for measuring the effectiveness of the food supply chain by weighing the development of the economy, society, and environment (Rudh 2005; Sharma et al., 2019). Only a few food items, like Coca-Cola, have recognisable brand value; the majority are considered to be commodities. This translates to producers' products having little to no differentiation, making them easily interchangeable. As a result, food processors lack the authority and power to make decisions in the downstream industries. The only way processors may sway their choice is by providing superior products, services, or prices (Wudhikarn et al., 2018).

All stakeholders in the food supply chain face problems along the way from producer to consumer, with compliance with EU rules being the most crucial to ensuring product quality and building consumer trust. Logistics connects all of them and ensures product availability. Companies compete based on their financial success as well as their production, quality, and cycle time. All of them are interlinked and serve as a framework for assessing a company's or a group of connected enterprises' level of competitiveness. Therefore, quality, timeliness, logistics cost, productivity, and capacity are the general performance factors associated to logistics processes (Rejeb et al., 2022). Quality is related to product quality but may also be used to measure how well logistics processes function along the supply chain in order to enhance these operations and guarantee customer satisfaction. Timeliness is a crucial sign of a trustworthy supply chain since it relates to the ability to react and respond to client needs within a specific time frame. Logistics For a correct financial performance, cost is crucial and relates to all logistical activities during all preparation, distribution, shipping, and warehousing phases. Productivity is a gauge of internal performance and deals with how effectively resources are used (Turi et al., 2014).

2. Recommendations and guidelines

The food business is crucial in ensuring consumer health, sustainable economic growth, and increased awareness of environmental issues. Due to its uniqueness, it presents some problems and difficulties that are slightly different from those in other industries; as a result, performance evaluation must take these into account and offer a suitable framework. The suggested indicators can be used to evaluate the performance of both individual links and the complete food supply chain. They will improve business competitiveness and strengthen the food supply chain (Friedman and Ormiston, 2022.). The report offers a methodical analysis of the market and serves as a springboard for further investigation for the authors as well as other academics who focus on the uniqueness of the food supply chain and its competitiveness (Figure 1) (Simmonds and Spence, 2017).

So, the bundle must carry out a lot of the sales tasks to leave a good impression overall. Consumers are becoming increasingly willing to spend a little bit more for the convenience and prestige of superior packages as consumer wealth increases. The firm and brand image are instantly recognisable thanks to packages (Vila-Lopez and Küster-Boluda, 2021). Innovative packaging design has the potential to greatly benefit both manufacturers and consumers. Hence, multipurpose packaging serves as both a means of content protection during the distribution system and a crucial component of the marketing mix (Moya et al., 2020).

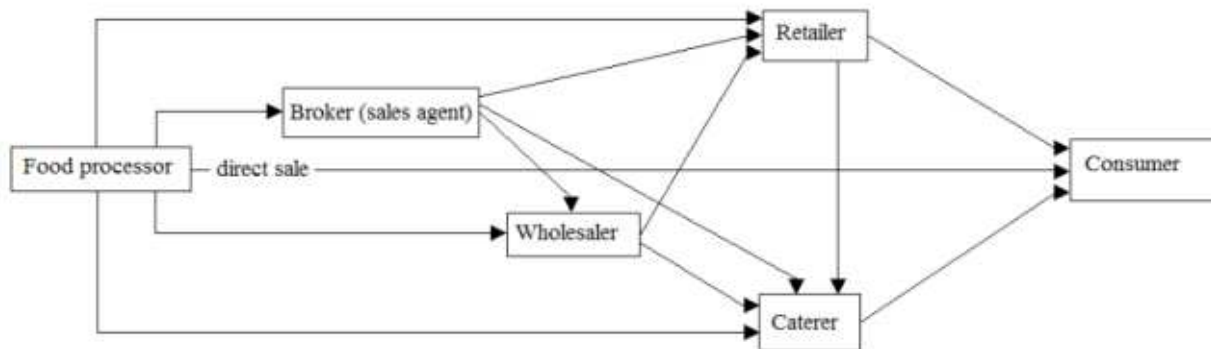


Figure 1. Food distribution system

According to Zeng et al., 2021, "the consumer's subjective perspective, not the product's factual truth, counts in his or her decision to buy, and this really emphasises the significance of packaging in the marketing mix. Before making a decision, consumers weigh all of a product's or supplier's advantages. In reality, 95% of all retail purchases are made at prices that are higher than the lowest reasonable ones (Trott and Simms, 2017). Whether the product is on a shelf or in the freezer, the packaging serves as a spokesman for the manufacturer. Due to preservation requirements, many food products are hidden from view because they need to be shielded from light or the environment (Brouwer et al., 2021). The package then serves as the primary point of contact between the provider and the customer, typically outlining the prepared goods through a design or picture in an effort to convince the customer of its advantages. The success of brands like Absolut Vodka and Tetra Pak, among others, demonstrates the significance of the container and how it can differentiate a product in a market that is fiercely competitive. The use of packaging as a marketing strategy has been influenced by a number of variables (Nguyen et al., 2020).

3. Conclusions

The packaging serves a number of crucial roles in the supply chain from the filler to the customer in the retail industry,. The package's primary and most obvious purpose is to safeguard and contain the product while it travels from the filler to the end user, but changing consumer demands have added a number of other demands. In order to sell the goods in a highly competitive atmosphere, the product's second purpose is to be displayed and promoted on the supermarket shelf by grabbing the customer's attention and making them feel good. According to research, the market's demand also dictates that many products be available in various

packaging sizes due to smaller homes. A competitive advantage over goods that must be opened and placed in an ovenproof dish can come from the desire for goods that can be heated right in the packaging. Several novel packaging options for the consumer have also been produced as a result of the rising demand for takeaway food. Sales packaging is one of the essential elements that can give many consumer products a competitive edge by utilising design to create concepts that enhance customer value. The value of branding in various sales venues is further increased by mergers and acquisitions within the European food business. Its significance cannot be overstated, and management must participate and comprehend the different packaging-related components of the company's commercial plan. Packaging has the potential to be the differentiating factor in the market. Case studies and earlier research have shown that competitive packaging had multiple functions. It is possible to get an edge within each function. When compared to advertising and marketing efforts, even a small expenditure in modifying the package can result in a big increase in brand sales.

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Pros and cons in the developing countries regarding E-commerce roles in the daily food sector after COVID-19: Current challenges and recommendations

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Abstract

New commerce ecosystems like social media platforms and all-in-one apps are evolving into tremendously potent channels for connecting with and interacting with customers. E-commerce sales have been increasing yearly, and in 2019 more people started shopping online more frequently and in bigger quantities. Professionals in the food industry concur that this is a long-term shift. In this presentation, we emphasise how the global food and agricultural industries, including those that produce staple foods, employ electronic commerce to manage quality and reduce costs.

Keywords: E-commerce, Food, Daily Food.

1. Introduction

The recent COVID-19 pandemic has amply demonstrated the importance of agricultural foods and e-commerce activities for numerous organisations, regions, and nations around the world. Almost the entire global economy has been suspended due to the COVID-19 pandemic, with the exception of strategic industries like agriculture (Lin et al., 2021). This industry, which is occasionally underappreciated, has a number of characteristics that place it in a special study setting. Agribusinesses must deal with unique product attributes, manufacturing techniques, and commercialization. Agricultural products originate from living organisms, in contrast to industrial products (plants or animals). They reproduce frequently and grow and die in predictable patterns (Lin et al., 2020). The ability of a company to "use the Internet to communicate information, ease transactions, improve customer service, and deepen backend integration" (Zhu et al., 2021) is referred to as e-commerce capability. Business agility is an organisational capability that relates to a firm's capacity to recognise and act on ongoing market developments quickly (such as business opportunities), and it aids in the growth and success of

businesses in a cutthroat environment (Joshi, 2019). Business agility, according to prior research, allows firms to better identify business possibilities for competitive action in target markets (Chen et al., 2021). While agricultural businesses are often sluggish to adapt to swift market changes, the deployment of e-commerce efforts in Chinese agribusinesses is now in its infancy (Yasin Ar, 2020). Moreover, customers' concerns about their health and quality of life and the high sensitivity of agricultural products to time variables have increased the pressure on agricultural enterprises to respond quickly. So, learning how to increase business agility is crucial for the survival and sustainability of agricultural enterprises (Li et al., 2022).

2. Guidelines and recommendations

E-commerce capacity enhances both operational flexibility and market capitalising agility. Moreover, market capitalising agility is more significantly impacted by e-commerce capacity than operational adjustment agility. Moreover, we discovered that environmental dynamism does not positively attenuate the effects of e-commerce capabilities on operational adjustment agility and market capitalising agility, while environmental complexity did. The significant incremental contributions to research are made by this theorising about and empirically demonstrating how agribusinesses might use e-commerce capabilities to support market capitalising agility and operational adjustment agility, this study expands previous IS research on IT and business agility (Tsang et al., 2021).

The investigate about the effects of e-commerce capability on the development of business agility under various conditions of the business environment, driven by the important role of the agriculture sector in China (and the rest of the world, as demonstrated during the COVID-19 crisis) and the emerging trend of companies investing in e-commerce and omnichannel initiatives (Elia et al., 2021). The use of a special survey dataset of Chinese agribusinesses. We discovered that e-commerce competence supports the development of operational emphasis (operational focus) and market capitalising agility (strategic and corporate focus), making agriculture ambidextrous in business agility (Yang et al., 2020).

In the complicated conditions of the business environment, that is, under the conditions of the diversity of customer habits, competitor actions, and product varieties, the enabling function of ecommerce competence is stronger and more useful. This study reveals how these expenditures create business value in this understudied but crucial industry by showing how investments in e-commerce initiatives help the agribusiness to be more adaptable both strategically and operationally. By giving agribusinesses business agility, Technology "does matter in this sense

since it provides business value". Who knows? Who would like to run the relay? (Guo et al., 2021).

More quickly than anyone could have predicted, the COVID-19 outbreak has swept across the globe. Many nations have put limitations on logistics and human travel and developed social separation policies. Globally, the question of ensuring food security and supplies under such conditions has emerged (Wang et al., 2020). The prevention and control efforts implemented to stop the disease's spread in China have seriously interrupted the operation of the country's traditional agricultural and food supply chain. E-commerce has emerged as a key factor in securing the supply of agriculture and food supplies to urban people during the outbreak. This includes the ability to preserve social distance through online activities (Figure 1) (Finotto et al., 2020).

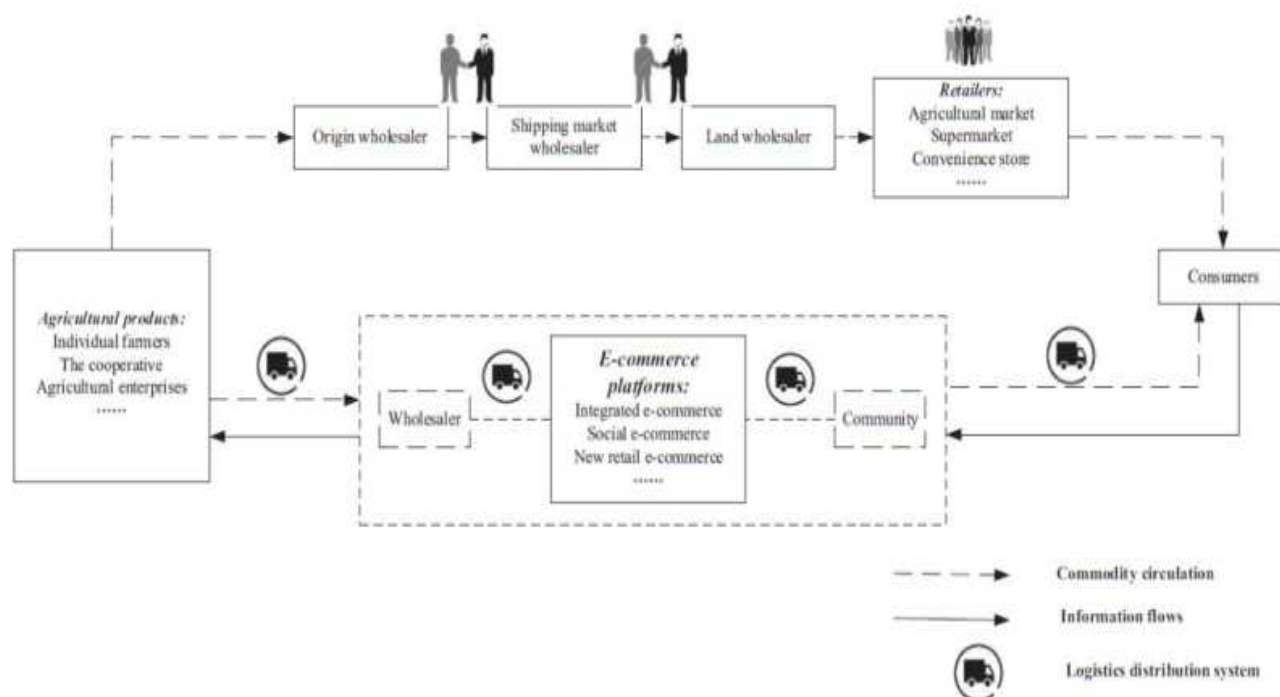


Figure 1. Supply model of agricultural products with tradition and E-commerce

Based on the major conclusions, we offer recommendations for how e-commerce might support ensuring food supply during the pandemic and in comparable public disasters. Secondly, in regions where e-commerce is well-established, the government can make use of e-commerce platforms to reduce pressure brought on by conflicts between the conventional model of food purchase and social distance requirements (Pallathadka et al., 2021). Second, in regions where

e-commerce is persistently underdeveloped, the capabilities of grassroots organisations merit greater attention (Khan et al., 2020). Resident committees can develop direct relationships with local supermarkets, retailers, or producers of agricultural items who can routinely distribute fresh produce under the direction of the local government (Nanda et al., 2021). This strategy highlights the value of citizen representatives and volunteers who assist in gathering data on household food demand while also negotiating with suppliers of agricultural products (Ji et al., 2020).

The local government can think about giving these people financial aid from the surplus of government funds. Finally, the local government needs to focus more on the crucial role that unofficial channels—which are an addition to the national e-commerce platforms—play in assuring the availability of food (Music et al., 2022). This is more significant for the vulnerable poor households because a lot of food purchased through informal channels is more affordable. This is also connected to the relationship between locals and agricultural service companies (Dianda, and Pandin, 2021).

We provide suggestions for how e-commerce could help ensure food supply during the pandemic and in similar public calamities based on the primary conclusions (Bhattacharyya et al., 2020). Second, the government can employ e-commerce platforms in areas where it is well-established to relieve pressure brought on by conflicts between the traditional model of food purchase and social distance standards (Purwanto, 2022). Second, grassroots organisations' capacities deserve more consideration in areas where e-commerce is chronically neglected. The local government can authorise resident committees to regularly distribute fresh produce by establishing direct partnerships with supermarkets, retailers, or agricultural producers in the area (Reardon et al., 2021). This tactic emphasises the importance of citizen representatives and volunteers who help gather information on family food demand and engage in negotiations with agricultural product providers (Ozbay and Ozcan, 2021).

3. Conclusions

It should be mentioned that our future research has a number of limitations. First off, the respondents to our research are users of Chinese fresh food e-commerce platforms. We investigated the elements that affect consumers' continuous purchase intentions in this scenario based on product and platform features. Given the impact of cultural diversity, further research is warranted to determine whether the research findings given in this paper are universally applicable. In order to confirm the efficacy of our model in the future, the findings of our paper

might be replicated in different cultural settings or a cross-cultural comparative analysis could be carried out. Second, consumers with previous experience buying organic goods are the target audience for this study. They are helpful in the development of this research since they have a thorough awareness of the state of the organic food sector at the moment. Future studies could take into account different product categories to have a deeper understanding of consumer purchasing patterns. Finally, the value of organic foods is rising steadily, particularly in the current era of pandemic illnesses. In addition to promoting the marketing of fresh food e-commerce platforms, it is important to boost consumers' interaction with and awareness of organic foods offline in order to better promote organic foods, deepen consumers' understanding and acceptance of organic foods. The analysis of how restaurant managers' views about organic foods would affect the promotion of organic foods may therefore be an essential research direction in the future given that restaurants are the primary location where organic foods are consumed. Fourth, historically, the perishable and delicate quality of organic foods made their preservation and transportation very expensive, which also contributed to their high cost of consumption. Modern information and communication technologies, as well as cold-chain transportation methods, have made it simpler and more economical to sell organic foods, encouraging more people to do so. As a result, pricing may have a significant impact on consumers' decisions to buy organic food, and future study could benefit from taking into account organic food price considerations based on pertinent literature and ideas. Finally, the analysis of static models and cross-sectional data is the foundation of our research. In the future, longitudinal data may be used to further validate the existing theoretical model.

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E-commerce roles in the daily food sector after COVID-19

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ABSTRACT

New commerce ecosystems like social media platforms and all-in-one apps are evolving into tremendously potent channels for connecting with and interacting with customers. E-commerce sales have been increasing yearly, and in 2019 more people started shopping online more frequently and in bigger quantities. Professionals in the food industry concur that this is a long-term shift. In this presentation, we emphasise how the global food and agricultural industries, including those that produce staple foods, employ electronic commerce to manage quality and reduce costs.

Keywords: E-commerce, Food, Daily Food.

Manufacturing Process, Modelling, Analysis, and Simulation

Metal or Non-metal Sorting Using Metal Detection

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Abstract: Metal or non-metal sorting is a crucial task in various industries, including recycling, mining, and manufacturing, where the efficient separation of metallic and non-metallic materials is essential. Traditional methods of sorting, such as manual labor and visual inspection, are time-consuming, error-prone, and not suitable for large-scale operations. In recent years, automated sorting systems based on metal detection technology have gained significant attention due to their accuracy, speed, and cost-effectiveness. This abstract highlights the application of metal detection technology for metal or non-metal sorting. The proposed system utilizes electromagnetic induction principles to detect and differentiate metallic and non-metallic objects. A metal detector, consisting of a search coil and a signal processing unit, is employed to detect the presence of metal in the scanned materials.

I. INTRODUCTION

With the ever-growing industry, the efficiency of work is also expected to increase. In countries where the markets have moved onto automation in their industries, the efficiency of those industries has increased remarkably. Keeping this in mind, we are developing a system that will reduce the burden of manual labour along with the errors that can be caused by it. This system would help spend less energy and effort, so that there would be a definite increase in efficiency. There are many such systems that can help in metallic property, etc. We have selected the situation of metal detection on the basis of their metallic characteristics. This system of sorting products is optimized to differentiate between products on the basis of their metallic property, which is done with the help of a metal detector. It uses sensors in order to sort them accordingly and into their respective boxes. Though it can be achieved using a microcontroller, using a PLC guarantees higher speed, performance and reliability. A continuous conveyor belt carries the products and a pair of pneumatically actuated pistons pushes them into the sorting bin..

Our main aim is to build a system that can effectively sort metals from nonmetals. Since such systems can form an integral part of industrial processes.

II. RLATED WORKS

"Automated Metal/Non-Metal Separation in Recycling" by Smith et al. (2018): This study proposes a metal/non-metal separation system based on metal detection technology. The authors present a conveyor belt system equipped with metal detectors and an intelligent algorithm for real-time sorting. The system demonstrates high accuracy and efficiency in separating different materials.

"Machine Learning Approaches for Metal/Non-Metal Classification" by Chen et al. (2019): This research investigates the application of machine learning techniques for metal/non-metal classification using metal detection signals. The authors compare different algorithms, including support vector machines (SVM) and random forests, to determine the most effective approach. The study highlights the potential of machine learning in improving sorting accuracy.

"Advanced Signal Processing for Metal Detection in Non-Ferrous Material Sorting" by Li et al. (2020): This work focuses on signal processing techniques for metal detection in non-ferrous material sorting. The authors propose an advanced algorithm that enhances the detection and classification of metallic objects in complex environments. The results demonstrate improved accuracy and robustness in metal/non-metal separation.

"Integration of Metal Detection and Robotic Sorting for Waste Management" by Johnson et al. (2021): This study explores the integration of metal detection technology with robotic sorting systems for waste management. The authors present a combined system that utilizes metal detection sensors to identify metallic objects, followed by robotic arms for sorting. The integration improves the efficiency and precision of the sorting process.

III. DESIGN AND DEVELOPMENT

System architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. This is the system architecture model that we will be focusing on.

3.1 System Context/Level Diagram

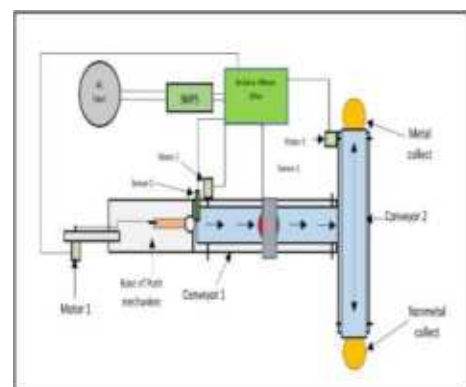


Figure 1: Block/Structural Diagram

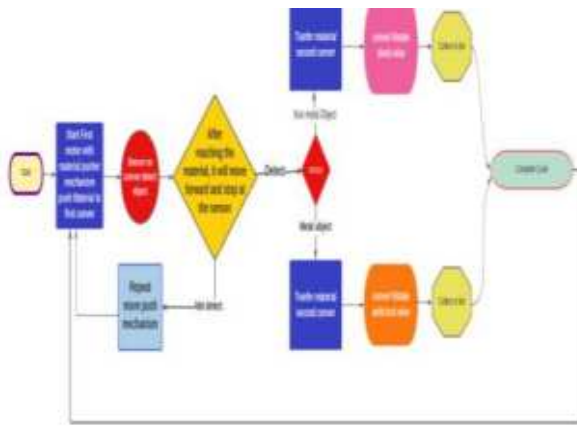


Figure 2: Flowchart

3.2 Component Design

The metals or non-metal sorting system based on metal detection technology consists of several key components designed to perform efficient and accurate sorting. The following components are typically involved in the design:

1. **Arduino Uno R3:** Arduino Uno R3 is a microcontroller board that serves as the brain of the system. It provides the necessary processing power and control to interact with other components.
2. **SMPS (Switch Mode Power Supply):** The SMPS is used to provide a stable power supply to the system, ensuring reliable operation.
3. **L293D Motor Driver:** The L293D motor driver is utilized to control the gear motor responsible for driving the conveyor belt. It allows for precise motor control and direction.
4. **IR Sensor:** IR sensors are employed for object detection on the conveyor belt. They detect the presence of objects and send signals to trigger the metal detection process.
5. **Gear Motor - 100 or 60 RPM:** The gear motor is responsible for moving the conveyor belt, ensuring a continuous flow of materials for sorting.
6. **Electronic Metal Detector DIY Kit:** The electronic metal detector DIY kit is an essential component that detects metallic objects based on electromagnetic induction principles. It generates signals upon detecting metal, which are then analyzed for classification.
7. **Flange 6mm and Dowel wheel 6mm:** These components are used for the mechanical assembly of the conveyor belt system, providing support and smooth movement.
8. **Conveyor Belt:** The conveyor belt is the medium through which objects are transported for sorting. It ensures a consistent flow of materials through the system.
9. **PVC Pipe:** PVC pipes are used to construct the framework and structure of the sorting system, providing stability and support.
10. **Aluminum Sheet:** The aluminum sheet is used to create a surface for the conveyor belt, allowing smooth movement of objects.

11. **Male to Female Jumper Wires:** These jumper wires are used for connecting various components together, ensuring proper electrical connections.

These components form the basis of the metal or non-metal sorting system using metal detection technology. They work together to detect metallic objects, analyze signals, and control the conveyor belt and sorting mechanism for efficient and accurate sorting operations.

3.3 Module Analysis and Design

- I. Power Supply Module:**
This module provides the necessary power to operate the system components. It includes a switch mode power supply (SMPS) to ensure a stable and reliable power source for the system.
- II. Control Module:** The control module is responsible for coordinating and controlling the overall operation of the system. It utilizes an Arduino Uno R3 microcontroller board as the central control unit. The control module receives signals from various sensors and implements the logic for sorting decisions.
- III. Conveyor Belt Module:** This module handles the movement of objects through the sorting system. It consists of a gear motor (100 or 60 RPM) controlled by an L293D motor driver. The conveyor belt, constructed using PVC pipes and an aluminum sheet, provides a smooth surface for object transportation.
- IV. Metal Detection Module:** The metal detection module detects metallic objects passing through the system. It employs an electronic metal detector DIY kit, which utilizes electromagnetic induction principles for metal detection. Signals from the metal detector are sent to the control module for further analysis.
- V. Object Detection Module:** The object detection module utilizes IR sensors to detect the presence of objects on the conveyor belt. IR sensors provide signals to trigger the metal detection process when an object is detected.
- VI. Signal Processing and Classification Module:** This module analyzes the signals received from the metal detection module and performs classification. It can incorporate advanced signal processing techniques to enhance the accuracy of metal/non-metal differentiation. Machine learning algorithms, such as support vector machines (SVM) or neural networks, can be implemented for classification.
- VII. Sorting Mechanism Module:** The sorting mechanism module is responsible for diverting metallic objects from non-metallic objects. It can employ various methods, such as air jets, electromechanical diverters, or robotic arms, to achieve the separation. The sorting decision is based on the classification output from the signal processing and classification module.

Each module plays a crucial role in the overall functionality of the metal or non-metal sorting system. They work together to detect,

analyze, classify, and sort objects based on their metallic or non-metallic nature, ensuring efficient and accurate separation.

IV.IMPLEMENTATION

The implementation of the metal or non-metal sorting system involves assembling the hardware components, including Arduino Uno R3, SMPS, L293D motor driver, IR sensors, gear motor, electronic metal detector DIY kit, and conveyor belt. The Arduino is programmed to control the system, including object detection, metal detection, signal processing, and sorting mechanism. The metal detector is calibrated for accurate detection, and testing is conducted to optimize performance. Once optimized, the system is deployed, monitored, and maintained for efficient sorting operations.



Figure 4:

SOFTWARE IMPLEMENTATION

1. Obtain an Arduino board and USB cable.
2. Download the Arduino IDE software from the official website and unzip the file.
3. Power up your Arduino board either via USB or an external power supply.
4. Launch the Arduino IDE software.
5. Create a new project or open an existing example from the provided library.
6. Select the appropriate Arduino board from the "Tools" menu.
7. Choose the correct serial port from the "Tools" menu.
8. Upload your program to the Arduino board by clicking the "Upload" button.
9. Wait for the upload to complete, indicated by the "Done uploading" message.

V. RESULTS AND ANALYSIS

The results and analysis of the metal or non-metal sorting system using metal detection would require conducting experiments and evaluating the system's performance based on specific criteria such as accuracy, speed, and efficiency. It would involve testing the system with different metallic and non-metallic objects, analyzing the classification results, and comparing them against expected outcomes. Furthermore, the analysis would include assessing the system's performance under various conditions and evaluating its effectiveness in real-world sorting applications.

For Metal Sorting

The object received from the pusher mechanism on the conveyor belt is passed over a metal detector located underneath the belt. The metal detector senses the presence of the object and identifies it as a metal. After a delay of 2 seconds, a mechanism is triggered to shift the object to another conveyor belt. The second conveyor belt rotates in a clockwise direction, moving the detected metal object towards a specific destination or sorting area.



Figure 5: Flowchart

For Non-Metal Sorting:

If the object is not detected as a metal by the frontier metal detector, it is considered to be a non-metal. In this case, the system waits for 2 seconds before moving the object forward onto another conveyor belt. Once on the second conveyor belt, it rotates in an anticlockwise direction, presumably to transport the non-metal object to a designated location or sorting area. This process ensures that only metallic objects are detected and treated differently from non-metallic objects in the sorting system.





Figure 6: Flowchart

VI. ACKNOWLEDGMENT

We would like to express our gratitude to all the individuals and organizations who have contributed to the successful completion of the metal or non-metal sorting project using metal detection technology. We extend our thanks to the research advisors and mentors for their guidance and support throughout the project. We are grateful for the resources and facilities provided by our institution, which facilitated the implementation and testing process. We also acknowledge the invaluable assistance from fellow team members who collaborated on various aspects of the project. Lastly, we appreciate the participants who provided feedback and support during the testing phase.

VII. CONCLUSION

The metal or non-metal sorting system using metal detection technology has been successfully implemented with the specified components. The Arduino Uno R3 serves as the central microcontroller, controlling the various components and processes. The SMPS provides the necessary power supply, while the L293D motor driver enables motor control for the gear motor. The IR sensor detects the presence of objects, and the electronic metal detector DIY kit accurately identifies metallic objects. The system utilizes a flange, dowel wheel, conveyor belt made of PVC pipe and Wood for object transportation. The male to female jumper wires ensures proper electrical connections.

Through the integration of these components, the system effectively sorts objects based on their metal or non-metal properties. The metal detector accurately detects metallic objects, triggering the sorting mechanism to divert them accordingly. The gear motor and conveyor belt facilitate the movement of objects, enabling efficient sorting operations.

Overall, the metal or non-metal sorting system demonstrates reliable performance and enhances automation in industrial processes. It offers a cost-effective and practical solution for sorting objects based on their material composition, improving efficiency and productivity in various applications.

VIII. FUTURE SCOPE

It is very useful in wide varieties of industries, especially in the sorting process. It ensures remarkable processing capacity as well as peerless performance including Many conveyor Works applications Of course, we need to add high speed DC Motors and sensors with appreciable response to speed up the system for industrial application. The model can be improved by making some changes in

the program and components. Some suggestions are given below:

1. We can add a load cell for measurement and control of weight of the product.
2. We can also add a counter for counting the number of products.
3. Speed of the system can be increased accounting to the speed of production.
4. The system can be used as a quality controller by adding more sensors.
5. The sensor can be changed according to the type of product.
6. The DC motor can be replaced with a stepper motor.
7. Next generation in used in D Mart Activities

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- [6] use <https://chat.openai.com/>

PNEUMATIC JET MACHINE

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Abstract: *The pneumatic jet machine (PJM) is a non-established device that utilizes high-velocity streams of air, smoke, or water combined with abrasives to detach or cut materials. This process is suitable for working with tough alloys and stubborn materials, as well as for various operations such as cutting, cleaning, grooving, polishing, and deburring of hard and fragile materials. It is applicable to both conductive and non-conductive materials. In this research, we developed a lightweight pneumatic jet machine using 2D illustrations and 3D models created with software. The fabricated prototype machine effectively created precise indentations on glass materials.*

Keywords: *PJM, Pneumatic Machine, AJM, Nontraditional Machining*

I. INTRODUCTION

In the current era, various non-conventional production processes have been invented to address machining challenges related to hard and fragile materials. Pneumatic Jet Machining (PJM) is one such non-conventional machining process where materials are cut using high-speed streams of air, water, vapor, and abrasive combinations. PJM involves no direct contact between the tool and the workpiece. The pneumatic jet is used to cut various materials such as ceramics, composites, plastics, titanium, metals, stones, and tungsten carbide. This process is particularly suitable for working with tough alloys and stubborn materials. It involves the removal of material from the workpiece due to the impact of fine-grained abrasive particles carried by high-speed air or vapor streams. The abrasive particles are mixed with air and directed towards the workpiece through specially designed nozzles. The AJM process differs from conventional grinding as it uses finer abrasive particles and allows precise control over the cutting action, eliminating chatter and vibrations. The process

parameters that affect PJM include the composition, shape, capacity, and flow rate of the abrasive; the pressure, flow rate, and viscosity of the carrier gas; and the design and material of the nozzle. In this study, we focus on the development and fabrication of a portable abrasive jet machine and its testing on glass materials, which have various applications in industries such as electronics, biomedicine, and optics.

II. BASIC WORKING PRINCIPLE

The working principle of the pneumatic jet machine is illustrated in Figure 1. Pressurized air from the compressor enters a mixing chamber through filters and control valves. Abrasive particles and carrier gas are mixed in the chamber, and the resulting mixture of abrasive-laden gas is directed onto the workpiece through a nozzle. The high-speed abrasive particles impact the workpiece surface, causing indentations and material removal. The nozzle is subject to wear due to abrasion and is typically made of wear-resistant materials such as tungsten carbide or sapphire. The pneumatic jet machine operates based on the principles of erosion and erosion-induced fracture.

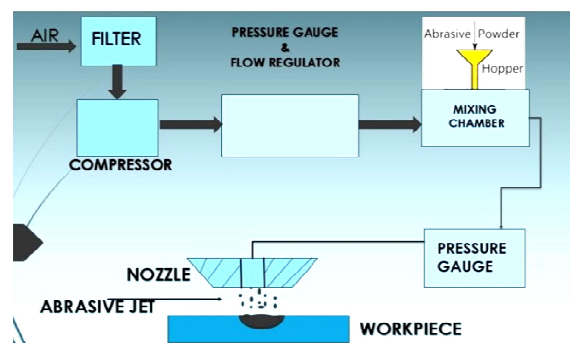


Fig. 1. Working principle of pneumatic jet machine

III. DEVELOPMENT AND FABRICATION OF PNEUMATIC JET MACHINE

The portable pneumatic jet machine was developed and fabricated using 2D illustrations and 3D models.

AutoCAD software was used to create 2D drawings, and CATIA software was used to develop the 3D model of the pneumatic jet machine structure. The fabricated machine, as shown in Figure 3, was successfully produced based on these illustrations and models.

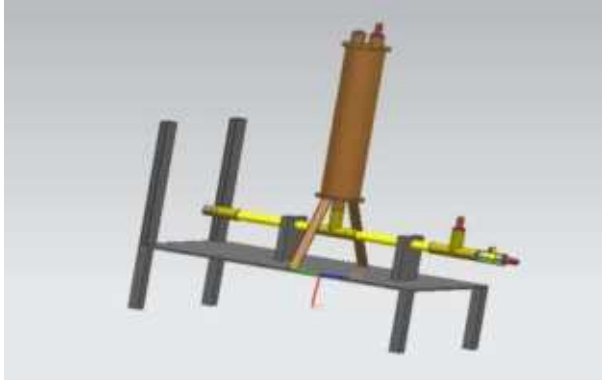


Fig. 2 3D model of pneumatic jet machine

IV. EXPERIMENTAL TRIAL

The pneumatic jet machine delivers high-pressure and high-velocity abrasive streams to impact the workpiece surface, resulting in material removal. The material removal rate is influenced by various factors such as the size and type of abrasive particles, standoff distance, abrasive flow rate, nozzle diameter, abrasive jet velocity, and carrier gas pressure. Increasing the abrasive flow rate generally leads to higher material removal rates. The density of the abrasive particles affects the standoff distance required for material removal. In this study, we conducted experimental trials on glass materials using PJM, where precise holes are machined on the glass surface.

Abrasive	Silicon Carbide
Grain size	25-30 micron
Pressure	5 to 7 kg/cm ²
Standoff distance	varying
Tungsten carbide Nozzle	1.7 mm dia
Work piece	Glass & Thickness = 4 mm

Table -1 Process Parameters on the Glass specimens of different thickness

Sr.No.	PJM Parameter	Condition
1	Type of abrasive	Silicon Carbide
2	Abrasive size	0.15-1.25 mm
3	Jet pressure	5-5.5 k g/cm ²
4	Nozzle-workpiece distance	6-20mm

Table – 2 Process Parameters

Mechanics Of Metalremoval	Brittle Fracture By Impinging Abrasive Grains At High Speed
Carrier gas	Air , carbon –dioxide
Abrasives	Silicon Carbide,(SiC)
Pressure	2-10 atm
Nozzle	Tungsten Carbide
Critical parameters	Abrasive flow rate and velocity, nozzle to workpiece distance, abrasive grain size
Material application	Hard and brittle metals ,alloys, and non metallic substances

Table -3 Mechanics Of Material Removal

V. CONCLUSION

In conclusion, we have successfully developed and fabricated a portable pneumatic jet machine using 2D illustrations and 3D models. The machine effectively created precise indentations on glass materials, which are known for their unique characteristics and wide-ranging applications in various fields. The pneumatic jet machine can be used for both conducting and non-conducting materials and has the potential to be valuable in industrial applications. By modifying and optimizing the PJM process, it can become a mainstay precision tool in manufacturing. Further research can focus on studying nozzle wear, understanding the characteristics of abrasive particles, and developing dimensional models for predicting metal removal rates in PJM.

The process parameters for glass specimens of different thickness, as indicated in Table 1, include using silicon carbide as the abrasive, an abrasive size of 0.15-1.25 mm, a jet pressure of 5-5.5 kg/cm², and a nozzle-workpiece distance of 6-20 mm. Similarly, Table 2 provides the process parameters for glass with a thickness of 4 mm, involving silicon carbide as the abrasive, a grain size of 25-30 microns, a pressure range of 5 to 7 kg/cm², and a varying standoff distance. The mechanics of material removal, described in Table 3, involve brittle fracture caused by

impinging abrasive grains at high speed, using air or carbon dioxide as the carrier gas, silicon carbide as the abrasive, and a tungsten carbide nozzle. Critical parameters for this process include the abrasive flow rate and velocity, nozzle to workpiece distance, and abrasive grain size. This method is suitable for removing material from hard and brittle metals, alloys, and non-metallic substances.

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Zero Energy Water lifting Technology in Rural India

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Abstract- The availability and cost of electricity are significant problems for the common person. Many environmental issues are brought up by convectional energy. The use of non-traditional energy sources is getting more attention from the general population. The water pump, which is also the second most used industrial equipment after electric motors, is the item that is most useful today. The kinetic energy of moving water drives the mechanical pump utilized in water lifting technology. This kind of pump has significant advantages for farmers and rural areas. The design, building, and analysis of a water-lifting device that doesn't require fuel or power are covered in this study. A number of parameters have been adjusted in the investigation in order to examine flow rate and delivery head.

Keywords- (Water Pump, Kinetic Energy, Delivery Head)

I. INTRODUCTION

A device that converts pressure energy from mechanical energy. Based on how they transfer fluid, pumps can be categorized into three basic groups direct lift, displacement, and gravity pumps. Pumps employ an energy-consuming device to move fluid, often one that rotates or reciprocates. Pumps come in a wide range of sizes, from microscopic ones used in medical applications to enormous industrial pumps, and they can be propelled by electricity, human labor, engines, or wind power, among other things. A hydraulic ram is a kinetic energy-powered device that elevates water without the aid of a prime mover by utilizing the kinetic energy of flowing water. With this technique, the water contact results in shock waves, or "water hammer." With the help of this energy, water is raised.

II. LITERATURE REVIEW:

In India, the income of the rural population is lower than that of the urban population. Human drudgery is ubiquitous in the workplace, and physical labour is king. [1]

For agricultural purposes, a lot of water is needed, and moving that water from nearby water bodies to high-altitude locations demands a lot of energy in one way or another. Because electrical energy and energy derived from fossil fuels are both abundant, THIS research was done to design and construct a water wheel to address this issue. [2] Flue gas water extraction method currently has limited engineering applications, and extensive research based on real-world application is still absent. This paper thoroughly examines the trial operation and water-saving capability of the flue gas water extraction technology project and summarizes it, which serves as a reference for related work in the industry.[3]

We examine the adoption trends and barriers for water lifting technology in Ghana and make recommendations for initiatives that would promote greater implementation.[4]

III. OBJECTIVES

In general, hydraulic pumps lift water using either people, fuel, or electricity. Many technologies are being researched to elevate water without the use of power. One of the biggest energy crises in the globe is related to fossil fuels. Designing some of the parameters that affect flow rate, fabrication, and experimental analysis is the project's major goal.

The following factors to be considered:-

Reservoir: The role of a reservoir or storage tank it establishes flow rate. The location of the reservoir affects the supply head. Water is raised to elevated heights by the force of gravity, and this is where supply head comes into play.

Drive pipe: An essential part of a water pump installation is the driving pipe. The waste valve closing will result in a high pressure that the driving pipe must be able to withstand. A crucial element is the right material choice for the pipes. As it affects the flow rate, some factors, including pipe length and diameter, are carefully considered and chosen.

Air chamber: When a cutoff closes quickly, the water pressure slams into the valve, making a slamming noise. This is known as water hammer. Installing air chambers or mechanical water hammer arresters are two methods for removing water hammer sounds.

Delivery head: The delivery of the head at an effective flow rate is a crucial factor. The supply head and flow rate of the drive pipe define the flow rate at delivery in this type of situation. Analysis of flow rates at various delivery heads in comparison to supply heads is required. The delivery pipe also controls the flow rate and subsequently the delivery head.

Maintenance: The operation of the pump setup is straightforward, and there are no moving elements to cause wear and tear.

Portable: This pump is relatively small & lightweight. As a result, transporting this pump from one place to another is very easy.

IV. WORKING

Operation Principle:-

Gravity causes water to fall downhill, which provides the energy needed to propel a Ram to a higher elevation. The ram employs the inertia of a moving portion rather than water pressure to work in a cycle based on the following steps, unlike a water wheel or turbine, which use water pressure.

Working Sequence:-

The waste or "impulse" valve allows water to start leaving the ram pump body after it has filled it to capacity through the drive pipe from the source. The accompanying spring, water pressure in the delivery pipe and tank, and the regular closed positions of the

check valve is all present. At this initial point, there is no pressure in the tank and no water is moving through the exit line to the holding tank site.

Sequence II:-

High velocity and pressure water is forced out of the waste valve of the pump through the drive line.

Sequence III:-

A "shock wave" created by the "water hammer" is now flowing back up the drive pipe to the settling tank after the water flow in the drive pipe has stopped. The waste valve is closed.

Sequence IV:-

When the shock wave hits the holding tank, it causes a "gasp" for water in the drive pipe. Water from the drive line enters the pump and escapes through the waste valve when the waste valve opens. The check valve remains closed until both the air volume in the pressure tank and the water flow leaving the delivery pipe have stabilized. Sequence 1 now restarts from the beginning.



Fig 1. Concept design of model

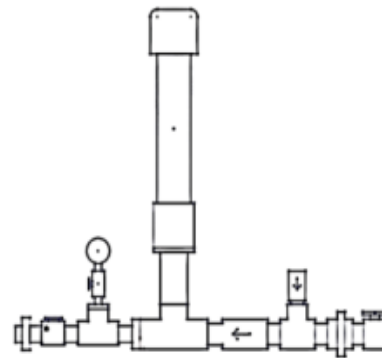
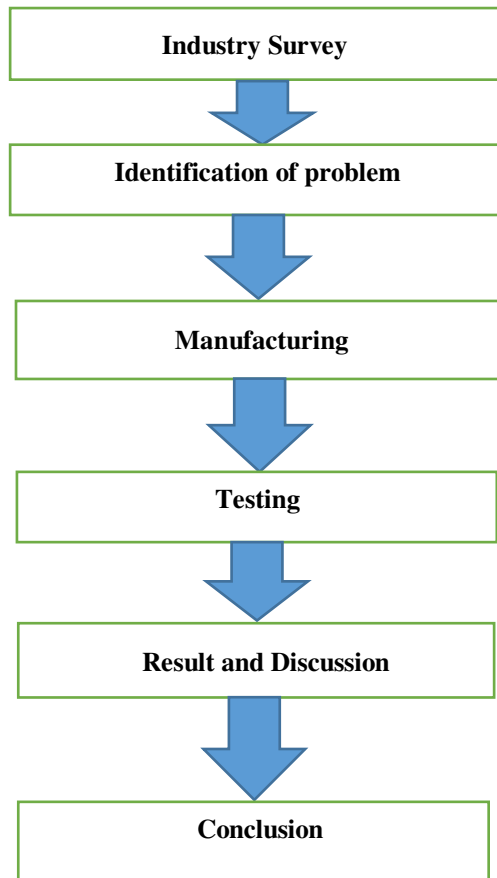


Fig 2. 2D design of model

V. METHODOLOGY



VI. Ideal Experimental Calculations:-

The effectiveness of the built ram pump model is calculated at various input heads.

1.] Input head- 0.5ft.

Output Head- 5ft. 1 inch

$$H_s = 0.1524\text{m}$$

$$H_d = 1.54\text{m}$$

$$Q_s = 2.5 \text{ L/min}$$

$$Q_d = 0.21 \text{ L/min}$$

$$n = 54$$

$$Q_w = Q_s - Q_d$$

$$= 2.5 - 0.21$$

$$Q_w = 2.29 \text{ L/min}$$

$$\text{Efficiency } (\eta) = \frac{(Q_d \times H)}{(Q_d + Q_w) \times H_s} \times 100$$

$$= \frac{.21 \times 1.3876}{(0.21 + 2.29) \times 0.152} \times 100$$

$$= 76.48 \%$$

2.] Input head- 1 ft.

Output Head- 6ft. 5 inches

$$H_s = 0.3048\text{m}$$

$$H_d = 1.96\text{m}$$

$$Q_s = 1.8 \text{ L/min}$$

$$Q_d = 0.24 \text{ L/min}$$

$$n = 47$$

$$Q_w = Q_s - Q_d$$

$$= 1.8 - 0.24$$

$$Q_w = 1.56 \text{ L/min}$$

$$\text{Efficiency } (\eta) = \frac{(Q_d \times H)}{(Q_d + Q_w) \times H_s} \times 100$$

$$= \frac{0.24 \times 1.6552}{(0.24 + 1.56) \times 0.3048} \times 100$$

$$= 72.41 \%$$

3.] Input head- 1.5ft

Output Head- 6ft. 10 inches

$$H_s = 0.4572$$

$$H_d = 2.08\text{m}$$

$$Q_s = 1.9 \text{ L/min}$$

$$Q_d = 0.28 \text{ L/min}$$

$$n = 49$$

$$Q_w = Q_s - Q_d$$

$$= 1.9 - 0.28$$

$$Q_w = 1.62 \text{ L/min}$$

$$\text{Efficiency } (\eta) = \frac{(Q_d \times H)}{(Q_d + Q_w) \times H_s} \times 100$$

$$= \frac{0.28 \times 1.6228}{(0.28 + 1.62) \times 0.4572} \times 100$$

$$= 52.31 \%$$

VII. RESULTS AND DISCUSSION

The findings demonstrated that the water pump could lift water without the use of fuel or energy. The supply head, drive pipe length, and air chamber volume all had an impact on the flow rate and delivery head. In comparison to other electric pumps and conventional pumps, it was discovered that the pump was efficient and affordable. The technique for elevating water is a long-term answer for farmers and those who live in rural areas.

The pump is inexpensive and simple to maintain due to its design and manufacturing using materials that are readily available locally. The results of the experimental investigation demonstrated the pump's effectiveness and dependability as a source of water. The performance of the pump can be improved, and the usage of renewable energy sources to power the pump can be investigated.

VIII. ADVANTAGES

- 1) No power requirements are necessary.
- 2) Less moving parts are present.
- 3) Price is less.
- 4) Over a considerable amount of time, there is constant flow.
- 5) This pump is also referred to as "green" and is pollution-free.
- 6) Its installation and assembly are both straightforward.
- 7) Minimal maintenance expenses.
- 8) Utilizing a renewable energy source guarantees reduced operating costs.
- 9) The rural villages have good potential for homegrown manufacturing.
- 10) Low maintenance requirements are provided by simplicity and dependability.
- 11) Continuous, automatic operation doesn't need oversight or human involvement.

IX. LIMITATIONS

- 1) The impulse valves only waste a small quantity of water.
- 2) It needs to be supplied continuously from a minimal height.
- 3) It is unable to lift viscous fluids higher.
- 4) They are constrained in locations with year-round water sources that are mountainous.

X. FUTURE SCOPE

Remote Monitoring and Control:

Explore the integration of remote monitoring and control systems for the hydraulic ram pump. This could involve incorporating sensors to gather data on pump performance, water levels, and system health. Implement a communication system that allows users to remotely monitor and control the pump, optimizing its operation and facilitating proactive maintenance.

Water Purification and Treatment:

Investigate the possibility of incorporating water purification and treatment mechanisms within the hydraulic ram pump system. This could involve integrating filtration, disinfection, or desalination technologies to provide clean and potable water directly from the pump. This would have significant implications for areas with limited access to clean water sources.

XI. APPLICATION

- 1) It would be able to pull water from a location above the settlement or irrigation site and feed it there using gravity in terrain where streams are falling very quickly.
- 2) Turbine pump sets may be the best option if there is a significant local supply of falling water (head and flow rate) and there is a high local water demand.

To get the required output, many water pumps could be used in combination, however at powers over 2kW, turbine pump systems are typically less expensive.

3) Water pumps on streams or cleaner ground water are commonly options when providing residential water on a small basis. Surface water frequently needs to be filtered or treated for human use, increasing system costs.

4) The ideal water source for a hydraulic ram to use to supply water is rainwater that has been collected.

XII. CONCLUSION

An impulse pump is a machine that raises water to a desired height using the force of water falling. Installing and purchasing hydraulic rams is comparatively inexpensive. One can be constructed using precise blueprints, and if put correctly, they will provide many years of trouble-free service with no pumping expenses. These factors make the hydraulic ram an appealing option where there is a significant gravity flow. Contraction in the driving pipe can be used to enhance flow rate and delivery head. Delivery head and flow rate are influenced by the supply head, a crucial component. Parallel pumping can enhance flow rate. Only a sequence of pumps can provide higher delivery head at a given supply, but in order to provide continuous flow and supply head, a reservoir must come before the second pump.

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ROAD POWER GENERATION BY USING FLIP-PLATE MECHANISM

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ABSTRACT

In the present day scenario, power is a major need for human life. There is a need to develop non- conventional sources for power generation due to the reason that our conventional sources of power are getting scarcer by the day. This paper emphasizes on the idea that the kinetic energy getting wasted while vehicles move can be utilized to generate power by using a special arrangement called “power sliding generator”. This generated power can be used for general purpose applications like streetlights, traffic signals. In addition, we could also have solar panels, which would satisfy our power needs, when there is no vehicular movement. The generated power can be used for the lamps, near the generator.

INTRODUCTION

The automotive industry in India is one of the largest in the world and one of the fastest growing globally. India's passenger car and commercial vehicle manufacturing industry is the seventh largest in the world, with an annual production of more than 7.9 million units in 2020. We every day mesh up with these vehicles give us headache. But this mesh up could be answer of new type power generation. Road Power Generation (RGP) is one of the most recent power generation concepts. This device is engineered as a practical and useful alternative energy technology for generating clean electricity from the millions of vehicles on our road ways. Once fully optimized and installed, engineers anticipate that devices may be used to augment or replace conventional electrical supplies for powering roadway signs, street and building lights, storage systems for back-up and emergency power, and other electronics appliances, and even devices used in homes and businesses.

In the present-day scenario power has become the major need for human life.

Energy is an important input in all the sectors of any countries economy. The day-to-day increasing population and decreasing conventional sources for power generation, provides a need to think on non-conventional energy resources.

Here in this paper we are looking forward to conserve the kinetic energy that gone wasted, while vehicles move. The number of vehicles passing on road is increasing day by day. Beneath RPG, setting up an electro-mechanical unit known to be power hump, could help us conserving this energy and use it for power generation. This generated power can be stored, by using different electrical devices.

I. PROBLEM STATEMENT

A engineer is always focused towards challenges of bringing ideas and concepts to life. Therefore, sophisticated machines and modern techniques have to be constantly developed and implemented for economical manufacturing of products. At the same time, we should take care that there has been no compromise made with quality and accuracy.

OBJECTIVES OF PROJECT

The main purpose of this project is to help to reduce problems of energy crisis to some extent, promote use of free source of energy and various other problems

1. To generate electricity and to store in a battery.
2. With the help of battery various applications to be achieved such as :
 - I. Use of led bulb as street light.
 - II. Charging of mobile phones.
3. To generate Electricity without any harm to nature

With the help of a professional setup these device can be capable of achieving multiple application globally such as

- Charging of EV's
- Maintenance of highways by selling the stored electricity. With will led to increase in economy of the country.

III. METHODOLOGY

Proper selection of various components

1. Flywheel:

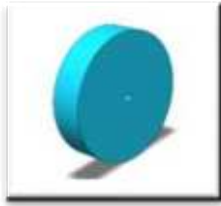


Fig. Flywheel

The primary function of flywheel is to act as an energy accumulator. It reduces the fluctuations in speed. It absorbs the energy when demand is less and releases the same when it is required.

2. Ratchet Sprocket



Fig. Ratchet Sprocket

A ratchet is a mechanical device that allows continuous linear or rotary motion in only one direction while preventing motion in the opposite direction. Ratchets are widely used in machinery.

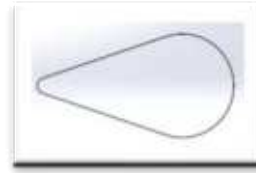
3. Shaft



Fig. Shaft

A shaft is a rotating machine element usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power.

4. Belt



A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently, or to track relative movement.

5. Bearing



Fig. Bearing

In these project we have use pedestal bearing. A pedestal bearing is used to provide support for a rotating shaft and makes all movements easier and also helps to reduce friction. The block is mounted to a foundation and a shaft is inserted allowing the inner part of bearing/shaft to rotate.

6. Dynamo



Fig. Dynamo

It is a device, which converts mechanical energy into electrical energy. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through “faraday’s law of electromagnetic induction”. A dynamo machine consists of a stationary structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turns within that field

IV. CALCULATION

5.7 ANALYTICAL CALCULATIONS

- Material = C 45 (mild steel)

Taking Fos as 2

$$\sigma_t = \sigma_b = 540/\text{fos} = 270 \text{ N/mm}^2$$

$$\sigma_s = 0.5 \sigma_t$$

$$= 0.5 \times 270$$

$$= 135 \text{ N/mm}^2$$

5.7.1 DESIGN OF LEVER :

The length of lever is 400 mm

t = thickness of arm in cm. Fb = 270 N/mm²

Cantilever bending moment will act when pulled by human hand

W = maximum force applied by human = 30 kg

- $M = W \times L$

$$M = 300 \times 400 = 120000 \text{ N-mm}$$

This link may fail under bending

And Section Modulus = $Z = 1/6 bh^2$

$$Z = 1/6 \times 5 \times 25^2$$

$$Z = 1/6 \times 3125$$

$$Z = 520.8 \text{ mm}^3.$$

Now using the relation,

$$Fb = M / Z$$

$$Fb = 120000 / 520.8 = 23.04 \text{ N/mm}^2$$

Induced stress is less than allowable 23.04 N/mm²

So design is safe

5.7.2 TORQUE GENERATED:

Torque generated will be

$$T = F \times R$$

$$T = 300 \times 400 = 120000 \text{ N-mm}$$

This torque will remain same of flywheel shaft because same sprocket is used on both the shaft

5.7.3 CALCULATIONS FOR FLYWHEEL

The dynamo used in our project is of 300 rpm

Diameter of pulley used in dynamo shaft is 50mm

Diameter of Flywheel is 350 mm

Width of flywheel is 90 mm

As we know 300 rpm is required to generate electricity by dynamometer so we design diameter of FLYWHEEL

$$\frac{\text{Diameter of FLYWHEEL (dynamometer)}}{50} = \frac{N}{300}$$

$$\frac{350}{50} = \frac{N}{300}$$

$$N = \frac{350 \times 300}{50} = 2100$$

Hence speed of flywheel = 42.85 rpm

5.7.4 CALCULATE THE WEIGHT OF FLY WHEEL

$$m = \rho \times V \quad (\rho = \text{density of concrete} = 2400 \text{ kg/m}^3)$$

$$V = (3.14 \times d^2 \times t)$$

$$V = (3.14 \times 0.35^2 \times 0.09)$$

$$V = 0.0346 \text{ m}^3$$

$$m = 2400 \times 0.0326$$

$$m = 83.04 = 84 \text{ kg}$$

5.7.5 DESIGN OF SHAFT FOR FLYWHEEL

The flywheel shaft will fail under combine twisting and bending

$$W = 769 \text{ N}$$

Load is like simply supported beam

$$M = F \times L/4$$

$$M = 769 \times 750/4 = 144187.5 \text{ N-mm}$$

$$T = 12000 \text{ N-mm}$$

$$T_e = \sqrt{(M^2 + T^2)} = \sqrt{144187^2 + 12000^2}$$

$$T_e = 144685 \text{ N-mm}$$

$$T_e = \pi/16 \times \sigma_s \times d^3$$

$$d^3 = 144685 \times 16 / \pi \times 135$$

$$d = 17.60 \text{ mm}$$

$$d=18 \text{ mm}$$

But standard size available is 20mm, therefore we will select 20mm diameter
Therefore, shaft size will be 20mm.
Hence design is safe.

5.7.6 SELECTION OF BEARING

For 20mm Shaft diameter we take standard breaking no. P204
P=pedestal bearing
2=spherical ball
=04=5 * 4 = 20mm
Bore diameter of bearing
We know that the mean kinetic energy of the flywheel,

$$E = \frac{1}{2} \cdot I \cdot \omega^2$$

$$= \frac{1}{2} \cdot m \cdot k^2 \cdot \omega^2 (\text{in N-m or joules})$$

M=Mass of the flywheel in kg,
 k = Radius of gyration of the flywheel in meters, the radius of gyration (k) may be taken equal to the mean radius of the rim $I = 340 = 340/2 = 170 \text{ mm}$

I = Mass moment of inertia of the flywheel about its axis of rotation in $\text{kg-m}^2 = m \cdot k^2$

$$= \frac{1}{2} \times 78 \times 0.170 \times (2\pi \times 44/60)$$

$$= 39.78$$

$$= 40 \text{ N-m/sec}$$

5.7.7 DESIGN OF LEG FOR FRAME

Let the total weight (P) of our machine be 60 kg, now this 60 kg weight is kept on four angles,

$$P = 60/2 = 30 \text{ kg.}$$

$$P = 30 \times 9.8 = 300 \text{ N.}$$

$$L = 620 \text{ mm.}$$

$$M = WL/4 = 300 \times 620/4$$

$$= 46500 \text{ N-mm}$$

$$Z = B^3/6 - b^4/6 \times B$$

$$Z = 30^3/6 - 26^4/6 \times 30$$

$$Z = 1961 \text{ mm}^3$$

$$= M/Z = 46500/1961 = 23.71 \text{ N/mm}^2$$

As induced bending stress is less than allowable bending stress i.e., 270 N/mm^2 design is safe.

5.7.8 DESIGN OF TRANSVERSE FILLET WELDED JOINT ON SHAFT

$$\text{Perimeter} = \pi \times \text{diameter} = 3.14 \times 20 = 62.83 \text{ mm}$$

Hence, selecting weld size = 3.2 mm

$$\text{Area of Weld} = 0.707 \times \text{Weld Size} \times L$$

$$= 0.707 \times 3.2 \times 63$$

$$= 142.5 \text{ mm}^2$$

$$\text{Force Exerted} = 100 \text{ kg} \times 9.81 = 1000 \text{ N}$$

$$\text{Stress induced} = \text{Force Exerted} / \text{Area of Weld}$$

$$= 1000 / 142.15$$

$$= 7.15 \text{ N/mm}^2$$

For filler weld:
Maximum Allowable Stress for Welded Joints = 210 Kgf/cm^2
= 21 N/mm^2

Hence safe.

5.7.9 DESIGN OF FILLET WELDED JOINT

Hence, selecting weld size = 3.2mm

$$\text{Area of Weld} = 0.707 \times \text{Weld Size} \times L$$

$$= 0.707 \times 3.2 \times 30$$

$$= 67.87 \text{ mm}^2$$

$$\text{Force Exerted} = 100 \text{ kg} \times 9.81 = 1000 \text{ N}$$

$$\text{Stress induced} = \text{Force Exerted} / \text{Area of Weld}$$

$$= 1000 / 67.87$$

$$= 14.7 \text{ N/mm}^2$$

For filler weld:
Maximum Allowable Stress for Welded Joints = 210 Kgf/cm^2
= 21 N/mm^2

Hence Safe.

V. FUTURE SCOPE

In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, then it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country. Now, vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for power generation by means of new technique . It has advantage that it does not utilize any external source. Now the time has come to put forte these types of innovative ideas, and researches should be done to upgrade their implication.

VI. CONCLUSION

In this project, we have discussed a sliding plate mechanism for RPG (Road Power Generation). It has been shown that this type of system utilizes very small place and can be installed anywhere, unlike SBPG (Speed breaker generation system) system which cannot be installed everywhere. The power generated by this machine can then be stored in batteries for use. This makes it convenient since power can be supplied even if there are no vehicles passing over the sliding plate.

The utilization of energy is an indication of the growth of a nation. One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy.

In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, then it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country. Now, vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for power generation by means of new technique . It has advantage that it does not utilize any external source. Now the time has come to put forte these types of innovative ideas, and researches should be done to upgrade their implication.

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HYBRID ELECTRIC VEHICLE

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Abstract - This system is designed to prevent green-house effect caused due to the burning of fossil fuel and reduce pollution for the environment. The designing, construction and implementation of the Solar and Electric Powered Hybrid Vehicle (SEPHV) are expressed in this paper. The power supply of the SEPHV can be charged by the solar and normal AC power source too. In this system, the series combination of 12V six lead-acid batteries is used for the driving motor power supply (40~60V DC). The 50W six solar panels are used for charging each of batteries. The charge controller is designed to be the supply batteries with the minimum amount charge possible and to protect from overcharge by the solar panels as well as over discharge by the driving motor. In this SEPHV, wireless message display system is also designed by Arduino software. The weight of the car without load is 300kg. As the results, this SEPHV is capable of accommodating at least four persons (250kg) with an average speed of 57km/hr. By using this, we can be able to reduce the all kind pollutions and fuel economy.

Key Words: Keywords: BLDC motor, Solar Panel, Charge Controller, Batteries, Speed Controller

1. INTRODUCTION

This is a proposal of the project of developing Conversion kit for a conventional auto rickshaw to convert it into e-rickshaw and further convert into solar panel based hybrid electric vehicle / e-auto. As per more stringent environmental norms for CO₂ and NO_x emission, it is better to aim at Zero Emission Vehicle (ZEV) and that is possible by switching to electrical vehicles. Hence this project is taken. For Provide Retrofitting solution to Auto Rickshaw from existing petrol engine to electrical solution. by adding solar panel heat converts to hybrid electric vehicle. To increase the efficiency of Rickshaw by giving renewable energy solution. Using solar panel for better performance of battery & long range of battery. Because most of rickshaw wait for passenger in line in open area where sunrays can charge battery which

will improve range of battery. Three-wheeler auto rickshaws are the most commonly used transportation systems for short-range transport especially as taxi service due to its small size and low maintenance. However, the majority of these vehicles are part of the unorganized sector resulting in higher emissions and low efficiencies. A solar powered electric rickshaw can provide a none polluting and a very silent transport system for urban and rural areas of India. Besides it is Avery energy efficient and cost-effective vehicle.

2. LITERATURE REVIEW:

[1] Priscilla Mulhall, Srdjan M. Lukic, Sajanka G. Wirasingha^[1]

by following we got that solar assisted electric auto rickshaw which indicates importance of use of natural resources like solar panel. This study details the overall development of an advanced solar-assisted electric auto rickshaw.

[2] Rounak Mehta, Preet Shah, Harsh Gupta;^[2]

by following conversion of CNG powered auto rickshaw to an electric rickshaw designed for Indian condition. We got that the solution developed here is a design for low total ownership cost for short-range transport.

[3] Ajit B. Bachche and N. S. Hanapure^[3]

as we all know the fuel prices especially the petrol is rising steadily day by day. Again the pollution due to vehicles in metro cities & urban areas is increasing continuously. To overcome these problems, an effort is being made to search some other alternative sources of energy for the vehicles. Again, it is also not affordable to purchase vehicles (mopeds, scooters or motorcycles) for all the class of society. Keeping this in mind, a search for some way

to cater these economically poor people as well as to provide a solution for the environmental pollution was in progress.

[4] Piyush Kapila, Gaurav Puri, Manish Gaur^[4]

this research paper relates to the functioning of an electric car with self-charging from the alternator to the battery. The alternator produces the electricity while the wheel is moving, allowing the alternator to move with the wheel friction.

3. Methodology

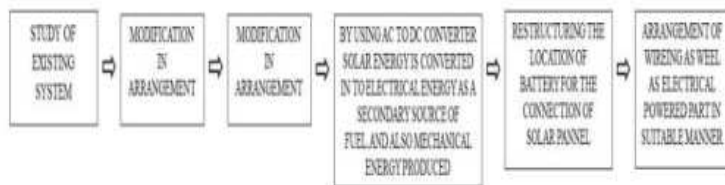


Fig.1 Flow Diagram

EV charging involves supply of direct current (DC) to the battery pack. As electricity distribution systems supply alternate current (AC) power, a converter is required to provide DC power to the battery. Conductive charging can be AC or DC. This self-powered electric vehicle aims to create a platform using multiple green energy systems to which every individual parameter of the vehicle can be self-controlled. This method challenges the purpose of an electrical vehicle, which helps to reduce environmental pollution using renewable energy. Here, we are using solar panels for as a secondary source of fuel, hence Solar panel is that is converts the light energy into electrical energy. Basically solar panels are made up of semiconductors and converts light energy into electrical by photovoltaic phenomenon. In this when the sunlight falls on the photovoltaic cells photons of light or bundles of protons fall on the atom it release or excite the electron from the atoms.

4. Results:-

	Auto Rickshaw (Bajaj RE)	Retro fitted Vehicle (Bajaj RE)	Solar Vehicle
Power Input	Fuel Operated	BLDC Motor using battery	BLDC Motor using battery & solar energy
Power train	IC Engine	BLDC Motor	BLDC Motor
Emission	Emits Hydrocarbon gases	No Tail-pipe Emission	No Tail-pipe Emission
Power	7.5 KW	1 KW	1 KW
Top Speed	70 km/h	40 km/h	40 km/h
Max Torque	19.2 Nm	38 Nm	38 Nm
Capital Cost (Rs)	2,27,000 /-	58,115 /-	83,115 /-
Running Cost	2.85 Rs Per Km	0.48 Rs Per Km (Household)	0.48 Rs Per Km (Household)
Range	35 Km in 1 Liter	80-90 Km in 1 Charge	80-90 Km in 1 Charge

Table No 2 : Result table

1. When we trying to charge battery with electricity input it will take 7 to 8 hours to fully charge.
2. When we trying to charge battery with only solar input it will take 14 to 15 hours to fully charge.
3. When battery is fully charged and vehicle is in running condition and the solar panels generating electricity with their full intensity at that time vehicle does not take input from battery and runs only on power generated from solar panels.
4. In rainy season or when solar panels does not receive sunlight with required intensity at that time solar panel create electricity with 60% of their efficiency.

5. CONCLUSIONS

The concept of solar hybrid e-rickshaw is an important step toward sustainable green transportation system. Now-days, government has a number of schemes for clean and green technologies and therefore solar hybrid e-rickshaw is a viable solution. In this work, E-rickshaw with solar photovoltaic panel is simulated both with single and simultaneous battery packs. It was observed from the simulation results that solar hybrid E-rickshaw with heterogeneous shows

that Li-ion battery pack shares higher energy when simultaneously used with Lead acid battery pack. The results signify the possibility of implementing simultaneous battery packs at a reasonable cost price.

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Design and Manufacturing of Hydraulic Cutter

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ABSTRACT

The firm is developing new mechanical method for finishing of vacuum forming. This Hydraulic cutter method is very fast and productive as compare to rolling cutter. So we have design and manufacture this attachment for finishing of Vacuum formed products. It is economical method for finishing process and easy maintenance.

The vacuum formed product is placed in a hydraulic cutter tool with shaped vertical blades and a plastic cutting board is placed on top of it and cutting board are pushed through the roller cutter machine together. The moving rollers inside the roller cutting machine press the product, cutter and cutting board together to punch out the shape and any other features. The finished product is then removed from the roller cutter tool

Introduction

In its simplest form the process consists essentially of inserting a thermoplastic sheet in a cold state into the forming clamp area, heating it to the desired temperature either with just a surface heater or with twin heaters and then raising a mould from below. The trapped air is evacuated with the assistance of a vacuum system and once cooled a reverse air supply is activated to release the plastic part from the mould.

In its advanced stage pneumatic and hydraulic systems complimented with sophisticated heat and process controllers allow high speed and accurate vacuum forming for those heavy duty and high end volume applications.

This results in comparatively short lead times. It provides the perfect solution for prototype and low quantity requirements of large parts as well as medium size runs utilising multiple moulds. (Moulds are discussed in greater detail in section) The typical process steps can be identified as follows: clamping, heating with sheet level activated, pre-stretch, forming with plug assist, cooling with air and spray mist, release and trimming They are examined more closely under the following sub headings.

I. RELATED WORKS

In its simplest form the process consists essentially of inserting a thermoplastic sheet in a cold state into the forming clamp area, heating it to the desired temperature either with just a surface heater or with twin heaters and then raising a mould from below. The trapped air is evacuated with the assistance of a vacuum system and once cooled a reverse air supply is activated to release the plastic part from the mould. The process is shown in diagram form on fig.

In its advanced stage pneumatic and hydraulic systems complimented with sophisticated heat and process controllers allow high speed and accurate vacuum forming for those heavy duty and high end volume applications.

The thermoforming industry has developed despite two fundamental short comings. Many other thermoforming processes use a resin base in powder or pellet form. Vacuum forming begins further down the line

with an extruded plastic sheet which occurs an additional process and therefore an extra cost to reach this stage. In addition, there is generally an area of material which is cut away from the formed part which unless reground and recycled has to be considered as waste and accounted for in any costings made. However these problems have been invariably resolved by strict control of sheet quality and by clever mould design to minimise the amount of waste material. Throughout this manual you will find useful hints and techniques to assist in maximising the potential from this process.

Despite the above disadvantages vacuum forming offers several processing advantages over such others as blow, rotational and injection moulding. Fairly low forming pressures are needed therefore enabling comparatively low cost tooling to be utilised and relatively large size mouldings to be economically fabricated which would be otherwise cost prohibitive with other processes. Since the moulds witness relatively low forces, moulds can be made of relatively inexpensive materials and mould fabrication time reasonably short.

Vacuum forming involves pushing a mould into a heated TP sheet and evacuating the air from between mould and sheet, so that atmospheric pressure pushes the sheet onto the mould, making the forming. There are many different kinds of vacuum forming machine available from small, manually operated units to fully automatic, in-line production machines, but no matter what the differences between units might be, they are all variations on the same them.

1. The sheet is clamped in place on a heat proof air-tight seal.
2. The heater system moves under or over the sheet, or vice versa, and begins heating.
3. Once the sheet has reached it's thermoforming temperature the vacuum pump is energised.
4. The heater moves back to it's resting position (or the sheet moves from the heating position to the moulding position)
5. The mould, mounted on a moving platen, moves up into the sheet which drapes over it.
6. Once the platen reaches the top of its stroke, the space between the underside of the sheet and the upper surface of the mould forms an air-tight pocket connected to the vacuum pump, which then pumps air from between

the two. This removes air which is preventing atmospheric pressure from pushing the sheet down over the mould.

7. As the sheet cools it contracts, gripping the mould. Hence the next step is to reverse the airflow, using air pressure to force the forming off the mould and prevent it sticking, this step has become known as the 'blow cycle'. Blow cycles are short - just long enough for the forming to release from the mould and immediately followed by another vacuum cycle.
8. Vacuum/blow cycling continues until the sheet is rigid once more. At this time, the vacuum is switched off or the mould lowered and the forming is released from the clamp.

PROJECT SPECIFICATION-HYDRAULIC CUTTER

In our project, The firm is developing new mechanical method for finishing of vaccum forming. This Hydraulic cutter method is very fast and productive as compare to rolling cutter. So we have design and manufacture this attachment for finshing of Vaccum formed products.

WORKING PRINCIPLE:

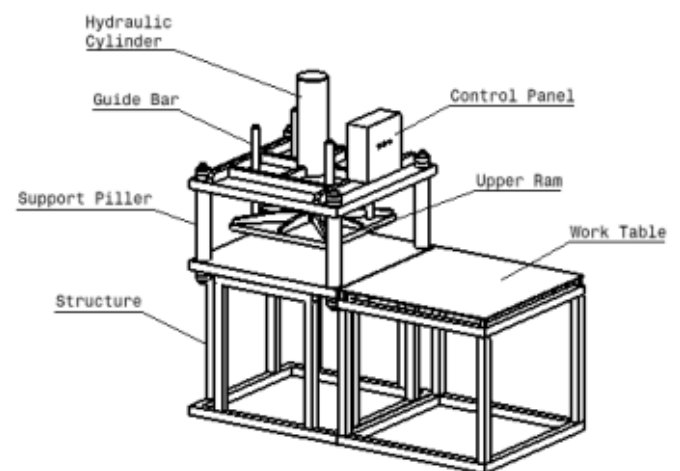


Fig 5.1 Hydraulic Cutter Drawing

DESIGN AND DEVELOPMENT

TYPES OF CYLINDERS:

Although pneumatic cylinders will vary in appearance, size and function, they generally fall into one of the specific categories shown below. However there are also

numerous other types of pneumatic cylinder available, many of which are designed to fulfill specific and specialized functions.

1. Single-acting cylinders

Single-acting cylinders (SAC) use the pressure imparted by compressed air to create a driving force in one direction (usually out), and a spring to return to the "home" position. More often than not, this type of cylinder has limited extension due to the space the compressed spring takes up. Another downside to SACs is that part of the force produced by the cylinder is lost as it tries to push against the spring. Because of those factors, single acting cylinders are recommended for applications that require no more than 100mm of stroke length.

2. Double-acting cylinders

Double-acting cylinders (DAC) use the force of air to move in both extends and retract strokes. They have two ports to allow air in, one for outstroke and one for in stroke. Stroke length for this design is not limited; however, the piston rod is more vulnerable to buckling and bending.

3. Multi-stage, telescoping cylinders

Telescoping cylinders, also known as telescopic cylinders can be either single or double-acting. The telescoping cylinder incorporates a piston rod nested within a series of hollow stages of increasing diameter. Upon actuation, the piston rod and each succeeding stage "telescopes" out as a segmented piston. The main benefit of this design is the allowance for a notably longer stroke than would be achieved with a single-stage cylinder of the same collapsed (retracted) length. One cited drawback to telescoping cylinders is the increased potential for piston flexion due to the segmented piston design. Consequently, telescoping cylinders are primarily utilized in applications where the piston bears minimal side loading.

- Cutting load requirement- 490 N for plastic pp sheet
- Direct Stress- 3.85 N/mm² for plastic pp material
- Sheet Compression after rolling- 0.001 mm for plastic pp material

CYLINDER DESIGN

- The basic, rod-style industrial cylinder consists of a tube sealed by end caps. A rod attached to an internal piston extends through a sealed opening in one of the ends. The cylinder mounts to a machine and the piston rod acts upon the load.
- A port at one end of the cylinder supplies to one side of the piston, causing it (and the piston rod) to move. The port at the other end lets air on the opposite side of the piston escape — usually to atmosphere. Reversing the roles of the two ports makes the piston and rod stroke in the opposite direction. Rod-style cylinders function in two ways:

A. SELECTION OF HYDRAULIC CYLINDERS

- B. • Single or Double acting
- C. • Dimensional standards like ISO, VDMA, CETOP, AFNOR.
- D. • Constructional details like – Piston rod, tie rod, square tube, rodless etc.
- E. • Force to be exerted (Bore dia)
- F. • Distance to be moved (stroke)
- G. • Surrounding medium (special material of construction / type of seals)
- H. • Oil pressure available.
- I. • Cushioned / Non cushioned.
- J. • Ambient temperature for selection of seal material.
- K. • Speed of actuation
- L. • Position detection (Reed switch type)
- M. • Mountings
- N. • Stop tube length for long stroke cylinders.

OTHER SPECIFICATION

ADVANTAGES:

TIME EFFICIENT

This is fast and efficient way of cutting vacuum formed items from the original sheet of vacuum forming material. The cutter can also cut any holes for cables, euroslots or any other shape of holes at the same time.

The hydraulic cutting process is excellent for fairly large items, where precision alignment isn't required - the tray to the right was roller cut out of the plastic sheet, with the cutter used to punch the holes at the same time.

PRODUCTION SPEED

Production speed is considerably high as compared to roller cutter.

COST EFFECTIVE

A second benefit is that running cost is also cooperatively less.

Easy Maintenance of machine reduces maintenance cost.

DISADVANTAGES:

PRECISION

Skill Operator require for hydraulic cutter operation.

APPLICATIONS:

1. For cutting Blisters.
2. Corrugation.

CONCLUSION

RESULT/CONCLUSION:

This machine is reliable for trimming operation as well as production purpose. Cost effectiveness is major factor with this machine. And also advantages over other methods as maintenance, operation, flexibility The sponsored company is going to use this project for continuous production activities with minimum investment.

10.2 FUTURE WORK:

A hydraulic cutting machine is developed for the purpose of trimming as well as cutting holes which is not available in today's market. It is economical method for finishing process and easy maintenance.

The machine is capable of cutting about 15 to 75mm thickness wood die thus it gives an advantage to the purchaser of using the same machine for cutting the product as well as holes and he doesn't have to buy two different machines for this purpose.

In future there can be arrangement for automatic feeding of the drive with time interval The sponsored company is use this project as benchmarking and after that we established new plant for manufacturing this hydraulic cutter with minimum cost.

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“RADIAL AND AXIAL RELIEF GRINDING MACHINE”

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- **Abstract** — Cam operated radial and axial grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam relief radial and axial machine fixture to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a radial or axial relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form.

The machine has a mounting base on a sharpening machine, a body for supporting and guiding a tool receiving a terminal and a carriage for mounting and guiding the body of the base. The terminal cooperates with a displacement unit for the axial and radial displacement of the body. The carriage has a lower part with a bore cooperating with a stud of the base and a recess separated with respect to the bore.

1. Introduction

Cam operated radial and axial Relief grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam. Cam operated radial and axial Relief grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam relief feature to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a helical or spiral relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form. When conventional cutter sharpening techniques are used to grind a form, the necessary relationships between form geometry are not maintained when the tool is re-sharpened. Conventional cutter sharpening techniques require additional re-forming of surfaces to reproduce the original

geometric relationship. Because of the complexity of these additional operations, similar equipment and skills used to produce the tool originally are necessary to re-sharpen the tool.

Cam relief grinding, however, overcomes the shortcomings of conventional cutter techniques, particularly in cutting tools with complex form geometry. The technique of Cam Relief grinding removes less material from the tool in the grinding process. This only enables the cutting tools to be re-sharpened numerous times as compared to conventional cutter sharpened tools, which may only be re-sharpened only once or twice, but gives the cutting tool a greater included angle at the cutting edge, hence a stronger tool. Also, with less material ground away, additional mass is left behind the cutting edge. This additional mass serves to dissipate heat away from the cutting

edge preventing annealing-softening of the tool base material due to exposure to excessive heat of the cutting edge under grinding condition. Relief feature to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a helical or spiral relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form. When conventional cutter sharpening techniques are used to grind a form, the necessary relationships between form geometry are not maintained when the tool is re-sharpened. Conventional cutter sharpening techniques require additional re-forming of surfaces to reproduce the original geometric relationship. Because of the complexity of these additional operations, similar equipment and skills used to produce the tool originally are necessary to re-sharpen the tool. In many cases, production companies have neither the needed specialized equipment, nor time necessary to re-sharpening cutting tools geometry. This forces the end user to return the tools to the original manufacturer for Cam relief grinding, however, overcomes the shortcomings of conventional cutter techniques, particularly in cutting tools with complex form geometry.

2. LITERATURE REVIEW

The present invention relates to the field of machines for the manufacture and sharpening of tools, in particular cutting tools made in small series or individually, and relates to a machine for balancing for axial and radial machining. The cutting tools of the forest or reamer type are generally made from a bar made of steel or tungsten carbide, by cutting to the length and subsequent machining of their cutting faces and their profile. In the case of large series of tools, these are machined using numerically controlled machines implementing specific tools for each cutting surface and for each profile, in the case of complex profile tools. The setting of such machines is, however, very complex and requires a very long preparation time, which is incompatible with the production of small series of tools or individual tools, because the cost price of the latter would be too much heavily burdened by the cost of the preparatory work.

[1] Mr. Orlie Dawson/Roal Oak Grinders/
1967/The R-O Form Relief Grinder has been technologically updated continuously and manufactured here ever since, along with a number of enhancements of the Royal Oak Grinders product line

[2] Dr. Jeffrey Badger grinding relief Geometry 1967
The cleaner cut achieved by relief grinding gives a higher standard of after-cut appearance, which also reduces the stress on components because less horsepower is needed to drive the cylinder

[3] Mr. Orlie Dawson R-O From Relieving Fixture 1959 offers improved grinding control through its master drive and stepless speed control. The Power unit is a D.C., 110 volt gear reduction motor with stepless speed control Gear reduction is 40:1 giving 44 inch pounds of torque. Speeds from 0 TO 80 RPM at the dial, through a timing belt drive.

3. METHODOLOGY

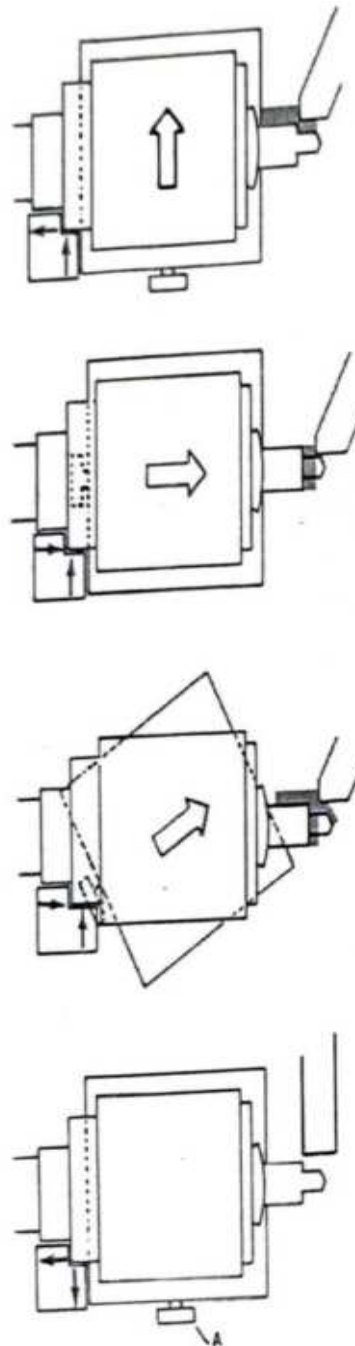
Identification of problem while working on a tool grinding operation :

- Search for suitable ideas for research paper.
- Selecting the concepts related to our aims of projects from research papers.
- Combining them all and creating best project design.
- Collecting the materials required for constructing projects.
- Applying some modification in design if necessary.
- Working on fixture design and sliding mechanism.
- Complete design model
- Assembling the parts as per the design.
- Analyzing the working of project on the machine.
- If some problem causes, applying few modification in design and remaking

1. Planning for project work
2. preparing on tool geometry and fundamentals
3. Concept diagram
4. 2D/3D Drawing
5. Design model and Fixture
6. Software and hardware requirement.
7. Design of Sliding displacement Mechanism
8. Manufacturing operations
9. Finishing operation

10. Assembly of design
11. Working of fixture
12. Grinding tool setting.
13. Testing of the project on Radial and axial relief Grinding Machining operation
14. Submit the project.
15. Study to collect industry survey

4. IMPLEMENTATION



1. For radial relief only - Both carriage and spindle indicators should read 90. At this setting the carriage is at right angle to the grinder table and the spindle is parallel with the table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind cutters with teeth on periphery, milling cutters, keyway cutters, etc.

2. For axial relief only - Both carriage and spindle indicators should read 0. At this setting both are parallel with the grinder table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind circular pilots, with end cutting teeth: counterbores, etc.

3. For radial and axial relief - Turn carriage to angle necessary to obtain required combination of radial and axial relief, Spindle remains parallel with grinder table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind step drills, center drills, etc. Carriage setting is easily determined by a simple formula and charts in operational handbook.

4. For cylindrical grinding Turn knurled thumb screw A - compressing carriage return spring which releases pressure on plunger and cam follower. Spindle turns free for cylindrical grinding. Circular grind can be performed at any position 0 to 90. Grinding to index can also be accomplished by use of index plate and index plunger.

When drilling and countersinking are done with the same tool, since if the countersinking is not centered with the hole, the tap follows the eccentricity as it starts and then has to correct its position as it gets deeper into the work for this reason among other making their own combination centering and chamfering tools for the same work. Without disturbing drill location switch to cam control on the front of relieving fixture and give tool a combination of radial and axial relief. If this is just circularly ground it has no axis or endwise clearance no matter how well it is backed off radially there is always chance it will rub. You can solve this by swinging the base of the fixture while keeping the tool in the line.

V. ACKNOWLEDGMENT

We would like to show our sincere gratitude towards Prof. Dr. A.B.Gholap Sir, HOD, Department of Mechanical Engineering, Mr. Sangram Nikam for his valuable guidance and encouragement. We would also like to thank our Sponsor, Nisaka Engineering PVT. LTD. for their support and continuous guidance throughout the development of this project.

VI. CONCLUSION

As a result, small series or single parts are generally produced by means of manually controlled shearing machines. At present, existing manual marking machines only allow the production of tools that can only be machined along their longitudinal axis. As a result, a machining of can not be achieved with precision and in a perfectly reproducible manner, the necessary adjustments to be made empirically. The object of the present invention

is to overcome these disadvantages by proposing a machine for offsetting for axial and radial machining which makes it possible to produce tools of complex shape, such as stepped tools, by making the tool simultaneously perform three movements, namely radial, axial and rotary. For this purpose, the lapping machine, which essentially consists of a mounting base on a sharpening machine, a support body and guide a receiving pin of a tool to be machined and by a carriage for mounting and guiding the body on the mounting base, is characterized in that the receiving pin of a tool to be machined cooperates with a means of axial and radial displacement of the support and guide body of said pin of receiving a tool to be machined.

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“DESIGN AND FABRICATION OF SEMI-AUTOMATIC MULCHING MACHINE”

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Abstract — During the past few decades, the agriculture sector has shown great progress in automatic control of different system. The conventional mulch paper laying results in requiring lot of man power and ultimately increase in cost. so, we had designed asemi-automatic mulching machine which reduces the man power and cost.

The conventional mulch paper laying method is time consuming, requiring man power, and costly. Now there are multipurpose agricultural machines also in market, but the cost that machine is very high. So small land acquired farmers are not able to purchase these machines.

In order to improve growing condition of crops there are various methods that improves productivity, reduces water require growing up the crops. But mulching paper which is also known as agriculture film is one of the best methods to cover the soil and maintain require atmosphere around the crop. This mulching paper is available in different types but plastic mulching is famous require less

1.Introduction

In this era of automation, the term is used to refer to any degree of automation where mechanical power replaces manual labor. Although the system's needs for physical input are decreasing as mechanization levels rise, the operation is still a crucial component of the system. By addressing labor issues, the automated system reduces costs, improves accuracy, and reduces human error.

This will be one of the strategies used to help enhance it in order to meet the increasing demands of the farmers who want to consistently increase the profitability of their farming by employing more efficient materials and equipment. A machine that can both lay mulching paper and make holes in it will be able to complete these tasks at once.

Making holes and laying mulching paper need a lot of labor and time. Farmers will exert less effort since it will take less money and time to lay the mulching paper using the most

practical manner and punch holes in it in a single pass of the machine. By covering the soil's surface with various materials, farmers and horticulturists can employ mulching to improve the state of agricultural soils.

1. LITERATURE REVIEW

1) "Advance Mulching Paper Laying Machine" by Prof. Amay Tipayale, Mayur S. Salunke, Samadhan U. Thete, Tushar S. Thete, Sandip B. Thete.

In this literature author explain about mulching paper laying machine. Mulching the plastic paper film near the root area of plants is for eliminating the rise of weeds also to retaining water and avoid de-moisturizing the soil but this process requires lots of capital and time. So „Drip irrigation pipe and Mulching paper laying machine“ will reduce the labour cost and time, it will do both the jobs i.e., laying irrigation pipe and mulching paper on the ground at a time. By using various mechanisms, this machine will lay the irrigation pipe and mulching paper at the same time it will make the holes on the paper to provide plantation area after laying the drip irrigation pipe and mulching paper.

To meet the growing needs of the farmers who wish continuously to improve the profitability of their farming by using more efficient materials and machineries this will be one of the methods which will help for improving it. „Drip irrigation pipe and Mulching paper laying Machine“ will be able to do the laying the irrigation pipe as well mulching paper simultaneously. “A pneumatic dibbling machine for plastic mulch”, American society of agricultural and biological engineers, applied engineering in agriculture.

2. METHODOLOGY

3) Scope and methodology

Problem Statement

for their kind co-operation & morale support.

In the past, the bed was covered with mulch paper and drip line using human labour. It takes 6 to 8 persons to lay the mulching paper and poke holes in it. The availability of workers is a major issue in today's atomized environment. The procedure to remedy this issue takes more time right now, however a machine has been invented that operates when coupled to a tractor. When compared to the prior state, 2 to 4 employees are no longer needed, but the process has increased operating costs because the tractor requires more time to adjust with the bed each time.

Even though this technology is highly established and adaptable, its application in India is still constrained by the challenge of physically laying the mulching paper. This is a result of the scarce workforce supply and high cost of labor. There are automatic machines, but either India cannot access them or they are only used in large-scale agriculture. Therefore, we must construct the machine in such a way that it can operate semi-automatically with only one or two workers, in the shortest amount of time, and at the lowest possible operating expense.

4. Project Design

V. ACKNOWLEDGMENT

It is our privilege to acknowledge my deep sense of gratitude to my guide **Dr. Sadanand Sarapure** in Mechanical Engineering at Arvind Gavali College of Engineering, Satara for his/her valuable suggestions and guidance throughout our degree course and the timely help given to us in completion of our project work.

We are thankful to **Dr. V. A. Pharande**, Principal, Arvind Gavali College of Engineering, Satara and **Dr. Gholap. A.B.**, Head of Mechanical Engineering department

VI. CONCLUSION

Laying plastic mulch film requires a lot of time, labour, and effort and is very taxing. By using machinery to lay plastic mulch film, efficiency is increased and labour costs are reduced. It has become essential for us to produce more produce of high quality in order to compete in the global market due to the rising demand for horticulture products and people's increased awareness of their health. In light of the evolving technology landscape, plastic culture is essential to Indian agriculture in order to increase crop yields and production. It requires the right technology to boost efficiency while reducing time and financial requirements throughout the laying operation. An effort has been made to design a manual plastic mulch laying machine because the majority of farmers are small and marginal farmers who rely on the manual as a source of power. For the purpose of installing mulch film on the already-prepared bed for various vegetable crops, a manual plastic mulch laying machine was designed.

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Machine Design and Mechanical System Design Analysis

Multipurpose Agriculture 3 – Wheel Pesticides Sprayer

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Abstract—

In order to meet the food requirements of the growing population and rapid industrialization, modernization development of agriculture is inescapable. Mechanization that enables the conservation of inputs through the precision in the metering ensuring the better distribution, reducing the quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces unit cost of production through higher productivity and input conservation. Farmers are using the same methods and equipment for the ages. In our country farming is done by traditional way, besides that there is large development of industrial and service sector as compared to that of agriculture. The spraying is traditionally done by labour carrying backpack type sprayer which requires more human effort. So to overcome these above problems a machine is developed which will be beneficial to the farmer for the spraying operations.

Introduction

India is set to be an agricultural based country approximately 75% of population of India is dependent on farming directly or indirectly. Our farmers are using the same methods and equipment for the ages. e.g. seed sowing, spraying, weeding etc. There is need for development of effective spraying machine which fulfill the requirement of not only the rich farmer but also the middle & lower level farmer. A Status of the agricultural mechanization in India & most off the developing countries of Asia have the main reasons for low productivity is insufficient power availability on the farms and low level of farm mechanization. This is especially true for India.

It is now realized the world over that in order to meet the food requirements of the growing population and rapid industrialization, modernization developing of agriculture is inescapable. It is said that on many farms, production suffers because of improper seedbed preparation and delayed sowing, harvesting and threshing. Mechanization enables the conservation of inputs through precision in metering ensuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces unit cost of production through higher productivity and input conservation.

Agricultural implement and machinery program of the government has been one of selective mechanization with a view to optimize the use of human, animal and other sources of power. In order to meet the requirements, steps were taken to increase the availability of implements, irrigation spray pumps, tractors, power tillers, combine harvesters and other power operated machines and also to increase the production and availability of improved animal drawn implements. Special emphasis was laid on the later as more than 70% of the farmers fall in small and, marginal category.

It is generally said that mechanization of small farms is difficult. But the Japan having average land holding even smaller than ours, with proper mechanization has led agriculture to great heights. In order to minimization the drudgery of small farmers, to increase efficiency and save farmer's time for taking up additional and supplementary generating activities, the use of modern time saving machines/implements of appropriate size needed to be suitably promoted the productivity as compared to the developed nations

I. RELATED WORKS

We conducted a survey of various applications related to our project and tested various systems that follow the same principle. We also conducted a walkthrough of various We conducted a survey of various applications related to our project and tested various systems that follow the same principle. We also conducted a walkthrough of various farms and real life problems farmers has been facing. which is almost a helpful activity for all of us to know and understand the true problems and the practical solutions we could do on. Moreover, we also studied the health related issue arising from the traditional fertilization for instance back pain, pain in arm walking problems etc. which are only because of the method farmers has been following. Furthermore, we also studied the types of sprayer, selection and exact use in our model for which we have gone through internet, books, some manuals and suggestions taken from farmers.

Also we had many responsibilities and works as given

Prepare a requirement document to reach expectations of project and to come up with functionalities which are needed to be implemented.

Documentation of expected output for various aspects with accepted margin error was also documented.

To design overall system based on workflow requirements.

Discussion with the project guide and Head of Department on ways to improve the design and to optimize performance.

Choosing suitable components and methods based on the configurations availability and requirements.

Testing and remedies, Recommendations

The types of sprayer –

1. Backpack Sprayer:

One type of backpack sprayer is a compressed air sprayer with a harness that allows it to be carried on the operator's back. Another type of backpack sprayer has a hand-operated hydraulic pump that forces liquid through a hose and one or more nozzles. The spray pump is usually activated moving the lever of pump which controls the piston movement. The mechanical agitator plate may be attached to the pump plunger. Some of these sprayers can generate pressures of 100 pounds per square inch (psi) or more. Capacity of both these types of backpack sprayers is usually 5 gallons or less.



2. Lite-Trac :

Lite-Trac is a trading name of Holmen Farm Supplies Ltd, a manufacturer of agricultural machinery registered in England and based in Peterborough. The Lite-Trac name comes from "light tractor", due to the patented chassis design enabling the inherently very heavy machines manufactured by the company to have a light footprint for minimum soil compaction. A Lite-Trac crop sprayer, or liquid fertilizer applicator, mounts onto the SS2400 Tool Carrier centrally between both axles to maintain equal weight distribution on all four wheels and a low centre of gravity whether empty or full



3. Motorcycle Driven Multi-Purpose Sprayer:

In the 1994, Mansukhbhai Jagani, developed an attachment for a motorbike to get a multi-purpose tool bar. It which addresses the twin problems of farmers in Saurashtra namely paucity of labourers and shortage of bullocks. This motor cycle driven plough (Bullet Santi) can be used to carry out various farming operations like furrow opening, sowing, inter-culturing and spraying operations. The Mansukhbhai's intermediate-technology contraption proved efficient and cost-effective for small sized farms



III. DESIGN AND DEVELOPMENT

1. Drawbacks In Existing Sprayer Pumps:

The Indian farmers (small, marginal, small and marginal, semi-medium) are currently using lever operated backpack sprayer. A backpack sprayer consists of tank 10 -20 litre capacity carried by two adjustable straps. Constant pumping is required to operate this which results in muscular disorder. Also, the backpack sprayer can't maintain pressure, results in there is equate pressurise the laborious and also time consuming. Pumping to operating the pressure is also time consuming. Moreover, very small area is covered while spraying. So, more time are required to spray the entire land. Back pain problems may arise during middle age due to carrying of 10-20 litre tanks on back.

2. High Cost Sprayer:

Presently farmers are using knap-sack sprayer for spraying pesticides on crops in their farms which costs for's 1800-4500/-. Pesticides are the most diverse and omnipresent. This sprayer has wide limitations and thus farmers can use the other sprayer also like bullock driven

sprayer pump and tractor mounted sprayer. Cost of bullock driven is about Rs 28000/ But though this these sprayer has high advantages but are not affordable by farmers of developing nation. So, it's a need to find out a golden mean among these.

But though this these sprayer has high advantages but are not affordable by farmers of developing nation .So, it's a need to find out a golden mean among these. The height factor also play a key role in spraying .For cotton, about 5 to 6 times spraying of pesticides is done. Cotton is one of the important commercial crops grown extensively in India. Over 4 million farmers in India grow cotton as their main source and income & livelihood. The textile sector, is primarily based on cotton fibre, is the largest employer & income provider in India, second only to agriculture. It employs close to 82 million people – 35 million in textile & 47 million in allied sector flashes the light on No. of crops on which spraying is done and their horizontal, vertical distances and maximum height.

Objectives

- Decrease the operational cost by using new mechanism.
- Work reliably under different working conditions.
- Decrease the cost of machine.
- Decrease labour cost by advancing the spraying method.
- Machine can be operated in small farming land (5 acre).
- Making such a machine which can be capable to perform both the operation (spraying and weeding).

So considering points related to spraying and weeding an attempt is made to design and fabricate such equipment which will able to perform both the operations more efficiently and also will results in low cost.



Pump :-

A pump is a piece of equipment used to move fluids, such as liquids or slurries, or gases from one place to another.

Tank:-

It is the storage place of chemical solution. It is made up of PVC, Brass, etc.

Agitator:-

It is the devices which stirs the solution and maintain the contents in homogenous state.

Air chamber:-

In a reciprocate type pump, an air chamber is provided on the release line of the pump to level out the pulsations of

the pump and thus given that an invariable nozzle pressure.

Pressure gauge :-

It is a dial gauge which shows the pressure at which the liquid is delivering from the pump.

Pressure regulator :-

The pressure regulator use for some important functions. It is the means of adjust the pressure is necessary for any spray job within the pressure choice of the pump.

Strainer :-

It is a little circular plastic ring with nylon wire mesh to filter any dust element coming with the chemical solution it is included in the suction line connecting the chemical tank and the check valves.

Nozzles :-

It is the part which pull the fluid in to fine droplet. Mechanization of spray fluid is usually achieved by releasing the liquid through lips called nozzle under pressure.

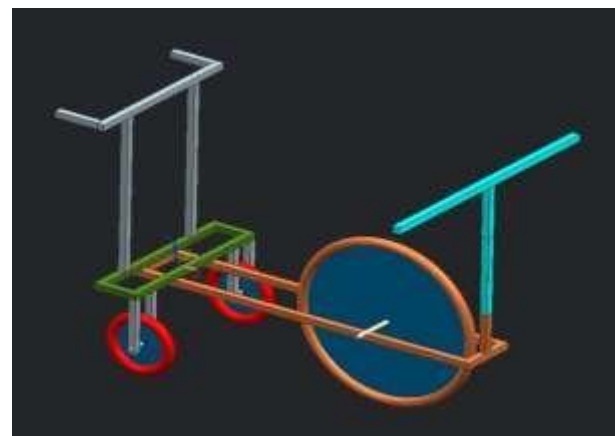
IV.IMPLEMENTATION

Concept Generation:-

Five concepts were generated considering various factors which meet the PDS like functionality, safety and cost. Final concept was selected and the working prototype model was build.

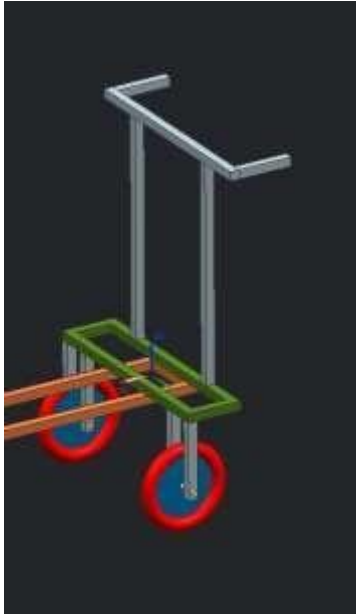
Push Type Sprayer:-

Features of this concept like hand operated hydraulic pump and lever is connected to crack by link. The existing tank (10-16 liters) focusing on new mechanism is to be used as shown in Fig.



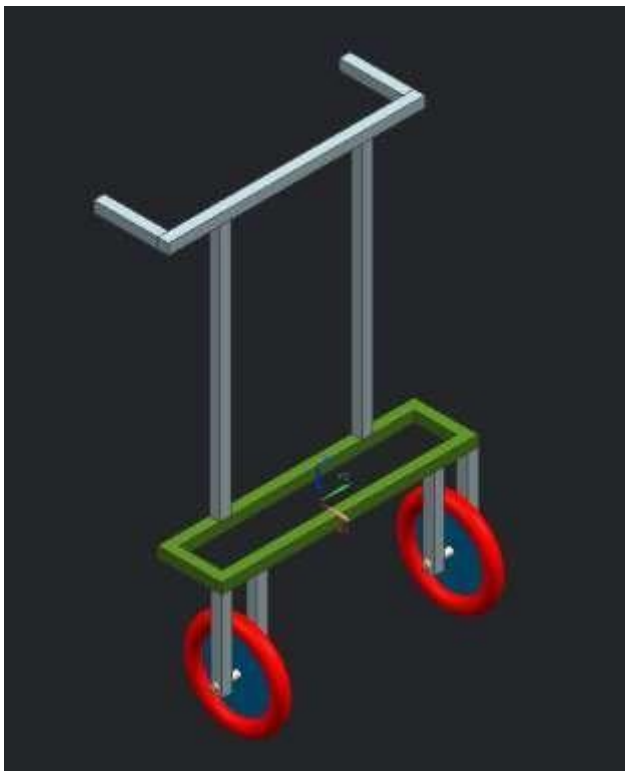
Tank Carrying Sprayer:-

In this concept to solve the existing problem like back ache and shoulder pain. The height adjustable stand with two support wheel to was designed to pull forward easily as shown in Fig.



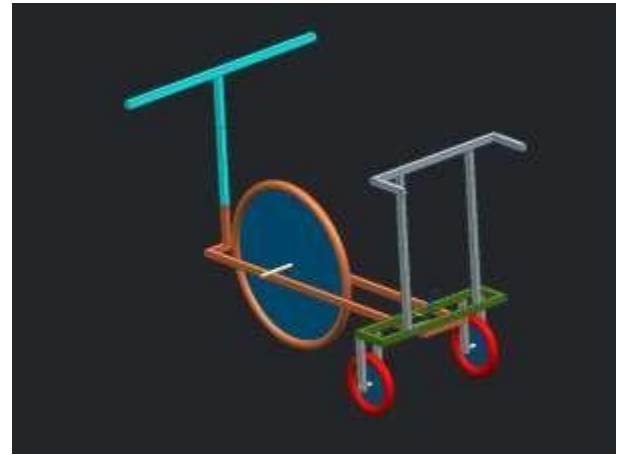
As a trolley With Out Sprayer:-

The frame design is to changed increase aesthetic look of the product and adjustable height support stand as shown in Fig.



Multi Nozzle Operated Sprayer:-

Concept 4 look like concept 3 but for easy movement and support two small wheels were included. It is easy to spray for any height crops because Adjustable height support stand will included as shown in Fig. The product can spray pesticide over multiple rows of plants in one pass there by reducing manual effort.



V. ACKNOWLEDGMENT

We are thankful to Dr. V. A. Pharande, Principal, Arvind Gavali College of Engineering, Satara and Head of Mechanical Engineering department for their kind co-operation & moral support.

We extend our sincere thanks to all teaching staff of mechanical engineering department, those who helped us in completing this project successfully.

Lastly we also thank the people who directly or indirectly gave us encouragement and support throughout the project.

VI. CONCLUSION

1. Spray pump of capacity 40 Liters can be fabricated.
2. Its components can be designed.
3. Components used are easily available in the market or manufactured.
4. Components cost is not too high.
5. The suggested model has removed the problem of back pain, since there is no need to carry the tank (pesticides tank) on the back.
6. The c.f. valves can also be applied which help in reducing the change of pressure fluctuation and c.f. Valves helps to maintain pressure.
7. Proper adjustment facility in the model with respect to crop helps to avoid excessive use of pesticides which result into less pollution.
8. Imported hollow cone nozzles should be used in the field for better performance.
9. Muscular problems are removed and there is no need to operate the lever.

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Design and development of 360 degree rotating fire protection system

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Abstract: Fire hazards are a common phenomenon in developing countries like India causing loss of lives and property every year. Fire emergencies occur where either a human cannot reach on time or location of fire is hazardous and life threatening for humans to approach and douse the fire. The Design and development of a Fire Fighting Robot will provide an impactful solution for society and help save lives. The solution uses Flame sensors to detect the fire hazard, Microcontroller to analyse data from sensors and decide the right course of managing the fire hazard. After analysing it uses WIFI module as a communicating device to alert a human being in charge of the control by raising an alarm through activation of the LED. The user activates the Fire extinguisher robot using the Blynk application to spray water with the help of a pump onto the fire guided by servo motor to synchronize the direction of water output.

I INTRODUCTION

The increasing occurrence of large-scale fires in modern society significantly impacts society and communities in terms of remarkable losses in human lives, infrastructures and properties. Depending on burn severity, wildfires also impact environment and climate change, increasing the released quantity levels of CO₂, soot and aerosols and damaging the forests that would remove CO₂ from the air. This results in extremely dry conditions, increasing the risk of wildfires. Furthermore, forest fires lead to runoff generation and to major changes to the soil infiltration. To this end, computer based early fire warning systems that incorporate remote sensing technologies have attracted particular attention in the last decade.

Usual fire protection systems installed in buildings have the following limitations, as they spray small amounts of water from each sprinkler which may not be enough to put out the fire. The sprinklers are not targeted and spray an entire floor or building ruining computers, furniture and paperwork. While this sprayer gun can spray water in desired qty only at fire outbreak point to stop fire without ruining complete office furniture and electronics. This demo version is made to be remote controlled from few meters but future version will operate remotely from fire dept. modelling of the chaotic and complex nature of the fire phenomenon, in the separation of the fire-emitted radiance from the reflected background radiance and in the occurrence of large variations of either flame or smoke appearance.

II. PROBLEM STATEMENT

Fire outbreaks are known to cause significant loss of life (victims and rescuers) and property. Due to high temperature and presence of potentially hazardous material fire-fighting robots will be useful for extinguishing fire, particularly in places where firemen cannot reach and work. It can thus reduce human injury from a burning fire.

III. OBJECTIVES OF PROJECT

The main objective of this project is to develop fire fighting system to decrease involvement of humans or fire fighters and operate the system remotely in this project.

The main work on sprayer gun or nozzle can spray water in 360 degrees rotating with up and down mechanism.

Fire monitors and sprayers are an aimable and controllable high-capacity water jet used to deal with large fires.

IV. METHODOLOGY

Proper selection of various components

1. Water pump motor:



Fig. water pump motor

It is a Single pump that is used for pumping water. This product works at a speed of 2880 rpm. The power rating of this

pump is 0.5 kW. Its dimensions are 315x190x250 mm. This pump weighs 7 kg. It comes with a warranty of 1 year. With a discharge of 2100-400 LPH, this product can pump water up to 10-25 m head height. This pump has a suction capacity of 25ft. The material used in the motor body is cast iron. It is operated at the voltage of 180-240V single phase energy supply. This range of centrifugal pumps is ideally suited for the supply of water to domestic & industrial places.

2. DC motor:



Fig. DC motor

DC 12V 55RPM 8.5Kg.cm Self-Locking Worm Gear Motor with Encoder and Cable, High Torque Speed Reduction Motor Specification: Voltage: DC 12V No-Load Speed: 55rpm Reduction Ratio: 1:72 Torque: 8.5Kg.cm

3. Battery

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy For Pump -230V AC For Motor-12V DC For Automation kit -5V DC. Each cell contains a positive terminal, or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work.

4. RF Control Remote:

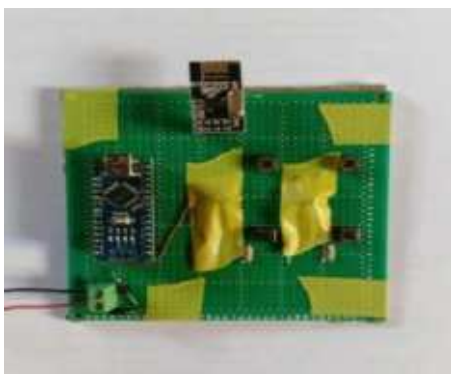


Fig. RF Control Remote

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications.

5. Jet Nozzle



Fig. Jet Nozzle

Dramm Brass Nozzle Water Spray Gun Water Jet Hose Nozzles Hose Pipe Spray Gun suitable for 1/2" Hose Pipe for Gardening and Washing. Easy adjust water spray hose nozzle, multiple spray patterns and flow volume are at your fingertips

Powerful rotating spray barrel adjusts water from fan to cone to powerful flow. Leak proof equipped with O-rings at the back and front for a tight connection that prevents any leakage. Multiple uses watering the plants, washing the car, cleaning the sidewalk or spraying the drain, the pressure hose nozzle works wonders.

5. Receiver circuit



Optical receivers can be classified as high-impedance, Frans impedance, and low impedance depending on the pre-amplifier design. When the timing of the optical signal is known, an integrate-and-dump pre-amplifier design can be used Low-impedance receivers have a broad bandwidth, but poor sensitivity. High impedance receivers have much better sensitivity, but they fail to achieve a useful bandwidth.

6. Base Frame

Most of the larger high speed compressor models are mounted on Base frames. Compressors are mounted on the Base frame to carry its weight, to maintain its alignment and to assist in carrying the dynamic loads which every compressor generates. Compressors base frame needs an effective design technology to ensure that the base frame as designed performs the required functions, and maintains its integrity. There is also a need to maximize the life of the compressor base frame under the loads to which it is exposed. One of the main reasons for the failure of base frame is lack of rigidity and the stress concentrations.

IV. 3D MODEL USING AUTO CAD



Fig. 3D VIEW

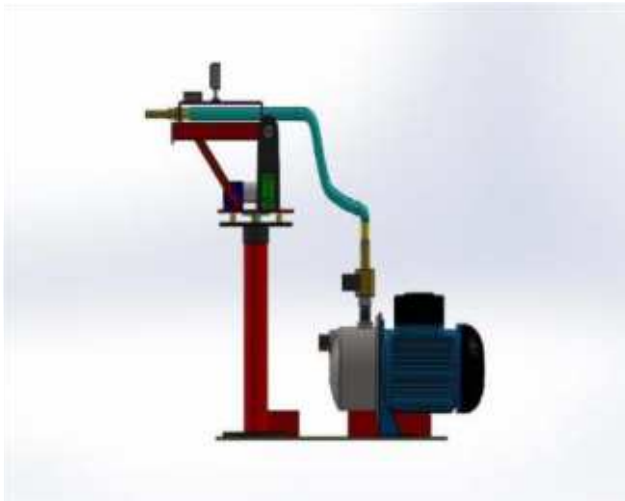


Fig. SIDE VIEW

V. CALCULATION

1. For ½ HP water pump calculation –

Water pump horse power

$$= \frac{\text{TDH} \times Q \times \text{Specific gravity}}{360}$$

TDH = Total dynamic Head + Friction losses

Assume, overall TDH = 70

Q = discharge of water

Q = 10 gpm

Specific gravity = 1

$$\text{Water pump horse power} = \frac{70 \times 10 \times 1}{3960} = 0.18 \text{ HP}$$

$$\text{Horse Power of motor} = \frac{\text{Horse power of water}}{\text{Pump Efficiency}} = 0.18$$

$$\begin{aligned} &0.5 \\ &= 0.36 \text{ HP} \end{aligned}$$

From this value we will use ½ HP water pump motor

2. For dc motor calculation:

F = force = 9.81N

D = displacement = 0.152 m

W = work done

W = F x D

$$= 9.81 \times 0.152$$

Work = 1.49112 Nm.

P = Mechanical power = f x d/t

$$= 149.112 \text{ nm/s}$$

3. Factor of safety

Factor of safety = maximum stress / Working stress

$$= 100/50$$

Factor of safety = 2

VI. FUTURE SCOPE

- In future work, an efficient approach for early fire detection from images by combining a powerful deep learning technique with multidimensional texture analysis using Linear Dynamical Systems (LDS) is proposed.
- To design and develop a robotic vehicle which has rover controls. (I.e., Forward movement, Backward movement, sideways movement, etc.).
- To program the flame sensors such that they detect the fire and move the robot manually towards it using the WIFI Module.
- To douse the fire using water by spraying it using a pump after detection.

VI. CONCLUSION

- To reduce the involvement of fire fighters thereby
- Decreasing the risk of physical injuries and life threats.
- Comparing this prototype with the existing technology we implement the sensor and wireless technology. Nowadays the firefighting technologies are fully manual. In scope of future, we implement wireless technology to control the fires.
- To improve the current robot, more research is needed.
- It can only extinguish fire in the room where it is now installed, however this can be remedied by adding sensors in different rooms that would inform the robot when it senses fire.
- The robot will next proceed to the location to put out the fire.
- A more efficient fire extinguisher can alternatively be used in place of the water carrier.

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Design and Fabrication of a Section Bending Machine

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Abstract— The objective of this research is to create a roller bending device that can be used in the workshop to bend metal strips and pipes. This project aims to design and build a movable roller bending device. This equipment is used to bend metal strips and steel pipes into the desired curve shapes. The machine's size makes it ideal for mobile work. It is made entirely of steel. Additionally, it is portable and simple to use at any time. It requires less human work and talent to operate this machine, which further reduces human effort. We lean forward while utilising a hand-operated roller-bending machine that uses a support (frame), motors, gears, and a block. Power is the machine that bends pipes; otherwise, everything is done manually. Our goal is to increase precision at a reasonable cost while maintaining the productivity of pipe bending. Instead of using a subtle fashion, this machine uses a straightforward kinematic approach. It is typically used by workshops or fabrication searches due to its mobility. Another common tool in the workshop used to bend metal is a bending machine.

Keywords—Roller bending, Hydraulic, bending, manual, bottle jack.

I. INTRODUCTION

Metal can be plastically deformed and given a different shape through the process of bending. The material is under stress below the ultimate tensile strength but above the yield strength. The material's surface area does not significantly alter. The term "bending" typically refers to axis-specific deformation. Bending is a versatile process that allows for the creation of a wide variety of shapes. Numerous forms can be produced using common die sets. Press brakes are used to bend. For this project, we are bending the metal pipe using hydraulic force. Because of the strong load capacity and efficiency of this hydraulic system. Additionally, this project uses no electricity. Therefore, the price is lower than for hydraulic systems using electrical power.

The important objectives of this project are given as follows

- Design of the manual roller bending machine.
- Design of the components required for this machine.
- The design of the machine should be cost efficient and easy to handle.
- Design the machine so that it performs its work efficiently with minimum effort.

II. LITERATURE REVIEW

A pipe bending system with numerous components and a wide range of shapes and sizes was developed by H. Yang et al. [1] Bent tube components satisfy the expanding demand for lightweight and strong components from a material and structural perspective. One of the fundamental engineering advancements for the creation of lightweight items has been tube bending. By examining bending characteristics and various defects, such as wrinkling instability at the intrados, wall thinning (cracking) at the extrados, springback phenomena, cross-section deformation, shaping limit, and process/tooling configuration, advances in understanding the common issues in tube bending are summarised. Hiroyuki [2] describes a brand-new, adaptable bending machine and its uses. The suggested computer takes a fresh approach. As tubes are placed into the fixed and mobile dies, the mobile die's relative direction is changed, causing the tubes to twist. The bending radius is also determined by the movable die's position in relation to the tube as well as their relative orientation. The fed conduit's length affects the bent angle. This shaping technique offers a substantial advantage. H. A. Hussain [3] designed and created an integrated bicycle pipe bending system. The machine can bend steel pipe with an outer diameter of 25 mm and a thickness of 2 mm thanks to a chain drive and a compound gear train. The kinematic synthesis of the bending mechanism is finished. An analysis of dimensions was chosen. The integrated bicycle pipe bending mechanism's effectiveness is predicted by the deduced relationships, and all of the parameters must be changed to optimise machine performance. P. P. Khandare et al. [7] built a project to design and construct a compact pipe bending system that could turn steel pipes into curves and other shapes. It was simple to transport and use at any time and in any place, requiring less human labor and requiring a less trained workforce. It can bend pipes with a thickness of up to 4-5 mm, but it is only suitable for use in a small workshop or welding shop.

III. DESIGN ASPECTS OF BENDING MACHINE

Design aspect of Bending machine

To develop the necessary specifications for how our system should operate and outcomes to carry out precise calculations of our system design appropriately, some theoretical considerations have been taken into consideration. We took into account elements like the frictional force, the force applied to the rollers, and the torque imparted to the

rollers. Undoubtedly, the computation at the bottom would be used to help define the specifications and performance standards for our prototype. After a quick shearing operation on sheet metal, components can be rolled to identify the material characteristics that affect component bending.

Design chain drive:

$$Lm = 2\left(\frac{a}{p}\right) + \left(\frac{z_1+z_2}{2}\right) + \left(\frac{z_1+z_2}{2\pi}\right)^2 \frac{p}{a} \quad \text{Eq. 1}$$

z_1 = Number of the teeth of sprocket = 27

z_2 = Number of the teeth of sprocket = 27

a = distance between driving sprocket = 200 mm

p = pitch = 4 mm

Design of power screw:

$$d = \frac{d_0 + d_c}{2} = \frac{7.4 + 6.04}{2} = 6.72 \text{ mm} \quad \text{Eq. 2}$$

d_c = major diameter = 7.4 mm

μ = co-efficient of friction = 0.15

d_0 = minor diameter = 6.04

w = weight of the roller = 2.5 kg = 24.54 N

lead = pitch = 6.35 α = Helix angle

ϕ = Friction angle

Force analysis:

Maximum torque required for a cylinder rolling Specifications

σ_s : material yield limit = 218 N/mm²

B : maximum width of rolled shield = 40 mm

δ : Thickness of rolled sheet in mm

1) For thickness $\delta = 2 \text{ mm}$

There is reinforcement when considering the deformation of the material, and the reinforcement co-efficient K is added to change the equation.

For thickness $\delta = 2 \text{ mm}$

There is reinforcement when considering the deformation of the material, and the reinforcement co-efficient K is added to change the equation.

$$M_t = K \sigma_s \frac{B \delta^2}{4} = 1.15 \times 218 \times \frac{40 \times 2^2}{4} = 10028 \text{ N-mm} \quad \text{Eq. 3}$$

For thickness $\delta = 3 \text{ mm}$

$$M_t = K \sigma_s \frac{B \delta^2}{4} = 1.15 \times 218 \times \frac{40 \times 3^2}{4} = 22563 \text{ N-mm} \quad \text{Eq. 4}$$

For thickness $\delta = 4 \text{ mm}$

$$M_t = K \sigma_s \frac{B \delta^2}{4} = 1.15 \times 218 \times \frac{40 \times 4^2}{4} = 40112 \text{ N-mm} \quad \text{Eq. 5}$$

Force Condition:

The force condition when rolling steel plate is depicted in the preceding figure. The following formula can be used to determine the supporting F_2 on the roll plate based on the force balance.

$$F_2 = \frac{M}{R \sin \phi} \quad \text{Eq. 6}$$

a = lower roller centre distance in mm.

d_{min} = mini. diameter of the rolling plate in mm = 388 mm

d_2 = lower roller diameter in mm = 62 mm

$$\phi = \sin^{-1} \frac{a}{d_{min} + d_2} = \sin^{-1} \frac{a}{388 + 62} = \frac{a}{450} = 26.5^\circ \quad \text{Eq. 7}$$

1) For thickness $\delta = 2 \text{ mm}$

$F_2 = 115.63 \text{ N}$

$F_1 = 206.91 \text{ N}$

2) For thickness $\delta = 3 \text{ mm}$

$F_2 = 260 \text{ N}$

$F_1 = 461 \text{ N}$

3) For thickness $\delta = 4 \text{ mm}$

$F_2 = 462 \text{ N}$

$F_1 = 828 \text{ N}$

R = neutral layer's radius of the rolling in mm

$R = 0.5 d_{min}$

$R = 0.5 \times 388 = 194 \text{ mm}$



Fig. 1. Section bending machine

IV. EXPERIMENTATION AND DATA ACQUISITION

In the output test, tests were conducted using GI pipe that was 15 mm and 20 mm in diameter. The test with a 25 mm pipe was abandoned since this size pipe could not be used in the lab. The pipes' diameters were measured at various midpoint deflections. The lead screw's lever was used to deliver torque to the lead screw, which created the bending force. The middle roller's handle was then used to push and pull the pipe, and by progressively increasing the bending pressure, the required bending diameter was achieved. Through repetition, the required bending was accomplished, and a smooth bending was discovered. The table below displays the diameter of pipes with different values and their deflection:

Pipe Diameter (mm)	Deflection (mm)	Bending Diameter (mm)	Remarks
15	31.755	457.20	Initially, 15 mm pipe suffered minor damage.
	38.100	412.75	
	50.800	330.20	
20	31.755	495.30	However, there is no harm to the 20 mm pipe.
	38.100	444.50	
	50.800	361.95	

Table 1: Data for bending test of 15- and 20-mm pipe

In the case of simply supported beam deflection, the radius is given by:

$$R = \frac{c^2 + 4d^2}{8d} \quad \text{Eq. 6}$$

Where,

R= Bending radius

C= Distance between two fixed rollers

d= Deflection in the middle roller

In the present case, the value of c= 254 mm.

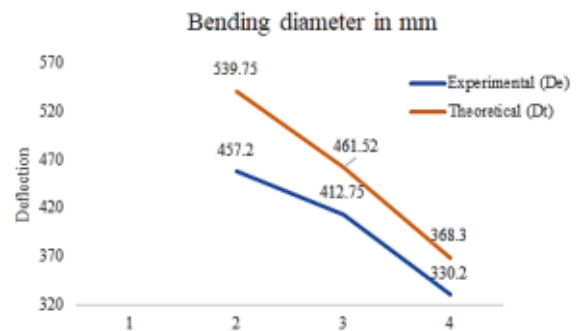
From the above formula, the value of theoretical bending radius has been calculated which has been given in the table below:

Pipe Diameter Mm	Deflectionmm	Bending diameter in mm		Deviation	
		Experimental (De)	Theoretical (Dt)	(De - Dt) mm	% (De - Dt)/ Dt
15	31.755	457.20	539.75	82.55	15.30
	38.100	412.75	461.52	48.77	10.56
	50.800	330.20	368.30	38.10	10.34
20	31.755	495.30	539.75	44.45	8.24
	38.100	444.50	461.52	17.02	3.69
	50.800	361.95	368.30	6.35	1.72

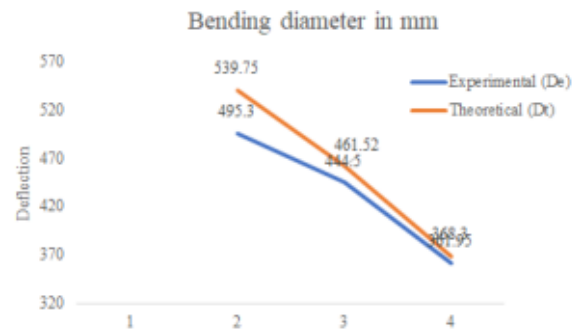
Table 2: Comparison between theoretical and experimental bending radius values

V. RESULTS:

There are two ways to adjust the bending angle and radius in a three-roller bending machine: one is to change the distance between two fixed rollers, and the other is to change the vertical displacement in the middle roller. In this initiative, the above is taken into account in order to reduce design complexity. As a result, the bending radius is solely determined by the middle roller's bending power. The bending radius is calculated using the above-mentioned equation.



Graph 1. Comparison between theoretical and experimental bending radius values for 15 mm pipe diameter



Graph 2. Comparison between theoretical and experimental bending radius values for 20 mm pipe diameter

Since the distance between the two rollers is set, the distance 'd' is the only one that can be changed.

The findings are showing deviation in results. This deviation could be minimized by using a steady and smooth operation. Also, the variation is decreased as the middle roller displacement increases. The theoretical value is significantly higher than the experimental value, as seen in charts 1 and 2.

- The curves in 15 mm pipe are parallel.
- For 20 mm tubing, though, the two curves appear to converge, resulting in greater deflection.

It can be concluded from the results that there is no difference between theoretical and experimental values. The variance may be minimized by ensuring a proper bending procedure and smooth operation.

A graphic comparison of the theoretical and experimental bending radius (diameter) values is shown for 15- and 20-mm tube. The variance reduces with increasing bending radius, as seen in the table.

When the pipe is bent, the bottom roller balances it while the middle roller creates friction. It's possible that the two ends aren't bending properly in any case.

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AUTOMATED FERTILIZER DISPENSER WITH PLOUGHING, SEED SOWING AND SPRAYING EQUIPMENT

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ABSTRACT— Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers must implement the new techniques which will not affect the soil texture but will increase the overall crop production. The aim of this project is to design and develop an automated fertilizer dispenser with ploughing, seed sowing and spraying equipment. The Seed sowing machine is a key component of agricultural field. The various technique used in India for seed sowing and fertilizer placement are manual and tractor operator. The manual and technique are time consuming and productivity is low. Tractor is running on fossil fuel which emits carbon dioxide and other pollution every second. This evident has led to widespread air, water, and noise pollution and most led to a realistic energy crisis soon, in order to make the development of our farmer as well as nation sustainable and cause less harm to our environment. Now, the approach of this project is to develop the automatic equipment which is to minimize the working cost and the time for digging as well as operate on clean energy

The objective of our project is to design and development of ploughing machine to use it for cultivation of soil. Our aim is to reduce the man power required for the operation of the plough. The only way is to automate it but we cannot fully automate it due to few constraints such as it will require electricity which will not be mostly available in villages, we will be requiring Microprocessor and sensors which will again increase the cost and might require skill to use it. We thought of solution being that instead of automating it fully we planned to semi automate it using engine, motors, and power transmission equipment. This might help us reaching our goal by reducing the man power as well as cost. In this work we are planning to design & fabrication of ploughing machine to use of agricultural operations.

I. INTRODUCTION

In olden days technology was not developed that much. So, they were seeding ploughing and plant cutting by hand. But nowadays technology is developed. So now it is not necessary to do seeding in sunlight. By using technology one can sit in a cool place and can-do seeding by monitoring. Today's agricultural field demands to find new ways of agricultural operation to improve performance efficiency. In the field of agriculture various problems are faced by the farmers in the operations like seed sowing, ploughing, and weeding. Also, the equipment's used to perform the operations are very heavy. Due to migration of humans in the cities the labor problem occurs. Now day's technology plays

a paramount role in all sections like medical field, industries, and various organizations. In other countries technology are used to perform different operations in the agricultural field. We can make the use of available technologies in the farming system to reduce the efforts of farmers and to reduce time, energy and required cost.

In the country like India where more than 80% of farmers are small and marginal and they are still doing farming by traditional method only they are also in need of improved agricultural tools that may be hand driven or bullock driven. In this the design and fabrication of ploughing is important agricultural equipment used for soil preparation. The existing cultivator which is manufactured by local small-scale manufacturer gets failed at different points after approximately one session of uses.

The major occupation of the Indian rural people is agriculture and both men and women are equally involved in the process. Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It must support almost 17% of world population from 2.3% of world geographical area and 4.2% of world's water resources. The present cropping intensity of 137% has registered an increase of only 26% since 1950-51. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed.

II. LITERATURE REVIEW

1. **Kyada, A. R, Patel, D. B. [2014]** focused on the basic requirements for small scale cropping machines are, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A manually operated template row planter was designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also, it increased seed planting, seed/fertilizer placement accuracies and it was made of durable and cheap material affordable for the small-scale peasant farmers. The operating, adjusting, and maintaining principles were made simple for effective handling by unskilled operators (farmers).

2. **D.Ramesh, H.P. Girishkuma [2014]** mainly focused on the basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climatic conditions to achieve optimum yields. Seed sowing devices plays a wide role in agriculture field.
3. **A. P. Rathod, A. V. Gorde, R. K. Gondane [2015]** focused on seed sowing and fertilizer placement is the main activity in farming. This paper deals with the various methods of seed sowing and fertilizer placement in India. Here is a comparison between traditional methods of seed sowing and newly designed machine which can perform simultaneous operations in less time and has several advantages. The depth at which seed should be sown and distance between seeds can be maintained by proper seed metering device because depth of seeding has great influence on crop yield. Farming process by using conventional methods takes more time and more labour for seed sowing and fertilizer placement. In today's era availability of labour is becoming great concern. This machine does the work with less efforts and in less time so it reduces cost of labour required for seed sowing and fertilizer placement.
4. **Roshan V Marode, Gajanan P Tayade [2013]** focused on the seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labour, hiring of equipment. The conventional seed sowing machine is less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector. Today, India ranks second worldwide in farm output. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. This paper deals with the various sowing methods used in India for seed sowing and fertilizer placement. The comparison between the traditional sowing method and the new proposed machine which can perform several simultaneous operations, has number of advantages.
5. **Amol B. Rohokale, Pavan D. Shewale, Sumit B.Pokharkar, Keshav K. Sanap[2014]** mainly covered that agriculture is demographically the broadest economic sector and plays a significant role in the overall economy of India. For the growth of Indian economy, mechanization is necessary. The main purpose of mechanization in agriculture is to improve the overall productivity and production. Planting is conventionally done manually which involves both animate (humans and draught animals), this result in higher cost of cultivation and delay in planting. The main purpose of this paper is to compare between conventional sowing method and new proposed machine which can perform number of simultaneous operations. The required row to row spacing, seed rate, seed to seed spacing and fertilizers placement varies from crop to crop can be achieved by the proposed machine. This machine reduces the sowing time, human efforts, and labour cost.
6. **Kalay Khan, Dr. S. C. Moses, Ashok Kumar [2015]** focused on manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. This project work focused on the design and fabrication of a manually operated planter sowing for different crop seed that is cheap, easily affordable by the rural farmers.
7. **Laukik P. Raut and et. al.,** studied to meet the food requirements of the growing population and rapid industrialization, modernization of agriculture is inescapable. Mechanization enables the conservation of inputs through precision in metering ensuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces the unit cost of production through higher productivity and input conservation.
8. **S.D. Sambare and S.S.Belsare** worked on Seed Sowing Using Robotics Technology. In India, near about 70% people are dependent upon agriculture. So, the agricultural system in India should be advanced to reduce the efforts of farmers. Various number of operations are performed in the agriculture field like seed sowing, weeding, cutting, pesticide spraying etc. Very basic and significant operation is seed sowing. But the present methods of seed sowing are problematic.
9. **Swetha and G.H. Shreeharsha** investigate on Solar Operated Automatic Seed Sowing Machine. The real power required for machine equipment depends on the resistance to the movement of it. Even now, in our country 98% of the contemporary machines use the power by burning of fossil fuels to run IC engines or external combustion engines. This evident has led to widespread air, water and noise pollution and most importantly has led to a realistic energy crisis soon.
10. **P. G. Salunkhe** worked on Automatic Seed Plantation Robot. Automatic Seed Plantation Robot which is based on electronic and mechanical platform that performs advance agriculture process. We have developed an electromechanical vehicle which is steered by DC motors to drive wheels. The farm is cultivated by the automated system, depending on the crop considering rows & specific columns. The spacing between two seeds in a column must be entered manually. Proximity sensor is used to measure the rotation of wheels. To detect the obstacle in the path of the vehicle IR LED with TSOP receiver is used and turning position is also depend on this sensor. To check whether seed container is empty or not LDR sensor is used. All the operations are monitored and control by PIC microcontroller using sensors. The programming of

this microcontroller is done in assembly language. LCD display is used to show seed count.

III. METHODOLOGY

The hopper for storing the fertilizer is mounted on frame along with wheel and passage for fertilizer is provided at bottom of hopper to the ground by two pipes and are controlled by suitable lever mechanism operated by engine mounted at frame and it is controlled by accelerator provided at rear end of machine. Similarly, the plough is provided at the rear end of the machine and by suitable link mechanism we can connect the seed sowing machine at rear end of equipment then the pump is also connected to engine is mounted on frame for spraying purpose.

When we start the engine, it moves the wheel and by applying the lever the fertilizer which is stored at hopper passes through pipes to the crops and the quantity of fertilizer controlled by controller. At the same the plough provided at rear end of machine mixes the fertilizer in soil.

By suitable link we can connect a seed sowing machine to equipment here when equipment moves forward the wheel of seeder will move and same time when the pattern rotates and carries the seeds in the hopper that seeds enter through the pipe to ground and by plough which is connected at rear end mixes with the soil is operated by chain drive connected between main wheel and pattern shaft.

Here by connecting a pump to engine which is mounted on frame that sprays through the nozzles which is mounted at the rear end.

IV.OBJECTIVE

- A. PRECISELY SPREADING OF FERTILIZER TO AGRICULTURE LAND.
- B. PLOUGHING OF AGRICULTURE LAND.
- C. SEED SOWING IN AGRICULTURE LAND.
- D. SPRAYING PESTICIDES TO CROPS.

○ V.CALCULATION

1.Volume of hopper-

Volume = area of trapezium and rectangle

a) Trapezium = $\frac{1}{2} (a + b) h * l$

= $\frac{1}{2} (3+18) * 9 * 18$

volume of trapezium = 1701 inch²



b) Rectangle = $l * b * h$

= $18 * 7 * 18$

volume of rectangle = 2268 inch²

Total volume = $(1701+2268) = 3969$ inch³
=65040 cm³

As per above calculation the capacity of hopper for UREA will be-

Weight of Urea - 1.323 gram/cc (urea)

1 cm³: 1.323gram/cc: 65040: x

X = 86.04 Kg capacity of hopper.

2.Sprayer-

A Sprayer is a piece of equipment that is used to apply pesticides or water on agricultural crops. Sprayer Tank Capacity is 16 litres and weight are 3.5kg. It supplied with 110cm long delivery hose. It is having Piston length of 40 cm

and Piston Diameter of 6.5cm. Sprayer tank Dimensions is 14.5*34*46 cm.

a) Normal speed in RPM

The disc of the sprayer has maximum 1000rpm rotation hence the maximum flow of water/pesticides for three rows for the crop is determined here.

b) Discharge

$$Q = (\pi/4) * (d^2) * L * rps$$

Where,

Q=discharge of pesticides

d= diameter of piston in sprayer

L= stroke length of piston =0.4m

rps= rotation of sprayer disc=100rpm/60=16.66rps

$$Q = (\pi/4) * (0.065) * (0.40) * 16.66$$

$$Q = 0.34m^3/sec$$

Hence, maximum flow of water/pesticides for three rows for the crop is determined here $Q = 0.34m^3/sec$

3.Seeding-

Seed Hopper container to collect the grains which is having the dimension 25*25 cm. In seeding equipment, there are two sprockets one sprocket has 12 teeth while other has 44 teeth. There are three patterns which is having 8cm diameter and 10 teeth. When one rotation of larger wheel takes then pattern shaft will rotates 3.67 times.

Rear Wheel circumference = 132cm=1.32m

Lower sprocket teeth, n1= 44

Smaller sprocket teeth, n2= 12

Gear Ratio= $n1/n2 = 44/12 = 3.67$

Gear ratio is 1:3.67

No. of slots in pattern =10

When Pattern rotates 1 complete turn at that time 10 grains seeds will drop into the seeds. The rear wheel rotates once then in the pattern slots 36 grains seeds.

The distance between the grains = $132/36 = 3.67$ cm per grains.

Here we have the formula for power = work/time

Work = force x distance,

So, power = force x distance/time or equivalently,

power = force x speed of lifting (rate)

Force needed to hold 100 kg against gravity = $100 * 9.8$,

rounding it up to 1000N.



Let us say the machine lifts it up at a rate second.

So power needed would be $1000 \times 1 = 1kW$. But this is the power needed without frictional and other losses. Fairly assuming that the assembly is 80% efficient, actual power the from the source would be $1000/0.8 = 1.25kW$. This verifies the fact that higher the rate, with which the weight needs to be lifted, more would be the wattage rating.

Let us consider 80kg fertilizer filled in hopper

Since the load is motor driven, the load must possess a set of wheels.

Let us assume the coefficient of friction between tyre and road be **0.25**

Then force required to propel the vehicle can be obtained using the following relation

Force required = coefficient of friction * normal load = $0.25 \times (80 \times 9.81) = 196.2 \text{ N}$

Let us assume that the maximum speed of the vehicle will be 45kmph and the radius of tire will be **0.23m**.

This means the tyre approximately rotate at the speed of **520 rpm**.

Let us assume the motor is directly coupled to the drive wheels. Then,

Power = $2 \times 3.14 \times 520 \times (196.2 \times 0.23) / 60 = \mathbf{2.46 \text{ kW}}$.

Also, $F = m \cdot a$

So, force required to accelerate $200 \text{ kg} = 200 \times 9.81 = \mathbf{1962 \text{ N}}$

Power = force x speed

so, speed = Power / force = $2684 / 1962 = \mathbf{1.37 \text{ m/s}}$

Power = torque x rotational speed

so, torque Nm = $9.554140127 \times 2684 / 5000 = \mathbf{5.12 \text{ NM}}$

Therefore a 2.6 kw engine, running at almost 5,000 rpm and producing a torque of 5 Nm, can accelerate a 200 kg vehicle.

VI. DESIGN OF SHAFT

We know that

Torque = $5.12 \text{ Nm} = 5.12 \times 10^3 \text{ Nmm}$

Force = 1962 N

Therefore,

Shear stress = $z = F/A = \frac{1962}{3.141/4 \times d^2} = \frac{7848}{3.141 \times d^2}$

By the strength criteria-

$T/J = z/R$

$\frac{5.12 \times 10^3}{3.141/32 \times d^4} = \frac{7848}{3.141 \times d^2}$

By calculating we get

$D = 10.56 \text{ mm} = 11 \text{ mm}$ hence diameter is safe

VII. SPECIFICATIONS

Specifications of engine

Power & Performance-

Displacement: 69.9 cc

Max Power 3.5 bhp @ 5,000 rpm

Max Torque 5 Nm @ 3,750 rpm

Stroke: 42 mm

Valves Per Cylinder 2

Top Speed: 50 Kmph

Transmission: Automatic

Transmission Type: Chain Drive

Cylinders: 1

Bore: 46 mm

Spark Plugs: 1 Per Cylinder

Cooling System: Air Cooled

Fuel Tank Capacity: 3 litres

Fuel Type: Petrol

Specifications of chain

Centre distance between engine sprocket – 19cm

1. Number of driving teeth – 23

2. Number of driven teeth – 44

Seeding chain centre distance- 58cm

1. Number of driving teeth – 44

2. Number of driven teeth – 12

Specifications of wheels

Rear wheel

1. Shaft Length – 68cm

2. Shaft Diameter – 19mm

3. Wheel circumference – 113cm

4. Radius of rear wheel – 21cm

Front wheel

1. radius – 33cm

2. Shaft length – 14cm

FABRICATION IMAGES





VIII. ADVANTAGES

- The fertilizer dispenser ensures the proper and balanced distribution of fertilizer.
- The fertilizer goes adequately and accurately to the roots of crops in the soil.
- Fertilizer dispenser allow for farming without dependency on manual labour, while still yielding high production rates.
- Reduce physical strength of farmers.
- Do not require carrying of heavy bags.
- The seeds are sown at the correct depth and correct interval.
- The seeds sown with a seed drill are in regular rows.
- Ploughing loosens the soil from both sides.
- Spraying A simpler, faster way to a great finish.

IX. DISADVANTAGES

- Controlling of quantity of fertilizer is manual.
- Fuel is used.

X. CONCLUSION

- Our goal is to be build a system which is efficient to perform a various application with fertilizer dispenser machine and this project will fulfil the demand of agricultural application.
- With this machine, percentage reduction in time required for fertilization was observed to be 50% and reduction in labour Cost as compared to conventional method was 80%.
- It has solved the problem of traditional way of fertilization. Since the capital cost is essential factor while selecting equipment for farming. This machine has very less capital cost as compare to other conventional equipment.
- By undergoing all this discussion and undergoing all the factors associated with fertilization, this machine will be great boon for the Indian agricultural

XI. FUTURE SCOPE

- We can use solar system or electrical system for driving mechanism for saving fuel
- We can add rotor for weed removing purpose
- We can and electronic system for more controlled flow of fertilizer
- We can add a remote-control system so that it can operate without driver.



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DESIGN AND FABRICATION OF AUTOMATIC GROUND CLEARANCE MACHINE

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Abstract: *The handling of a vehicle depends upon the various parameters, center of gravity of the vehicle is one of them. For better handling of the vehicle, we need to keep the center of gravity as low as possible. For sport cars it is always kept low but for the passenger cars it compromises with its ground clearance. The designers prefer to maintain fixed ground clearance and design the system to acquire requisite suspension parameters. For different types of tracks, the ground clearance of vehicles is designed accordingly and that is why this is a subtle reason which also differentiates the vehicles as on-road (Sedan/Hatchback cars) and off-road Sports utility vehicles (SUV). Off-road vehicles have to face the rough terrain, where we need the high ground clearance of the vehicle, on the other hand we run the same vehicle on a road where high ground clearance is not necessary. Whereas a sedan car or hatchback has to run on smooth roads as well as on rough terrains sometime with its fixed lower ground clearance which tends to create dents on the bottom portion of the car*

known and static environments. In factory environments, a sudden arrival of obstacle could block the AGV path. To deal with this, several obstacle avoidance algorithms were proposed such as curvature velocity method, dynamic window approach, moving obstacle avoidance, and obstacle avoidance based on obstacle geometric. However, as the calculated area are limited, the goal position reachability condition is not guaranteed. After an optimal path is generated, a trajectory tracking control algorithm is need for the AGV to track the optimal path. Among these controllers, although the stability of the system is guaranteed, it might not be easy to find an appropriate control law. To solve these problems, this paper proposes a obstacle avoidance and trajectory tracking in partially known environmen

Keywords: Ultrasonic Sensor, AGV

I. INTRODUCTION

The use of AGV is the one of the most preferred means to reduce the operation costs by helping the factories to automate a manufacturing facility or warehouse. The common challenging problems related with AGV operation are positioning, path planning, obstacle avoidance and trajectory tracking. The commonly used

II. LITERATURE REVIEW

[1] Aroon Das P, Rakesh S., et al.

The Author studied, The issues of designing and installing a system of Automated Guided Vehicles (AGVS) in a Flexible Manufacturing System (FMS) are examined in this work. The development, advantages and future trends of AGVS are briefly reviewed.

[2] Jobi Paulose, Vignesh Gopal Raja, et al.

The Author studied, The thesis covers the information about internal industrial logistics that are carried out in automotive industries and warehouses

[3] Pathik Pate, Rudresh Parekh, Rutvik Panchal, Vivek Solanki, et al

The Author studied, Material Handling is an important activity within the larger system by which material is moved, stored, and tracked in our commercial Infrastructure.

[4] Aman Sharma, Hina Akhtar, et al

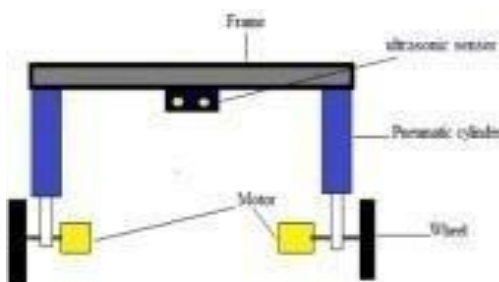
The Author studied, In this paper the chassis of vehicle is lifted by the use of hydraulic pressure. Due to this lift of chassis the ground clearance of vehicle is increased so that it is able to overcome all the obstruction during drive like speed breaker, broken roads etc.

[5] Jagadeesh H, Navinesh B C, et al

The Author studied Author concluded that the pneumatics jacks can act in the place of hydraulic jacks efficiently. The air Compared with other jacks. As our jack is in built the fatigue is less. If made in the lot the cost could be less. It serves better than hydraulic jacks which is used for lifting.

III. BASIC WORKING

Our whole system is mounted on frame which is moved with the help of wheels. On the front end of the system there is sensor. We have used ultrasonic sensor here. The main function of sensors is that they sense the object in front of frame. Ultrasonic sensor uses transducer and receiver to send and receive signal. When there is an object in front of the system, sensor detects it and gives signal to controller. If there is an object ahead of the frame, controller actuates the pneumatic valve. The valve connects compressor to actuators. For smooth, efficient and uninterrupted operation of the Automated Guided Vehicle the controller actuates the actuator for overcoming the obstacle. After lifting the frame with the help of the actuator, the gap between floor and frame increases and it becomes easy to pass that way.



In this operation of lifting the frame, there is certain time period we have given to the controller so that it can keep the system lifted, which can be varied accordingly and after that it again lowers back to its original position. We have given 9 seconds time period for this one. For this given time period vehicle get lifted by distance equal to stroke length of cylinder which is 50mm. We have manufactured this machine so that, all these processes happen simultaneously without any human interruption or without stopping o the AGV

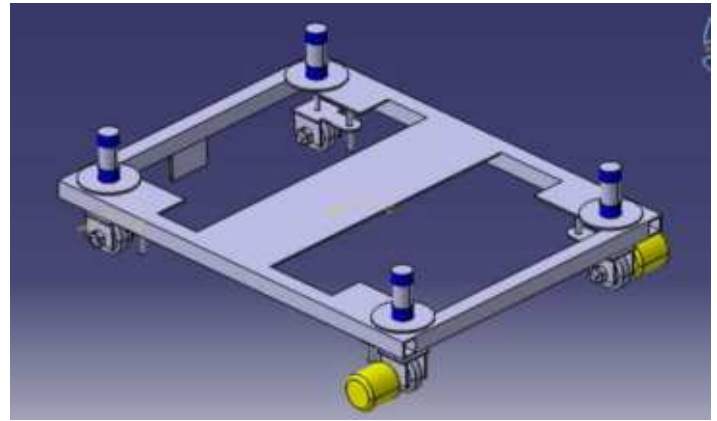


Fig. 2: 3D Model of Assembly

VI. DEVELOPMENT AND FABRICATION

We started the work of this project with literature survey. We gathered many research papers which are relevant to this topic. After going through these papers, we learnt about Automatic Guided Vehicle. We came to know about the problem that was faced by automated guided vehicles and material handling vehicles. After that the components which are required for our project were decided. After deciding the components, the 3 D Model and drafting will be done with the help of CATIA software. The components will be manufactured and then assembled together. The experimental observations will be taken, calculations will be done and then the result will be concluded

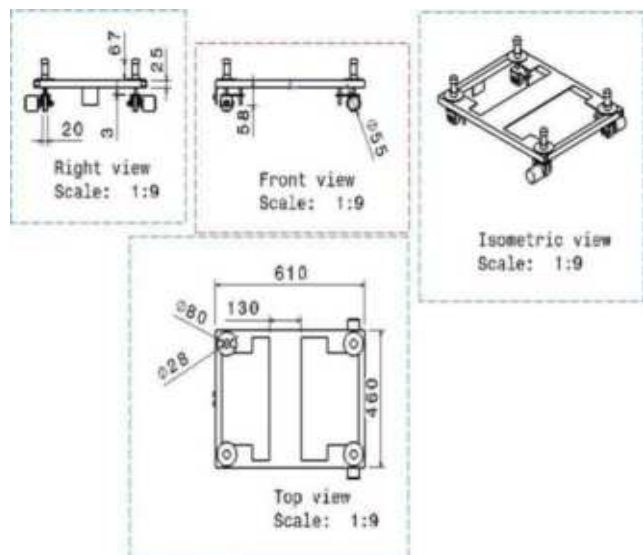


Fig. 3: Drafting of Model

V. MATERIAL REQUIRMENT

Sr No	Components	Quantity
1	Pneumatic Cylinder	4
2	DC Motor	2
3	Pneumatic Valve	1
4	Frame	1
5	Arduino Board	1
6	Ultrasonic Sensor	1
7	Wheel	4
8	Electronic Relay	1
9	Pneumatic Hose	1
10	Wires & plug	1

VI. MAIN HARDWARE REQUIRMENT

1.Ultrasonic Sensor –



Fig. 3. Ultrasonic sensor

The ultrasonic sensor measures the distance of the nearest object, sending the result to the serial port. It can work from 2 cm to 3 m. It measures the time spent by the signal to reach the object and return to the sensor.

2. Pneumatic cylinder-



Fig. 4. Pneumatic cylinder

Pneumatic cylinder is mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved

3. Motor-



Fig. 5. D.C. Motor

A motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of rotation of a shaft. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, converting mechanical energy into electrical energy.

4.Arduino Uno-



Fig 6. ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It has the same microcontroller as the Arduino Nano board, and the same headers as the Leonardo board

VII. ARDUINO UNO PROGRAMMING

/*

* Ultrasonic Sensor HC-SR04 and Arduino Tutorial

*

* by Dejan Nedelkovski,

* www.HowToMechatronics.com

*/


```

*/
// defines pins numbers
const int trigPin = 9;
const int echoPin = 10;
// defines variables
long duration;
int distance;
void setup () {

pinMode(5, OUTPUT);
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
Serial.begin(9600); // Starts the serial communication

}
void loop () {

// Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
// Reads the echoPin, returns the sound wave travel time in
microseconds
duration = pulseIn(echoPin, HIGH);
// Calculating the distance
distance= duration*0.034/2;
// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);

if(distance<=25)
{
digitalWrite(5, HIGH);
delay(7000);
digitalWrite(5, LOW);

}

else

digitalWrite(5, LOW);

```

VIII. FUTURE SCOPE

1. Problem of path changing faced by automated guided vehicles due to obstacles is eliminated.
2. Portable setup.
3. Can be used for different vehicles by little modification.
4. By changing size of actuators desired lift can be achieved.

IX. CONCLUSION

This reduces the time in supply chain management process. We have concluded that this project model can be heavily commercialized in various industries. By using this mechanism obstacles can be avoided with minimum effect on stability. We can conclude that this mechanism can also be useful for off-road vehicles for better obstacle prevention.

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Design and Manufacturing of Hydraulic Cutter

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ABSTRACT

The firm is developing new mechanical method for finishing of vacuum forming. This Hydraulic cutter method is very fast and productive as compare to rolling cutter. So we have design and manufacture this attachment for finishing of Vacuum formed products. It is economical method for finishing process and easy maintenance.

The vacuum formed product is placed in a hydraulic cutter tool with shaped vertical blades and a plastic cutting board is placed on top of it and cutting board are pushed through the roller cutter machine together. The moving rollers inside the roller cutting machine press the product, cutter and cutting board together to punch out the shape and any other features. The finished product is then removed from the roller cutter tool

Introduction

In its simplest form the process consists essentially of inserting a thermoplastic sheet in a cold state into the forming clamp area, heating it to the desired temperature either with just a surface heater or with twin heaters and then raising a mould from below. The trapped air is evacuated with the assistance of a vacuum system and once cooled a reverse air supply is activated to release the plastic part from the mould.

In its advanced stage pneumatic and hydraulic systems complimented with sophisticated heat and process controllers allow high speed and accurate vacuum forming for those heavy duty and high end volume applications.

This results in comparatively short lead times. It provides the perfect solution for prototype and low quantity requirements of large parts as well as medium size runs utilising multiple moulds. (Moulds are discussed in greater detail in section) The typical process steps can be identified as follows: clamping, heating with sheet level activated, pre-stretch, forming with plug assist, cooling with air and spray mist, release and trimming They are examined more closely under the following sub headings.

I. RELATED WORKS

In its simplest form the process consists essentially of inserting a thermoplastic sheet in a cold state into the forming clamp area, heating it to the desired temperature either with just a surface heater or with twin heaters and then raising a mould from below. The trapped air is evacuated with the assistance of a vacuum system and once cooled a reverse air supply is activated to release the plastic part from the mould. The process is shown in diagram form on fig.

In its advanced stage pneumatic and hydraulic systems complimented with sophisticated heat and process controllers allow high speed and accurate vacuum forming for those heavy duty and high end volume applications.

The thermoforming industry has developed despite two fundamental short comings. Many other thermoforming processes use a resin base in powder or pellet form. Vacuum forming begins further down the line

with an extruded plastic sheet which occurs an additional process and therefore an extra cost to reach this stage. In addition, there is generally an area of material which is cut away from the formed part which unless reground and recycled has to be considered as waste and accounted for in any costings made. However these problems have been invariably resolved by strict control of sheet quality and by clever mould design to minimise the amount of waste material. Throughout this manual you will find useful hints and techniques to assist in maximising the potential from this process.

Despite the above disadvantages vacuum forming offers several processing advantages over such others as blow, rotational and injection moulding. Fairly low forming pressures are needed therefore enabling comparatively low cost tooling to be utilised and relatively large size mouldings to be economically fabricated which would be otherwise cost prohibitive with other processes. Since the moulds witness relatively low forces, moulds can be made of relatively inexpensive materials and mould fabrication time reasonably short.

Vacuum forming involves pushing a mould into a heated TP sheet and evacuating the air from between mould and sheet, so that atmospheric pressure pushes the sheet onto the mould, making the forming. There are many different kinds of vacuum forming machine available from small, manually operated units to fully automatic, in-line production machines, but no matter what the differences between units might be, they are all variations on the same them.

1. The sheet is clamped in place on a heat proof air-tight seal.
2. The heater system moves under or over the sheet, or vice versa, and begins heating.
3. Once the sheet has reached it's thermoforming temperature the vacuum pump is energised.
4. The heater moves back to it's resting position (or the sheet moves from the heating position to the moulding position)
5. The mould, mounted on a moving platen, moves up into the sheet which drapes over it.
6. Once the platen reaches the top of its stroke, the space between the underside of the sheet and the upper surface of the mould forms an air-tight pocket connected to the vacuum pump, which then pumps air from between

the two. This removes air which is preventing atmospheric pressure from pushing the sheet down over the mould.

7. As the sheet cools it contracts, gripping the mould. Hence the next step is to reverse the airflow, using air pressure to force the forming off the mould and prevent it sticking, this step has become known as the 'blow cycle'. Blow cycles are short - just long enough for the forming to release from the mould and immediately followed by another vacuum cycle.
8. Vacuum/blow cycling continues until the sheet is rigid once more. At this time, the vacuum is switched off or the mould lowered and the forming is released from the clamp.

PROJECT SPECIFICATION-HYDRAULIC CUTTER

In our project, The firm is developing new mechanical method for finishing of vaccum forming. This Hydraulic cutter method is very fast and productive as compare to rolling cutter. So we have design and manufacture this attachment for finshing of Vaccum formed products.

WORKING PRINCIPLE:

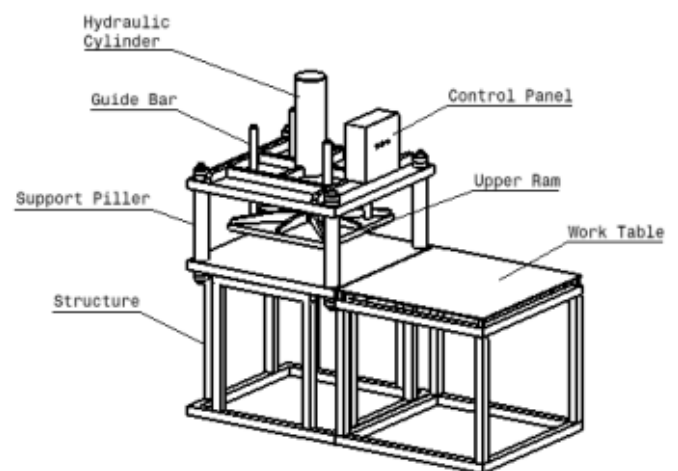


Fig 5.1 Hydraulic Cutter Drawing

DESIGN AND DEVELOPMENT

TYPES OF CYLINDERS:

Although pneumatic cylinders will vary in appearance, size and function, they generally fall into one of the specific categories shown below. However there are also

numerous other types of pneumatic cylinder available, many of which are designed to fulfill specific and specialized functions.

1. Single-acting cylinders

Single-acting cylinders (SAC) use the pressure imparted by compressed air to create a driving force in one direction (usually out), and a spring to return to the "home" position. More often than not, this type of cylinder has limited extension due to the space the compressed spring takes up. Another downside to SACs is that part of the force produced by the cylinder is lost as it tries to push against the spring. Because of those factors, single acting cylinders are recommended for applications that require no more than 100mm of stroke length.

2. Double-acting cylinders

Double-acting cylinders (DAC) use the force of air to move in both extends and retract strokes. They have two ports to allow air in, one for outstroke and one for in stroke. Stroke length for this design is not limited; however, the piston rod is more vulnerable to buckling and bending.

3. Multi-stage, telescoping cylinders

Telescoping cylinders, also known as telescopic cylinders can be either single or double-acting. The telescoping cylinder incorporates a piston rod nested within a series of hollow stages of increasing diameter. Upon actuation, the piston rod and each succeeding stage "telescopes" out as a segmented piston. The main benefit of this design is the allowance for a notably longer stroke than would be achieved with a single-stage cylinder of the same collapsed (retracted) length. One cited drawback to telescoping cylinders is the increased potential for piston flexion due to the segmented piston design. Consequently, telescoping cylinders are primarily utilized in applications where the piston bears minimal side loading.

- Cutting load requirement- 490 N for plastic pp sheet
- Direct Stress- 3.85 N/mm² for plastic pp material
- Sheet Compression after rolling- 0.001 mm for plastic pp material

CYLINDER DESIGN

- The basic, rod-style industrial cylinder consists of a tube sealed by end caps. A rod attached to an internal piston extends through a sealed opening in one of the ends. The cylinder mounts to a machine and the piston rod acts upon the load.
- A port at one end of the cylinder supplies to one side of the piston, causing it (and the piston rod) to move. The port at the other end lets air on the opposite side of the piston escape — usually to atmosphere. Reversing the roles of the two ports makes the piston and rod stroke in the opposite direction. Rod-style cylinders function in two ways:

A. SELECTION OF HYDRAULIC CYLINDERS

- B. • Single or Double acting
- C. • Dimensional standards like ISO, VDMA, CETOP, AFNOR.
- D. • Constructional details like – Piston rod, tie rod, square tube, rodless etc.
- E. • Force to be exerted (Bore dia)
- F. • Distance to be moved (stroke)
- G. • Surrounding medium (special material of construction / type of seals)
- H. • Oil pressure available.
- I. • Cushioned / Non cushioned.
- J. • Ambient temperature for selection of seal material.
- K. • Speed of actuation
- L. • Position detection (Reed switch type)
- M. • Mountings
- N. • Stop tube length for long stroke cylinders.

OTHER SPECIFICATION

ADVANTAGES:

TIME EFFICIENT

This is fast and efficient way of cutting vacuum formed items from the original sheet of vacuum forming material. The cutter can also cut any holes for cables, euroslots or any other shape of holes at the same time.

The hydraulic cutting process is excellent for fairly large items, where precision alignment isn't required - the tray to the right was roller cut out of the plastic sheet, with the cutter used to punch the holes at the same time.

PRODUCTION SPEED

Production speed is considerably high as compared to roller cutter.

COST EFFECTIVE

A second benefit is that running cost is also cooperatively less.

Easy Maintenance of machine reduces maintenance cost.

DISADVANTAGES:

PRECISION

Skill Operator require for hydraulic cutter operation.

APPLICATIONS:

1. For cutting Blisters.
2. Corrugation.

CONCLUSION

RESULT/CONCLUSION:

This machine is reliable for trimming operation as well as production purpose. Cost effectiveness is major factor with this machine. And also advantages over other methods as maintenance, operation, flexibility The sponsored company is going to use this project for continuous production activities with minimum investment.

10.2 FUTURE WORK:

A hydraulic cutting machine is developed for the purpose of trimming as well as cutting holes which is not available in today's market. It is economical method for finishing process and easy maintenance.

The machine is capable of cutting about 15 to 75mm thickness wood die thus it gives an advantage to the purchaser of using the same machine for cutting the product as well as holes and he doesn't have to buy two different machines for this purpose.

In future there can be arrangement for automatic feeding of the drive with time interval The sponsored company is use this project as benchmarking and after that we established new plant for manufacturing this hydraulic cutter with minimum cost.

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“RADIAL AND AXIAL RELIEF GRINDING MACHINE”

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- **Abstract** — Cam operated radial and axial grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam relief radial and axial machine fixture to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a radial or axial relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form.

The machine has a mounting base on a sharpening machine, a body for supporting and guiding a tool receiving a terminal and a carriage for mounting and guiding the body of the base. The terminal cooperates with a displacement unit for the axial and radial displacement of the body. The carriage has a lower part with a bore cooperating with a stud of the base and a recess separated with respect to the bore.

1. Introduction

Cam operated radial and axial Relief grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam. Cam operated radial and axial Relief grinding machine is a technique for grinding a form on the cutting edges of cutting tools. This technique utilizes a cam relief feature to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a helical or spiral relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form. When conventional cutter sharpening techniques are used to grind a form, the necessary relationships between form geometry are not maintained when the tool is re-sharpened. Conventional cutter sharpening techniques require additional re-forming of surfaces to reproduce the original

geometric relationship. Because of the complexity of these additional operations, similar equipment and skills used to produce the tool originally are necessary to re-sharpen the tool.

Cam relief grinding, however, overcomes the shortcomings of conventional cutter techniques, particularly in cutting tools with complex form geometry. The technique of Cam Relief grinding removes less material from the tool in the grinding process. This only enables the cutting tools to be re-sharpened numerous times as compared to conventional cutter sharpened tools, which may only be re-sharpened only once or twice, but gives the cutting tool a greater included angle at the cutting edge, hence a stronger tool. Also, with less material ground away, additional mass is left behind the cutting edge. This additional mass serves to dissipate heat away from the cutting

edge preventing annealing-softening of the tool base material due to exposure to excessive heat of the cutting edge under grinding condition. Relief feature to advance the cutting tool toward the grinding wheel at a constant rate, while it is rotating to produce a relief behind the cutting edge. This creates a helical or spiral relief, as opposed to an angular relief, which maintains the same rate of advancement over the entire cutting form. The advantage of Cam relief grinding is that when the tool is re-sharpened, there is no change in the relative shape and dimensions of the form. When conventional cutter sharpening techniques are used to grind a form, the necessary relationships between form geometry are not maintained when the tool is re-sharpened. Conventional cutter sharpening techniques require additional re-forming of surfaces to reproduce the original geometric relationship. Because of the complexity of these additional operations, similar equipment and skills used to produce the tool originally are necessary to re-sharpen the tool. In many cases, production companies have neither the needed specialized equipment, nor time necessary to re-sharpening cutting tools geometry. This forces the end user to return the tools to the original manufacturer for Cam relief grinding, however, overcomes the shortcomings of conventional cutter techniques, particularly in cutting tools with complex form geometry.

2. LITERATURE REVIEW

The present invention relates to the field of machines for the manufacture and sharpening of tools, in particular cutting tools made in small series or individually, and relates to a machine for balancing for axial and radial machining. The cutting tools of the forest or reamer type are generally made from a bar made of steel or tungsten carbide, by cutting to the length and subsequent machining of their cutting faces and their profile. In the case of large series of tools, these are machined using numerically controlled machines implementing specific tools for each cutting surface and for each profile, in the case of complex profile tools. The setting of such machines is, however, very complex and requires a very long preparation time, which is incompatible with the production of small series of tools or individual tools, because the cost price of the latter would be too much heavily burdened by the cost of the preparatory work.

[1] Mr. Orlie Dawson/Roal Oak Grinders/ 1967/The R-O Form Relief Grinder has been technologically updated continuously and manufactured here ever since, along with a number of enhancements of the Royal Oak Grinders product line

[2] Dr. Jeffrey Badger grinding relief Geometry 1967 The cleaner cut achieved by relief grinding gives a higher standard of after-cut appearance, which also reduces the stress on components because less horsepower is needed to drive the cylinder

[3] Mr. Orlie Dawson R-O Form Relieving Fixture 1959 offers improved grinding control through its master drive and stepless speed control. The Power unit is a D.C., 110 volt gear reduction motor with stepless speed control Gear reduction is 40:1 giving 44 inch pounds of torque. Speeds from 0 TO 80 RPM at the dial, through a timing belt drive.

3. METHODOLOGY

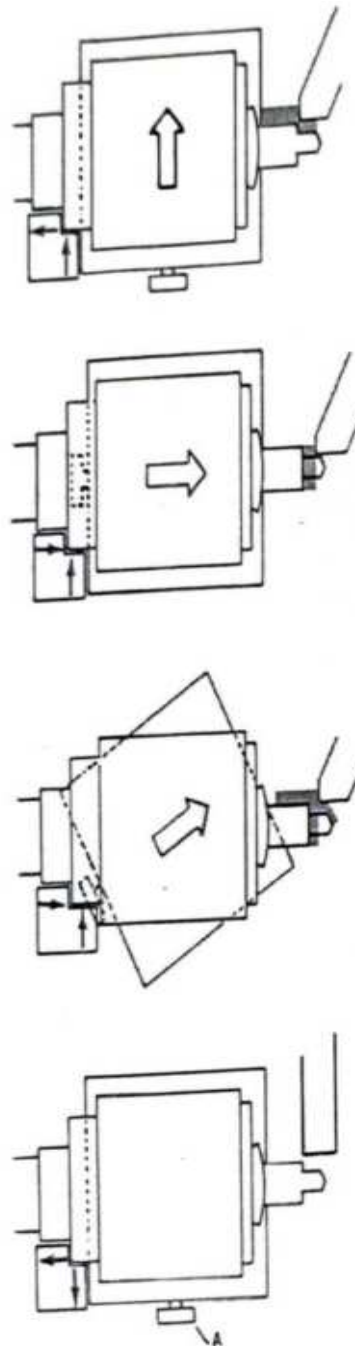
Identification of problem while working on a tool grinding operation :

- Search for suitable ideas for research paper.
- Selecting the concepts related to our aims of projects from research papers.
- Combining them all and creating best project design.
- Collecting the materials required for constructing projects.
- Applying some modification in design if necessary.
- Working on fixture design and sliding mechanism.
- Complete design model
- Assembling the parts as per the design.
- Analyzing the working of project on the machine.
- If some problem causes, applying few modification in design and remaking

1. Planning for project work
2. preparing on tool geometry and fundamentals
3. Concept diagram
4. 2D/3D Drawing
5. Design model and Fixture
6. Software and hardware requirement.
7. Design of Sliding displacement Mechanism
8. Manufacturing operations
9. Finishing operation

10. Assembly of design
11. Working of fixture
12. Grinding tool setting.
13. Testing of the project on Radial and axial relief Grinding Machining operation
14. Submit the project.
15. Study to collect industry survey

4. IMPLEMENTATION



1. For radial relief only - Both carriage and spindle indicators should read 90. At this setting the carriage is at right angle to the grinder table and the spindle is parallel with the table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind cutters with teeth on periphery, milling cutters, keyway cutters, etc.

2. For axial relief only - Both carriage and spindle indicators should read 0. At this setting both are parallel with the grinder table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind circular pilots, with end cutting teeth: counterbores, etc.

3. For radial and axial relief - Turn carriage to angle necessary to obtain required combination of radial and axial relief, Spindle remains parallel with grinder table. The tool moves into the wheel as illustrated in the diagram. Set-up used to grind step drills, center drills, etc. Carriage setting is easily determined by a simple formula and charts in operational handbook.

4. For cylindrical grinding Turn knurled thumb screw A - compressing carriage return spring which releases pressure on plunger and cam follower. Spindle turns free for cylindrical grinding. Circular grind can be performed at any position 0 to 90. Grinding to index can also be accomplished by use of index plate and index plunger.

When drilling and countersinking are done with the same tool, since if the countersinking is not centered with the hole, the tap follows the eccentricity as it starts and then has to correct its position as it gets deeper into the work for this reason among other making their own combination centering and chamfering tools for the same work. Without disturbing drill location switch to cam control on the front of relieving fixture and give tool a combination of radial and axial relief. If this is just circularly ground it has no axis or endwise clearance no matter how well it is backed off radially there is always chance it will rub. You can solve this by swinging the base of the fixture while keeping the tool in the line.

V. ACKNOWLEDGMENT

We would like to show our sincere gratitude towards Prof. Dr. A.B.Gholap Sir, HOD, Department of Mechanical Engineering, Mr. Sangram Nikam for his valuable guidance and encouragement. We would also like to thank our Sponsor, Nisaka Engineering PVT. LTD. for their support and continuous guidance throughout the development of this project.

VI. CONCLUSION

As a result, small series or single parts are generally produced by means of manually controlled shearing machines. At present, existing manual marking machines only allow the production of tools that can only be machined along their longitudinal axis. As a result, a machining of can not be achieved with precision and in a perfectly reproducible manner, the necessary adjustments to be made empirically. The object of the present invention

is to overcome these disadvantages by proposing a machine for offsetting for axial and radial machining which makes it possible to produce tools of complex shape, such as stepped tools, by making the tool simultaneously perform three movements, namely radial, axial and rotary. For this purpose, the lapping machine, which essentially consists of a mounting base on a sharpening machine, a support body and guide a receiving pin of a tool to be machined and by a carriage for mounting and guiding the body on the mounting base, is characterized in that the receiving pin of a tool to be machined cooperates with a means of axial and radial displacement of the support and guide body of said pin of receiving a tool to be machined.

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“DESIGN AND FABRICATION OF SEMI-AUTOMATIC MULCHING MACHINE”

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Abstract — During the past few decades, the agriculture sector has shown great progress in automatic control of different system. The conventional mulch paper laying results in requiring lot of man power and ultimately increase in cost. so, we had designed asemi-automatic mulching machine which reduces the man power and cost.

The conventional mulch paper laying method is time consuming, requiring man power, and costly. Now there are multipurpose agricultural machines also in market, but the cost that machine is very high. So small land acquired farmers are not able to purchase these machines.

In order to improve growing condition of crops there are various methods that improves productivity, reduces water require growing up the crops. But mulching paper which is also known as agriculture film is one of the best methods to cover the soil and maintain require atmosphere around the crop. This mulching paper is available in different types but plastic mulching is famous require less

1.Introduction

In this era of automation, the term is used to refer to any degree of automation where mechanical power replaces manual labor. Although the system's needs for physical input are decreasing as mechanization levels rise, the operation is still a crucial component of the system. By addressing labor issues, the automated system reduces costs, improves accuracy, and reduces human error.

This will be one of the strategies used to help enhance it in order to meet the increasing demands of the farmers who want to consistently increase the profitability of their farming by employing more efficient materials and equipment. A machine that can both lay mulching paper and make holes in it will be able to complete these tasks at once.

Making holes and laying mulching paper need a lot of labor and time. Farmers will exert less effort since it will take less money and time to lay the mulching paper using the most

practical manner and punch holes in it in a single pass of the machine. By covering the soil's surface with various materials, farmers and horticulturists can employ mulching to improve the state of agricultural soils.

1. LITERATURE REVIEW

1) "Advance Mulching Paper Laying Machine" by Prof. Amay Tipayale, Mayur S. Salunke, Samadhan U. Thete, Tushar S. Thete, Sandip B. Thete.

In this literature author explain about mulching paper laying machine. Mulching the plastic paper film near the root area of plants is for eliminating the rise of weeds also to retaining water and avoid de-moisturizing the soil but this process requires lots of capital and time. So „Drip irrigation pipe and Mulching paper laying machine“ will reduce the labour cost and time, it will do both the jobs i.e., laying irrigation pipe and mulching paper on the ground at a time. By using various mechanisms, this machine will lay the irrigation pipe and mulching paper at the same time it will make the holes on the paper to provide plantation area after laying the drip irrigation pipe and mulching paper.

To meet the growing needs of the farmers who wish continuously to improve the profitability of their farming by using more efficient materials and machineries this will be one of the methods which will help for improving it. „Drip irrigation pipe and Mulching paper laying Machine“ will be able to do the laying the irrigation pipe as well mulching paper simultaneously. “A pneumatic dibbling machine for plastic mulch”, American society of agricultural and biological engineers, applied engineering in agriculture.

2. METHODOLOGY

3) Scope and methodology

Problem Statement

for their kind co-operation & morale support.

In the past, the bed was covered with mulch paper and drip line using human labour. It takes 6 to 8 persons to lay the mulching paper and poke holes in it. The availability of workers is a major issue in today's atomized environment. The procedure to remedy this issue takes more time right now, however a machine has been invented that operates when coupled to a tractor. When compared to the prior state, 2 to 4 employees are no longer needed, but the process has increased operating costs because the tractor requires more time to adjust with the bed each time.

Even though this technology is highly established and adaptable, its application in India is still constrained by the challenge of physically laying the mulching paper. This is a result of the scarce workforce supply and high cost of labor. There are automatic machines, but either India cannot access them or they are only used in large-scale agriculture. Therefore, we must construct the machine in such a way that it can operate semi-automatically with only one or two workers, in the shortest amount of time, and at the lowest possible operating expense.

4. Project Design

V. ACKNOWLEDGMENT

It is our privilege to acknowledge my deep sense of gratitude to my guide **Dr. Sadanand Sarapure** in Mechanical Engineering at Arvind Gavali College of Engineering, Satara for his/her valuable suggestions and guidance throughout our degree course and the timely help given to us in completion of our project work.

We are thankful to **Dr. V. A. Pharande**, Principal, Arvind Gavali College of Engineering, Satara and **Dr. Gholap. A.B.**, Head of Mechanical Engineering department

VI. CONCLUSION

Laying plastic mulch film requires a lot of time, labour, and effort and is very taxing. By using machinery to lay plastic mulch film, efficiency is increased and labour costs are reduced. It has become essential for us to produce more produce of high quality in order to compete in the global market due to the rising demand for horticulture products and people's increased awareness of their health. In light of the evolving technology landscape, plastic culture is essential to Indian agriculture in order to increase crop yields and production. It requires the right technology to boost efficiency while reducing time and financial requirements throughout the laying operation. An effort has been made to design a manual plastic mulch laying machine because the majority of farmers are small and marginal farmers who rely on the manual as a source of power. For the purpose of installing mulch film on the already-prepared bed for various vegetable crops, a manual plastic mulch laying machine was designed.

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Industry 4.0 and Above

“ROBOTIC ARM WITH VEHICLE”

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Abstract — Robotic arms are widely utilized in industries to enhance operational efficiency, productivity, and precision while minimizing human errors. An important advantage of robotic arms is their ability to operate in challenging conditions, such as high temperatures and pressures, where human presence is risky. These manipulators fall under the category of Flexible Automation, allowing for easy updates and modifications. In response to security concerns posed by terrorist attacks involving harmful devices like bombs and landmines, a project was initiated to develop a robotic arm integrated with a vehicle. This innovative solution aims to reduce human threats by enabling remote operation and offering enhanced adaptability. Additionally, robotic arms are capable of operating in extreme environments, such as radioactive areas, which are hazardous for human beings. The integration of cameras and ultrasonic sensors allows for environmental reconnaissance. Extensive research papers, including DRDO Daksh, were reviewed to gain insights into various control strategies and methodologies employed by different authors in determining the degrees of freedom necessary for object manipulation and precise placement. The knowledge acquired from these papers contributes to the design of the robotic arm system.

I. INTRODUCTION

Robotic arms have transformed industrial automation, indispensable across manufacturing, healthcare, defense, and space exploration. Equipped with sensors, actuators, and components, these arms perform diverse tasks. Their utilization boosts productivity, accuracy, and safety, providing an appealing substitute for human labor.

Advancements in materials science, AI, and robotics have facilitated the creation of sophisticated robotic arms. Soft robotics offer flexibility and adaptability for delicate tasks, while biomimetic designs enhance agility and dexterity by imitating animal movement.

The control system of robotic arms is vital for executing complex actions. Different strategies, including joint-level, task-level, and hybrid control, have been developed with unique pros and cons. The ongoing research focuses on intelligent control systems that can adapt to diverse tasks and environments.

Robotic arms have demonstrated their versatility in various painting, and assembly, contributing to increased efficiency. In healthcare, robotic arms have been instrumental in surgical procedures, enabling enhanced precision and less invasive techniques.

In the realm of space exploration, robotic arms play a crucial role in performing maintenance tasks and conducting scientific experiments, aiding in the exploration of potential use.

This review aims to cover recent research on robotic arm design, control, and applications. We will explore advancements in arm design, control strategies, and applications in defense & surveillance. Additionally, future research directions will be outlined. The automation industry in India is experiencing rapid growth, and we have continued to treat terrorists & Naxalites with ongoing two border conflicts its necessary to overcome these types of challenges with robotic technology in the most efficient, and cost-effective way. Robotic automation has also improved safety by eliminating risks and potential dangers to humans during the process.

Robotics explores the development of robotic arms with multiple DOF. Control systems, including Arduino Uno microcontrollers, are used. Servomotors are commonly employed for joint motion. Manufacturing of parts can be done by 3D printing for Surveillance purpose camera used. the arm is mounted on a remotely operated vehicle (ROV). Can be operated remotely as well as on mobile

II. LITERATURE REVIEW

In the field of robotics, the development of robotic arms with multiple degrees of freedom (DOF) has been an active area of research. Various control systems have been implemented for such arms, including microcontrollers such as the Arduino Uno. The use of servomotors has also been a popular choice for providing rotary motion to the joints of the arm. In addition, the manufacturing and sharpening of cutting tools, including those with complex profiles, has been a challenge for small-scale or individual production due to the complexity and cost of machine setup. Techniques such as Cam relief grinding have been developed to address this issue.

[1] Farooq Ahmad et al. (2018) evaluated robotic arms applications in the healthcare domain, with their applications in rehabilitation, prosthetics, and surgery. Thoughts were exchanged on the probable crisis and challenges of using robotic arms in healthcare.

[2] Waseem Khan et al. (2019) evaluated the use of robotic arms in the manufacturing industry, including their applications in assembly, material handling, and welding. Also, they discussed the advantages and limitations of using robotic arms in manufacturing.

[3] Zhihui Li et al. (2020) evaluated the use of robotic arms in the field of agriculture, including their applications in harvesting, pruning, and spraying. Also, they shared views on the challenges and opportunities of using robotic arms in agriculture, specifically in the improvement of efficiency and reducing labor costs.

II. METHODOLOGY

- **Problem and Requirements Identification:** Analyze constraints and requirements for the robotic arm, including degrees of freedom, motion range, payload capacity, accuracy, and precision. Develop an optimal project design by combining all these factors.
- **Literature Review:** Conduct an extensive review of existing research papers and literature on robotic arm development. Identify relevant concepts, components, and technologies to be incorporated into the robotic arm's design.
- **Conceptual Design:** Based on the requirements analysis and literature review, create the conceptual design for the robotic arm. This involves selecting appropriate joints, actuators, sensors, and control systems.
- **Detailed Design:** Generate a detailed 2D/3D design of the robotic arm, encompassing all components and subsystems. Consider material selection and manufacturing processes during this phase.
- **Fabrication and Assembly:** Utilize suitable manufacturing techniques to fabricate the robotic arm's components. Assemble the arm according to the design specifications.
- **Testing and Validation:** Thoroughly test the robotic arm to ensure it fulfills the requirements and specifications.
- This includes evaluating motion range, payload capacity, accuracy, and precision.
- **Evaluation and Refinement:** Evaluate the robotic arm's performance, and make modifications to enhance capabilities.
- **Documentation and Reporting:** Document design, fabrication, testing outcomes, and modifications for the robotic arm. Prepare a comprehensive final report summarizing the entire project.

III. IMPLEMENTATION

Determining the design of a robotic arm is reliant on its intended application. This encompasses selecting the suitable arm size, reach, and payload capacity, as well as determining the required number and type of joints. In industrial environments, a popular choice is the six-axis robotic arm due to its versatility and capacity to maneuver in multiple directions.

During the assembly process, a meticulous approach is taken to choose and integrate the various components of the robotic arm. This involves incorporating motors, sensors, and actuators that empower the arm to execute its assigned tasks. The motors are responsible for controlling the

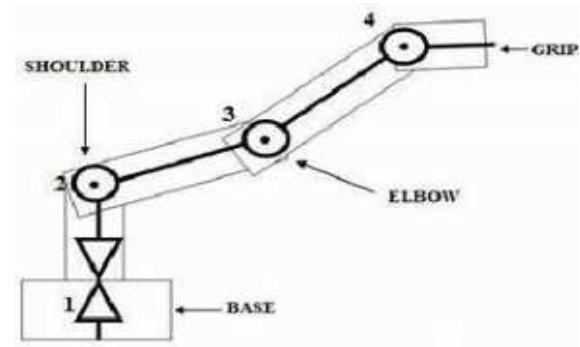


Fig. 1: Robotic arm mechanism

movement of the arm's joints, while sensors play a crucial role by providing essential feedback to ensure precise and accurate operation.

Programming the robotic arm's movements is a crucial step in the implementation process.

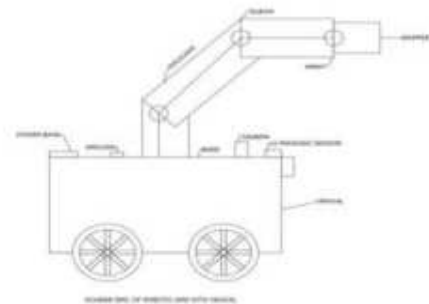


Fig. 2: Schem. Drg. of Robotic Arm with Vehicle

This entails creating a sequence of commands that define specific patterns, such as grasping objects or relocating them. Typically, programming is done using a computer, and the commands are then sent to the robotic arm's control system.

In the end, the robotic arm is then integrated into the larger system it will operate in, connecting it to other machines or systems like a conveyor belt or control panel. Rigorous testing ensures accurate and efficient task performance by the robotic arm.

IV. ACKNOWLEDGMENT

We would like to show our sincere gratitude towards Prof. Mrs. Alatar M.N, HOD, Department of Mechanical Engineering, Mr. Sangram Nikam for his valuable guidance and encouragement. We would also like to thank our Sponsor, Nisaka Engineering PVT. LTD. or their support and continuous guidance throughout the development of this project.

V. CONCLUSION

Overall, the objectives of this project are achieved which are developing the hardware & software for the wireless mobile robotic arm, implementing the pick and place system operation, and testing the robot that meets the standards of the purpose project. The analysis that has been made, clearly shows that its movement is accurate, simple to control, and user-friendly. The mobile robot has been developed successfully because the movement of the robot including the mobile and arm robot can be controlled wirelessly. This robot is expected to beat problems like placing or picking objects away from the user and pick and place hazardous- objects in the fastest and easiest way.

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Automatic Answer Checker

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ABSTRACT

Automatic answer checking process would not only relieve the exam checker but the checking process would also get way more transparent and fair as there would not be any chances of biasedness from the teacher side. An Automatic answer checker application that checks and marks written answers similar to the human being . It removes human errors that commonly occurring Answersheet checking.

In this modern age, where the world moves towards automation so, there is an need for in an Automatic Answer Checker system. Currently, the online answer checker is available for MCQ based question, hence Automatic Answer Checker is Used.

Keywords

INTRODUCTION

In Today's World ,currently there are many exam conduction ways, be it online exams or MCQ types exam. Various Examinations are conducted every day around the world . The most Important aspect of any Examination is the checking of the answer sheet of the student.

Automatic answer checking process would not only relieve the exam checker but the checking process would also get way more transparent and fair as there would not be any chances of biasedness from the teacher side. Nowadays various online tools are available for Checking multiple choice questions but there are very few tools to check Objective answer type Examination. This project aim to carry out the checking of Subjective and Objective answer type Examinations by Implementing the Data. This application can be used in various educational Institutes for Checking Objective answer type Examinations.

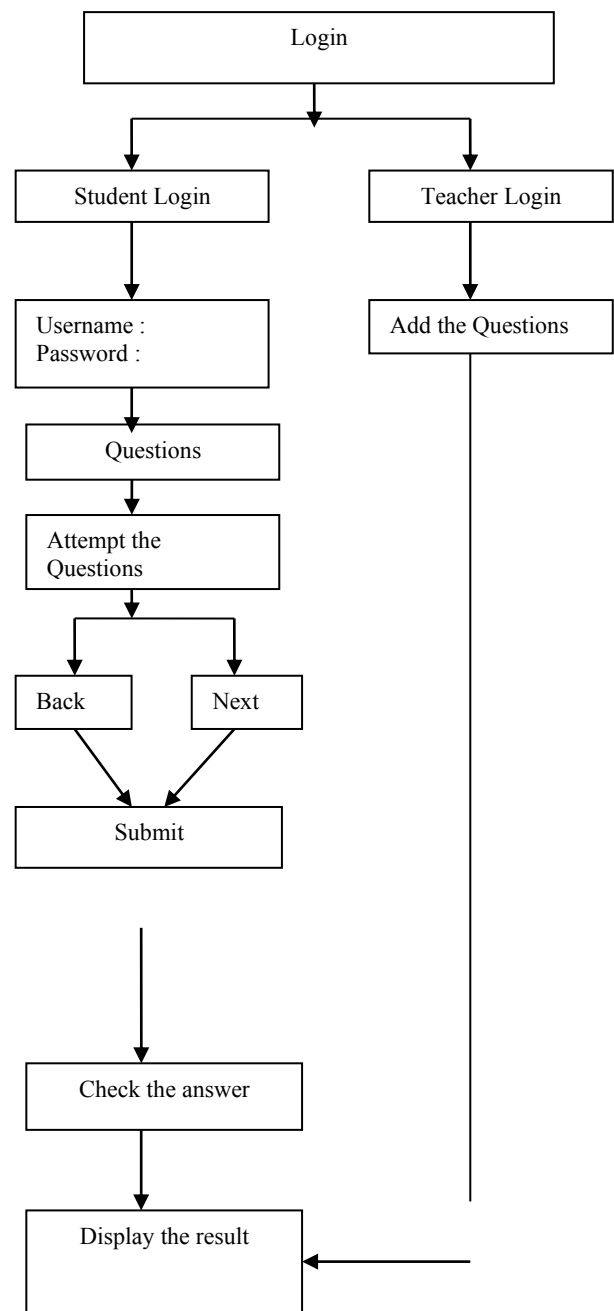
OBJECTIVE

An Automatic answer checker application that checks and marks written answers similar to human being. This Application built to check Subjective and Objective answers in an online examination and allocate marks to the user after verifying the Answer.

The System requires you to store the original answer for the system. This facility is provided to the Admin. The Admin may insert questions and Subjective and Objective answers n the System. This Answers Are Stored as Note pad files . When a user takes the test he is provided with questions and are a to type his answers.

The User Enter his/her answers the system then compares this answer original answer written data base and allocates marks Accordingly. Both the Answers need not be exactly same , word to word.

BLOCKDIAGRAM



ADVANTAGES

- The system calculates the score and provides results instantly.
- It removes human errors that commonly occur during manual checking.
- The system provides an unbiased result.
- Thus the system excludes human efforts and saves time and resources.
- Environmental Friendly
- Save Time
- Plugged into Technology
- More secure less cheating

DISADVANTAGES

- The system must be given proper inputs otherwise system can produce wrong results.
- Challenge Of Technology
- Infrastructure Problem

FUTURE SCOPE

The system would be beneficial for the Universities , schools and colleges for the academic purpose by providing ease to faculties and the examination evaluation cell. Many Educational Institutes conduct their examinations Online.

Our Solution can still be improved. This emerges from the nature of problems we were solving. For most of them , there is a wide range of various cases and each requires a slightly different approach.

We can add more rules into SET grammer , to detect rarer type of Questions and answers. These system calculate the score and provides result instantly.

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Automatic Drip Irrigation System Using Microcontroller & Electrical Devices

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Abstract— The implementation of an automated irrigation system project aims to develop a system that can efficiently and effectively water plants or crops using sensors and automation technology. The system will utilize a microcontroller, water pump, moisture sensor, and other components to monitor the moisture levels in the soil and water the plants when necessary. This project aims to improve crop yield and conserve water resources by automating irrigation processes. The system will be tested in a small-scale setting, and the results will be analyzed to determine the feasibility of implementing it on a larger scale. Overall, this project has the potential to revolutionize the way agriculture is conducted, making it more efficient, effective, and sustainable.

(Keywords—Drip Irrigation, Automated, Agriculture, Irrigation System)

I. INTRODUCTION

This project aims are designed for monitoring moisture level in soil and to control it using drip irrigation. The continuous increasing demand of food requires the rapid improvement in food production technology. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources. The main reason is the lack of rains & scarcity of land reservoir water. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes to waste. This problem can be rectified if we use microcontroller based automated irrigation system in which the irrigation will take place only when there will be acute requirement of water. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. The automation of whole system is done by microcontroller this unit consist of soil moisture, current sensor, relay unit, ac motor and LCD to display the moisture level. The design of

this system is very much sensitive and should be handled with utmost care because the microcontroller is a 5 volts' device and it is employed to monitor the house hold power consumption per day where it should be interfaced with a 240 volts' energy meter. So every small parameter should be given high importance while designing the interfacing circuit between the controller and the water pump. The Microcontroller gets input from the soil-moisture sensor regarding the moisture content in the field. The Microcontroller automatically switches ON the water pump with sprinkler, if the moisture content is low. Also, it automatically switches OFF the water pump if the moisture content has reached the required level. The major advantage of this device is, it can be operated by the illiterates and the status of the motor can also be known by a simple LED indication more over the device is very economical and can be brought available to the common man.

II. METHODOLOGY

In this chapter the block diagram of the project and design aspect of independent modules are considered. Block diagram is shown in Fig. 1.

The main blocks of this project are:

- Micro controller (16F877A)
- AC Motor
- Crystal oscillator
- Regulated power supply (RPS)
- LED indicator.
- Current sensor module.
- Relay
- LCD.
- Soil moisture sensor

Auto Drip Irrigation System by using microcontroller and electrical circuit

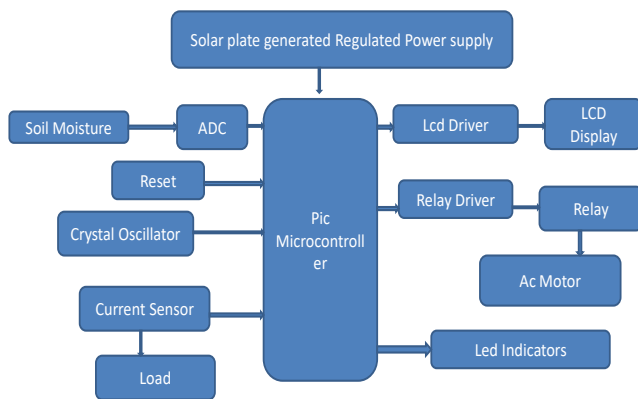


Fig. 1. Block diagram of Auto Drip Irrigation System by using microcontroller and electrical circuit.

A. Microcontroller:



Fig. 2. Microcontrollers

Circumstances that we find ourselves in today in the field of microcontrollers had their beginnings in the development of technology of integrated circuits. This development has made it possible to store hundreds of thousands of transistors into one chip. That was a prerequisite for production of microprocessors, and the first computers were made by adding external peripherals such as memory, input-output lines, timers and other. Further increasing of the volume of the package resulted in creation of integrated circuits. These integrated circuits contained both processor and peripherals. That is how the first chip containing a microcomputer, or what would later be known as a microcontroller came about. Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical.

B. PIC Microcontrollers:

PIC stands for Peripheral Interface Controller given by Microchip Technology to identify its single-chip microcontrollers. These devices have been very successful in 8-bit microcontrollers. The main reason is that Microchip Technology has continuously upgraded the device architecture and added needed peripherals to the microcontroller to suit customers' requirements. The development tools such as assembler and simulator are freely available on the internet at www.microchip.com.

C. Low - end PIC Architectures:

Microchip PIC microcontrollers are available in various types. When PIC microcontroller MCU was first available from General Instruments in early 1980's, the microcontroller consisted of a simple processor executing 12-bit wide instructions with basic I/O functions. These devices are known as low-end architectures. They have limited program memory and are meant for applications requiring simple interface functions and small program & data memories. Some of the low-end device numbers are

12C5XX
16C5X
16C505

D. Mid-range PIC Architectures:

Mid-range PIC architectures are built by upgrading low-end architectures with more number of peripherals, more number of registers and more data/program memory. Some of the mid-range devices are

16C6X
16C7X
16F87X

Program memory type is indicated by an alphabet.

C = EPROM, F = Flash, RC = Mask ROM

Popularity of the PIC microcontrollers is due to the following factors.

- Speed: Harvard Architecture, RISC architecture, 1 instruction cycle = 4 clock cycles.
- Instruction set simplicity: The instruction set consists of just 35 instructions (as opposed to 111 instructions for 8051).
- Power-on-reset and brown-out reset. Brown-out-reset means when the power supply goes below a specified voltage (say 4V), it causes PIC to reset; hence malfunction is avoided. A watch dog timer (user programmable) resets the processor if the software/program ever malfunctions and deviates from its normal operation.
- PIC microcontroller has four optional clock sources.
 - Low power crystal
 - Mid-range crystal
 - High range crystal
 - RC oscillator (low cost).
- Programmable timers and on-chip ADC.
- Up to 12 independent interrupt sources.
- Powerful output pin control (25 mA (max.) current sourcing capability per pin.)
- EPROM/OTP/ROM/Flash memory option.
- I/O port expansion capability.

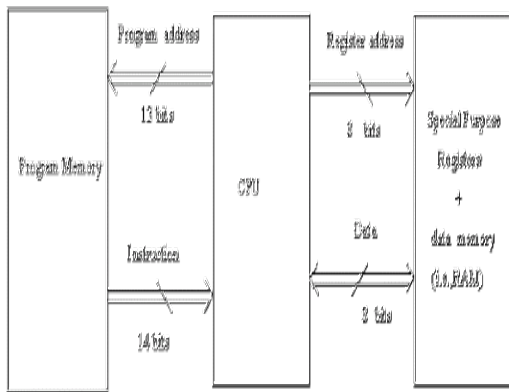


Fig. 3. PIC microcontroller

Basically, all PIC microcontrollers offer the following features:

- RISC instruction set with around 35 instructions _9 Digital I/O ports
- On-chip timer with 8-bit prescaler.
- Power-on reset
- Watchdog timer
- Power saving SLEEP mode
- Direct, indirect, and relative addressing modes
- External clock interface
- RAM data memory
- EPROM (or OTP) program memory

E. Peripheral features:

- High sink/source current 25mA
- Timer0: 8-bit timer/counter with 8-bit prescaler can be incremented during sleep via external crystal/clock
- Timer2: 8-bit timer/counter with 8-bit period register prescaler and post scalar.
- Capture, Compare, PWM (CCP) module
- Capture is 16-bit; max resolution is 12.5ns
- Compare is 16-bit, max resolution is 200 ns
- PWM max, resolution is 10-bit
- 8-bit 5 channel analog-to-digital converter
- Synchronous serial port (SSP) with SPI (Master/Slave) and (Slave)

Some devices offer the following additional features:

- Analogue input channels
- Analogue comparators
- Additional timer circuits
- EEPROM data memory
- Flash EEPROM program memory

- External and timer interrupts
- In-circuit programming
- Internal oscillator
- USART serial interface

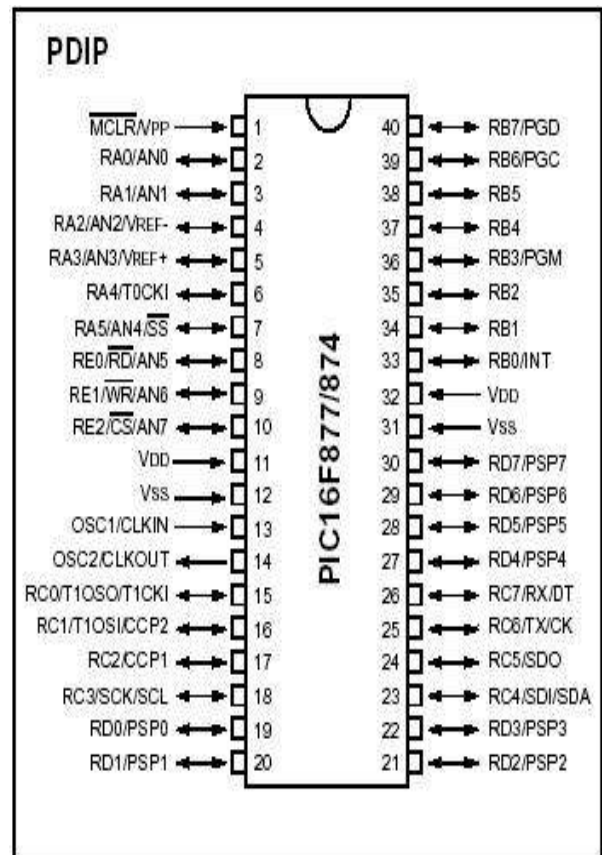


Fig. 4. PIC16F877/874

Pic16f877 is a 40 pin microcontroller. It has 5 ports port A, port B, port C, port D, port E. All the pins of the ports are for interfacing input output devices.

Port A: It consists of 6 pins from A0 to A5

Port B: It consists of 8 pins from B0 to B7

Port C: It consists of 8 pins from C0 to C7

Port D: It consists of 8 pins from D0 to D7

Port E: It consists of 3 pins from E0 to E2

The rest of the pins are mandatory pins these should not be used to connect input/output devices.

Pin 1 is MCLR (master clear pin) pin also referred as reset pin.

Pin 13, 14 are used for crystal oscillator to connect to generate a frequency of about 20MHz.

Pin 11, 12 and 31, 32 are used for voltage supply Vdd(+) and Vss(-)

F. PIC 16F877A Specification:

RAM	368 bytes
EEPROM	256 bytes
Flash Program Memory	8k words
Operating Frequency	DC to 20MHz
I/O port	Port A, B,C,D,E

G. PROJECT DESCRIPTION:

In this chapter, schematic diagram and interfacing of PIC16F877A microcontroller with each module is considered.

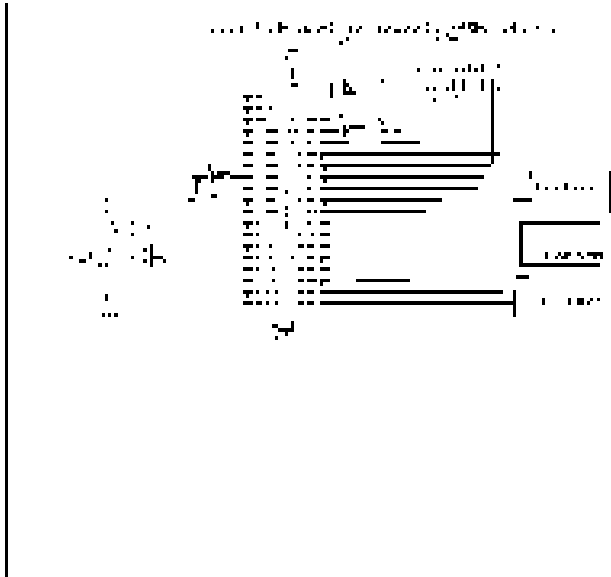


Fig. 5. Schematic diagram of transmitter section of Auto Drip Irrigation System by using microcontroller and electrical circuit.

The above schematic diagram Construction of Auto Drip Irrigation System by using microcontroller and electrical circuit explains the interfacing section of each component with micro controller and Current sensor module, Soil Moisture Relay Unit. Crystal oscillator connected to 13th and 14th pins of micro controller and regulated power supply is also connected to micro controller and LED's also connected to micro controller through resistors.

The detailed explanation of each module interfacing with microcontroller is as follows:

H. Applications:

1. Utilized for irrigation purpose.
2. For house hold automations.

III. RESULT AND DISCUSSION

The project "Auto Drip Irrigation System by using microcontroller and electrical circuit" was designed for monitoring moisture level in soil and to control it using drip irrigation. Automatic drip irrigation system has lots of advantages than general drip irrigation.

This system not just save the money, time, labor work but also increase the food production. It also reduces the soil erosion. Through wireless Sensor Network in Agriculture Drip Irrigation is highly important in the crop production everywhere in the world.

Indian economy is basically depending of the agriculture. In Agriculture used mostly available fresh water resource plant and used of fresh water resource will day-by-day increase because population growth increased and food demand is increased. Irrigation system is allowed to the scale up for large farm or open fields.



Fig. 5. Pictorial representation of the Automatic Drip-Irrigation System.

Drip irrigation is used in farms, commercial greenhouses, and residential gardeners. This is a system of irrigation which supplies water to the plant equivalent to its consumptive use. This is highly water use efficient system of irrigation having very less irrigation water requirement. Especially in arid region, drip irrigation is very benefitting technique of irrigation. In arid areas there are two basic constraints of surface irrigation. During the land level is the very costly venture and also with low water availability, getting production becomes a question. Drip irrigation system server both the purpose. It is equally effective in undulated land terrain. As the water is applied through drippers, the system naturally takes care of limited water availability. His system dependency of labor can be neglected. If this technique adopted in region like marathwada, it will ensure the minimum losses of water and creating a healthy atmosphere to achieve the sustainable development goal for nation.

VI.CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

ACKNOWLEDGMENT

It is our privilege to acknowledge the sense of gratitude to our guide Dr. B M Nayak from Electrical Engineering Department at Arvind Gavali College of Engineering, Satara for his valuable suggestions and guidance throughout our degree course and the timely help given for completion of our project work.

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Finally, we wish to express our sincere thanks to all the staff members of Arvind Gavali College of Engineering, Satara for their direct and indirect help during the course of our project.

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Automatic Engine Locking System Through Alcohol Detection with GSM & GPS

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Abstract- The main case behind this design is to describe the capricious motorists on road. Now a day's biggest reason behind adding the rate of accident are alcohol consumption of the motorist or the person who's driving the auto. This Alcohol Discovery design made for the safety of the people. This design can be installed inside the helmet or near the driving seat. This design presents the design and perpetration of an alcohol discovery with Engine Locking for buses using the Alcohol discovery detector which is MQ3 and Arduino Uno as the master control unit. The system will continuously cover position of alcohol attention in alcohol discovery detector and therefore turn off the machine of vehicle if the position of alcohol attention is above standard position. The model will also shoot the communication of whereabouts about the vehicle through SIM900A. The design provides effective result over a road accident.

INTRODUCTION

The current situation shows that a lot of the road accidents happen due to Alcohol Consumption of motorist or Driving Person. The motorists who drink alcohol aren't in a stable condition and so, dangerous driving occurs on track which can be perilous to the lives of the people on road, the motorist inclusive. The laws in India are presently proscribing motorists to drink and drive so that the forfeiture can stop them to drink and drive. Whatsoever, effective observation of inebriated motorists could be a challenge and road safety officers, the explanation for this stems from the natural incapability of populace to be present also as state among identical house and time. This confined capability of enforcement agents undermines each homemade trouble geared toward edge drink-driving.

There's thus the need for an alcohol discovery system that can serve without the restriction of space and time. Though the report declared speed violation is the foremost reason for these accidents, it'll safely be inferred that nearly all of the cases are because of motorists unstable condition caused by motorists getting drunk before they drive. The disquisition done by the Planet Health Organization in 2008 shows that concerning 50- 60 of business accidents square measure associated with drink-driving. also, WHO information on road business deaths bared million business deaths were recorded encyclopedically in 2013 with the low- and middle- income countries having advanced casualty rates per a 100K population (24.1 and 18.4 independently), information collected showed that several of profitable vehicles motorists in Bharat admitted to drinking alcohol throughout

operating days. This shows that nearly all motorists, particularly business and serious duty exchanges motorists interact in drink-driving, which may affect in accident. Bharat sets a legal limit of 30mg/ 100mL blood alcohol attention (BAC), any position advanced than that is same to be ineligible. The BAC depicts the quantum of alcohol in an exceedingly sure volume of blood. For BAC position from 0.4 to 0.6, motorists feel dazed/ confused or else disoriented, and it's generally not safe for a motorist to drive a vehicle beneath similar condition. Also, BAC position for 0.7 to 0.8 makes a motorists internal, physical and sensitive functions to be oppressively bloodied. At this stage, a motorist is inactive and unable of driving. BAC position of 0.2 to 0.3 continues to be not safe still the motive force still. So, there's need of similar system which can reduce the number of road accidents caused due to drunk driving. **LITERATURE check** The pen has put forward a fashion which utilizes GPS and GSM to ascertain alcohol but this fashion is veritably precious, but the charges can be cut off to a great extent. In this design a temptress is being used which is largely provident, and can keep people in close propinquity watchful. (1) Wearing smart helmet to help any mishap is suggested by pen which have certain scarcities. originally restrictions on the use of helmets to only 2 wheelers. Secondly, microcontrollers are software grounded mega system in comparison to the provident temptress that are open source tackle. (2) Composite health monitoring and detectors grounded on infrared are employed to ascertain alcohol as talked about by pen but the chance of false alarm can not be avoided in this system, because nanosecond change in some situations can affect in false alarm but in our design use of needed technology makes it more authentic. (3) To help the mishap of capricious driving pen have used PIC16F877A microcontroller which is an outdated system and precious bone

also which restrains its use to only certain class of society whereas we're using Arduino and Uno microcontroller which is advanced as well as provident. (4) fussing about the capricious driving the pen suggests the system to overcome the issue but using MQ2 alcohol detector has come dear. MQ2 alcohol detector isn't authentic and raises the chance of false alarm while we've used MQ3 which is largely authentic. (5) To manage with helmet negligence and alcohol discovery contemporaneous the pen proposed a system which is veritably complicated and use of P89V57RD2 microcontroller makes it largely precious also this system can only be equipped with 2 wheelers whereas Arduino uno microcontroller is provident as well as can be equipped with any class of vehicle making it more authentic and successful. (6).

PROPOSED WORK

MQ3 detector provides affair on the base of the attention of the alcohol, If the alcohol attention is advanced the conductivity of MQ3 detector increases which in turn gives the reading to Arduino. still, Arduino will stop the dc motor The red LED will also blink if the distance is lower than the safe distance to give suggestions to other vehicle that the vehicle in front of them is unsafe, If the reading is lesser than the threshold position. Now, with the help of SIM900 the communication will be transferred to the particular vehicle is unsafe and can be a trouble to other will be transferred to the civil forces that the particular vehicle is unsafe and can be a trouble to other people.



Figure 1 : Block Diagram

Component Details

- 1) Arduino UNO board – It's an open source electronic platform grounded on easy to use tackle and software. It's used for transferring, entering and recycling the signal.
- 2) MQ3 Alcohol Detector – The Analog Gas Sensor- Mq3 Is Suitable for Alcohol Detecting the Sensor Can be used as a Breath Analyzer. It Has A High perceptivity To Alcohol & Small Sensitivity To Benzene.
- 3)TV Display – TV(LIQUID CRYSTAL DISPLAY) screen is an electronic display module & finds a wide range of operations a 16 * 2 TV display is veritably introductory module & is veritably generally used in colorful bias & circuits. These modules are preferred over seven parts & other multi member LEDs. The Reasons being LCDs are provident, fluently program & have no limitation of displaying special & indeed custom-made characters(unlike in seven parts). In this the TV display is used to show the consumption of alcohol or not that the detector has tasted
- 4) DC Motor- DC or direct current motor works on the star, when a current carrying captain is placed in a glamorous field; it experiences a necklace and has a tendency to move. This is known as motoring action. However, the direction of gyration also reverses, If the direction of current in the line is reversed. When glamorous field and electric field interact they produce a mechanical force, and grounded on that the working principle of DC motor is established. In our design DC motor is using as machine starter which would be connected to coil of the machine. The speed of a dc motor is directly commensurable to the force voltage, so if we reduce the force voltage, the motor will at half speed. The speed regulator work by varying the average voltage transferred to the motor. This voltage is depending

upon the alcohol detector(mq3). That means when the alcohol detector tasted the alcohol chance lower than 40, the motor will run. But if the detector tasted the alcohol chance above 40, The motor stops.

5) Jumper Cables- A muumuu line(also known as muumuu, muumuu line, muumuu string, DuPont line, or DuPont string named for one manufacturer of them) is an electrical line or group of them in a string with a connector or leg at each end(or occasionally without them simply" tinned"), which is typically used to connect the factors.

6) GSM Module with SIM 900A- GSM/ GPRS Modem- RS232 is erected with Binary Band GSM/ GPRS machine- SIM900A, works on frequentness 900/ 1800 MHz. The baud rate is configurable from 9600- 115200 through AT command. It's suitable for SMS, Voice as well as DATA transfer operation in M2M interface. The onboard Regulated Power force allows you to connect wide range limited power force.

7) GPS MODULE- GPS bias may give installations similar as Charts, including thoroughfares charts, displayed in mortal- readable format via textbook or in graphical format turn by turn navigation directions to a mortal in charge of a vehicle or vessel via textbook or speech, direction fed directly to an independent vehicle similar as a robotic inquiry. Grounded on the type of computer and available connectors, connections can be made through periodical, USB string or Bluetooth, Compact Flash, SD, PCMCIA, and the newer runner card. GPS module is perfect for operations involving navigation, tracking or surveying.

8) Potentiometer: The measuring instrument called a potentiometer is basically a voltage separator used for measuring electric eventuality(voltage); the element is an perpetration of the same principle' hence its name. Potentiometers are generally used to control electrical bias similar as volume controls on audio outfit. Potentiometers operated by a medium can be used as position transducers.

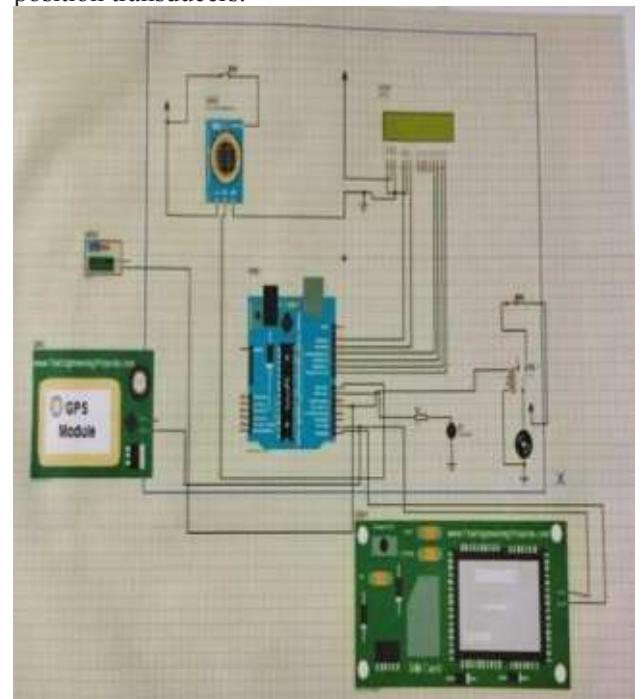


Fig 2.Circuit Diagram

Component Details:

Sr.no	Component Name	Specification
1.	Arduino Uno	Microcontroller: ATmega328P Operating Voltage: 5V Input Voltage(recommended): 7-12V Input Voltage (limit): 6-20V Clock Speed: 16 MHz I/P-O/P pins 14
2.	MQ-3 Sensor	The sensor can operate at temperatures from -10 to 50°C and consumes less than 150 mA at 5 V.
3.	LCD 16*2	Operating current: 1mA Custom characters support Work in both 8-bit and 4-bit module
4.	Dc Motor	Frame sizes from 8 to 35 mm. Speeds from 5,000 to 14,000 rpm. Continuous motor torque - 0.36 to 160mNm.
5.	GSM Module with SIM 900A	Dual- Band 900/ 1800MHz. GPRS multi-slot class 10/8. GPRS mobile station class B.
6.	GPS Modem	Supply Voltage- 3.3V Dimensions Frequency L1, 1575.42MHz, C/A Code - 1.023MHz.
7.	Potentiometer	Value: 0- 10K. Resistance Tolerance:- $\pm 10\%$ Rotation angel:- $210 \pm 20^\circ$ Rotational Life Cycle: 200 cycles. Temperature Range : - 55 to +125 °C.

Application:

It provides an Automatic safety system for cars and other vehicle as well. This can also be used in various companies, mines to detect alcohol consumption of employees. Provide security of roads, national highways, state highways etc.

Result:

Peoples are aware of situation by the help of "LCD screen" present in the vehicles and hence take required action. All equipments are totally tested and connected as required thereby giving us the much needed results.

Future Scope:

We can interface Bluetooth in the system so that kit, we will use in Helmet also. We can insert Intelligent Alcohol Detection System in Bikes also.



Fig: Actual Set-Up

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IOT BASED “INTERNET OPRATE ROBOT CONTROL SYSTEM”

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ABSTRACT-- Internet of Things allow massive number of uniquely addressable “things” to communicate with each other and transfer data over existing internet or compatible network protocols. This paper proposes a new concept which tackles the issues for supporting control and monitoring activities at deployment sites and industrial automations, where intelligent things can monitor peripheral events, induce sensor data acquired from a variety of sources, use ad hoc, local, and distributed “machine intelligence” to determine appropriate course of actions, and then act to control or disseminate static or dynamic position aware robotic things in the physical world through a seamless manner by providing a means for utilizing them as Internet of robotic things (Although progressive advancements can be seen in multi-robotic systems, robots are constantly getting enriched by easier developmental functionalities, such vertical robotic service centric silos are not enough for continuously and seamlessly supporting for which they are meant. In this paper, a novel concept— is presented that highlights architectural principles, vital characteristics, as well as research challenges. The aim of this paper is to provide a better understanding of the architectural assimilation and identify important research directions on this term.

INTRODUCTION

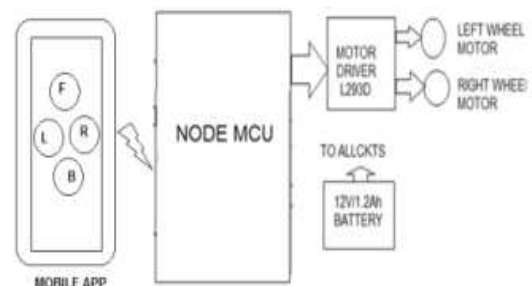
Robotic system has brought tremendous changes in various socio-economical aspects of human society during the past decades [1]. Per industrial robot have been widely deployed and used in all sorts of industries to perform repetitive, tedious, critical, and/or dangerous tasks, such as product assembly, car painting, box packaging, and shield welding. These prep robots have always been very successful at their accomplishments in several structured industrial applications due to their high accuracy, precision, endurance, and speed. Robotic t have been integrated with existing network technologies to extend the range of functional values of these robots when deployed in unstructured environments while fostering the emergence of networked robotics during 90’s [2]. IEEE Society of Robotics and Automation’s Tech Committee on Networked Robots

MOTIVATION WORK

This section presents a general overview of Internet of Robotic Things. First, concept behind Internet of Things is presented. Later, Cloud Robotics is merged with IoT as Internet of Robotic Things including its novel definition. A. DEFINITIONS The main idea behind the Internet of Things or IoT is not a new one. The idea of IoT was conceived by Mark Weiser in his Scientific American article on ubiquitous computing called “The Computer for the 21st Century”. Later, in the year of 1999, Internet of Things term was coined by Kevin Ashton, the then executive director of the Auto-ID Center. As per Giusto et al., IoT combines people, process, device and technology with sensors and actuators. This overall integration of IoT with

human being in respect to communications, collaboration and technical analytics enables to pursue realtime decision. The concept behind this idea is the ubiquitous presence around human being and its socio-economical culture with a variety of smart objects enabled by radio tags, sensors, actuators, smart devices which are disseminated through unique addressing schemes, secure communication channels and standardized architectural frameworks that perform interaction and bridges the cooperation with their neighbors to reach specific goals [7]. Smith [8] describes IoT as a dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual “things” have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network; often communicate data associate with users and their environments.

BLOCK DIAGRAM



RESERCH METHODOLOGY

This paper may not be concluded without answering important question: are existing technologies mature to let Internet of Robotic Things born?

While answering this question, let us first present the core characteristics (see Section IV.A) of IORT arch processing units (see Section IV.C), and cloud robotics platforms (see Section IV.D) in what follows a use adopted to manage enhanced services in day-to-day human

RESULT AND DISSCUSSION

The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical system, which also encompasses technologies such as smart grids, virtual power plants, smart homes and smart cities. Each thing is uniquely identified through its embedded computing system but is able to interoperate within the existing internet infrastructure

CONCLUSION

Although this research is still in an early stage of development, it has already proven to succeed in several of its goals. The operating system of smart phone is android which can develop effective remote control program. It has proven to allow for meaningful two-way communication between the Android phone and the robot which would allow a non-expert to interact with and adjust the functionality of a system which uses ESP12E controller, a single board micro-controller application of interactive objects or environments more accessible intended to make the

FUTURE SCOPE

Robotics is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback and information processing. A Robotic System is a type of mechanical system, usually programmable, The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The internet of things (IoT) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity that enable these objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and result in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the

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Solar Operated Mobile Pesticide and Fertilizer Sprayer

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Abstract—Spraying of pesticides is an important task in agriculture for protecting the crops from insects. Farmers presently using hand operated or fuel operated knapsack sprayers for this task. This paper discussed about different types of solar sprayers developed by several researchers with an aim to reduce human drudgery while spraying in field and as part of pollution free and environment friendly green energy. Some advantages and drawbacks of solar sprayers have been identified, discussed and future need of research in line of development of green technologies have been presented in this paper. Comprehensive solution towards solving future energy needs of agriculture is attempted in this study. Spraying is not a continuous operation round the year. So, the same PV system available in solar sprayers can be utilized for energizing other farm operations such as pumping, farm lighting etc. One of the factors which affect the use of conventional electricity or fuel is increasing prices and its non-availability at peak time in rural area. The available solar sprayers used by the farmers are having low field coverage capacities, creating health hazards due to direct inhaling of spray drift and thus, polluting the environment with engine operated sprayers. Therefore, the emphasis should be given on design and developing independent renewable power source which can give uninterrupted energy and fulfill energy demand of remotely located farmers for operating various farm equipment.

Keywords—Solar energy, solar panel, solar powered pesticide sprayer, Pesticide Sprayer

I. INTRODUCTION

In agriculture, considerable amount of energy is used to perform different field activities e.g. ploughing, irrigation, intercultural operations, spraying of agricultural chemicals, harvesting and post-harvest processing etc. Energy security of a country is very important and efforts are being made for utilization of renewable energy sources mainly solar energy, as the fossil fuel based energy is depleting at a very fast rate. Spraying of pesticides is an important task in agriculture for protecting the crops from insects. Approximately, 18- 25 % of the crop production is damaged if pest and diseases are not controlled at right time. Uniform spraying of liquid formulations throughout the crop field is very important for effective control of pest and diseases. Using sprayer, liquid pesticide formulations are generally broken down to minute droplets of effective size for uniform distribution over a large surface area. Dose of agricultural chemicals also plays a critical role since under dose may not give the desired coverage whereas overdose is expensive and may contaminate the food chain through residues. Farmers mainly use hand operated or fuel operated knapsack sprayers for this task. Sprayer is a machine to apply herbicides, fungicides, and insecticides in the form of droplets. Among the others lever operated knapsack sprayer, power sprayer and manually operated sprayers are commonly used by small to medium farmers. These conventional sprayer causes user fatigue due to excessive bulky and heavy construction. The traditional knapsack sprayer causes user tiredness due to continuous operation of lever and movement in the field with heavy load on its back. [1][3][5]

Considering the above requirements, this paper discussed about different types of solar sprayers developed by several researchers with an aim to reduce human drudgery while spraying in field

carrying conventional sprayer on user's back, few researchers have also designed and developed vehicle for carrying the sprayer.[7][8]

The design of solar PV sprayer and developments in solar powered agricultural sprayers is discussed and reviewed in detail under this study.

II.METHODOLOGY

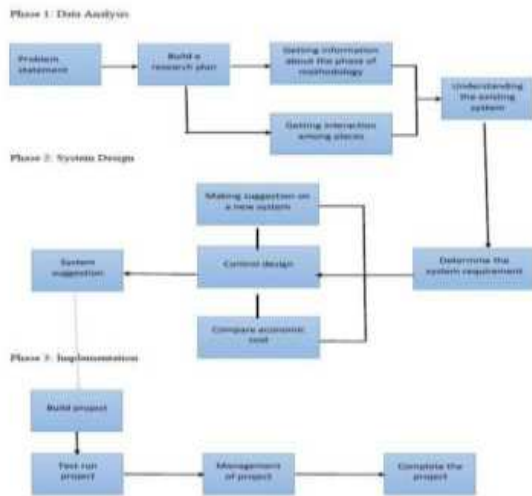


Fig. 1. Layout diagram of solar sprayer

III. LAYOUT AND WORKING PRINCIPLE OF SOLAR SPRAYING SYSTEM

Fig.1 Block diagram of spraying system

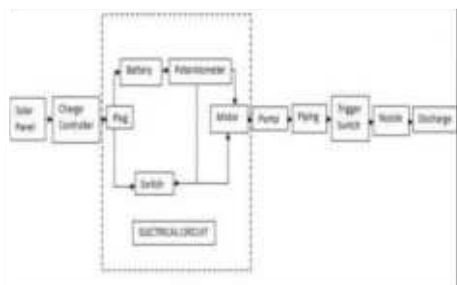


Fig. 2. Block diagram of solar sprayer

The solar powered agricultural sprayer has following components:

Tank

Solar power unit

- i. Solar panel
- ii. Charge controller
- iii. Battery DC motor/pump Spraying unit
- iv. Spray boom
- v. High pressure spray pipe
- vi. Nozzles

The selection of the components can be done as per requirement. Tank is used to store the pesticide/insecticide chemical solution. It supplies chemical solution to nozzles on boom through dc motor/pump and pressure pipe.[7]

The solar power unit is energy conversion unit. Solar energy obtained from sun is converted into electrical energy using solar panel by photovoltaic effect. The output of the energy conversion is given to charge a deepcycle lead acid battery through a charge controller.

The charge controller limits the rate at which electric current is added to the battery. Thereby, preventing overcharging and protecting against over voltage. It employs the Pulse Width Modulation (PWM) technique which gradually stops charging the battery, when it exceeds a set high voltage level and gradually re-enables the charging, when the battery voltage drops back below the safe level.

The main advantage of PWM is that the power loss in the switching device is very low. The output from the charge controller is given to the battery by a three pin socket through an electrical network. This circuit is designed to control the RPM of the motor by controlling the amount of resistance between the motor and the battery while simultaneously providing a charging supply for the battery. DC motor/pump lifts the pesticide from tank and delivers to nozzles with desired high pressure. Energy is supplied

To DC motor/pump by the solar power unit for its running/operation. Nozzles on the boom atomize the spray liquid into fine droplets and sprayed on the crop canopy. The droplet size and spray pattern depends on pressure and type of nozzle used as per requirement. [1][6]

IV. DIFFERENT DESIGNS OF SOLAR SPRAYER

Joshua et al., (2010) modified existing power sprayer on fossil fuel into solar sprayer (Fig. 2). To overcome the difficulties in the existing model and to reduce the operating cost of the power sprayer, a modified solar sprayer model was designed and introduced for effective operation without fossil fuel. In this modified model, the two stroke petrol engine was replaced by a single motor. This was operated by the electrical energy stored in the 12V battery attached in the unit. The 12V battery can be recharged by the solar panels. Comparison between existing power sprayer and developed solar sprayer is shown in Table 1.

This study concluded that, the developed solar sprayer is environment friendly, cost effective, maintenance free and fuel cost was nil.[2]

Patil et al., (2014) evaluated solar operated knapsack sprayer developed using 37 watt solar panel facilitate to operate it on both modes independently i.e. on battery mode and on directly solar panel mode (Fig. 3). Overall model design provides weight of panel as well as weight of sprayer on operator shoulder, which facilitate effortless operation. Sprayer can run 2.5 hours more after 5 hours of operation in full solar intensity. Sprayer is capable of spraying the liquid 360 liter/ha in 4.00 h at a walking speed of 0.7 m/s. Discharge rate of sprayer was 0.0267 liter/sec.[3]

Swami et al., (2016) designed and developed a solar PV based sprayer which can be moved in the field with the

help of manually drawn vehicle. The developed solar PV sprayer operates both on direct mode and indirect mode. In the direct mode, the sprayer was operated by using electricity generated by 100 Wp polycrystalline PV module mounted on the sprayer and in the indirect mode it was operated on battery mode using stored electric energy in a deep cycle battery (12 V, 32 Ah). In both modes, a DC motor pump of 60 W was used to generate the required operating pressure to spray the liquid pesticide formulations. The brass nozzle, which requires an operating pressure of about 1.5-2 kg /cm² to provide a discharge of 900 ml/ min was used in the study. The capacity of the liquid tank 50 liters for an uninterrupted operation for 2 hours with two nozzles.

Performance of the developed solar PV sprayer on manually drawn vehicle has been tested in field and found satisfactory to spray pesticide in different arid crops and the sprayer can be best operated during 9:00 AM to 3:00 PM for Jodhpur station (Fig. 4). Although, initial cost (Rs. 24,650) of the proposed system is little more as compared to conventional sprayer but the running cost is very less. Further, the system is eco-friendly.[4]

Yallappa et al., (2016) developed and evaluated solar powered sprayer consisting of 20 W solar panel, 12V DC battery charged by solar energy received by the solar panel, a DC motor operated by the battery, a pump to spray pesticide and a tank to

hold the pesticide (Fig. 5). The entire unit is portable and operated by one labour. The discharge rate of the sprayer during laboratory and field conditions were measured, the average discharge rate was about 0.023 l/s.[5]

V. ADVANTAGES AND DRAWBACKS OF EXISTING SOLAR SPRAYING TECHNIQUES

Based upon the reviews made in the paper, some advantages and drawbacks of solar sprayers have been identified and discussed. It is observed that, in the manual backpack spraying, the labor has to carry all the weight of the pesticides filled tank which causes fatigue to labor and hence reduces the human capacity. Proper pressure is not maintained, which affects the droplet size and distribution uniformity. Operator is exposed to harmful pesticide spray drift during spraying and operator's safety is at risk. The existing power knapsack sprayers were converted into solar sprayers by replacing fuel engines with DC motor. The back pain due to vibration was observed during the operation. Operator's safety is also a question mark, as he is always exposed to harmful pesticide spray drift during spraying. Elimination of harmful exhaust gases may lead to clean environment.

Pushing activity involved in trolley based solar sprayers

A. REFERENCE TYPE OF SPRAYER RESEARCH FINDING

Joshua et al.(2010) Modified solar sprayer Developed a power sprayer with two stroke petrol engine. Since the operating cost was found high they suggested a solar operated sprayer

Patil al.(2014) knapsack sprayer knapsack sprayer Solar operated Evaluated solar operated knapsack sprayer and was capable of spraying the liquid 360 liter/ha in 4.00 h at a walking speed of 0.7 m/s Discharge rate of sprayer is 0.0267 liter/sec

creates fatigue among the operators. These sprayers also have less field capacity and operators are exposed to chemical as he walks behind the spray pattern.[2][3][4][5]

Fig.2 Modified solar sprayer

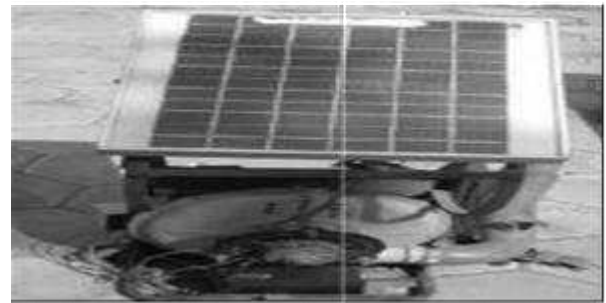


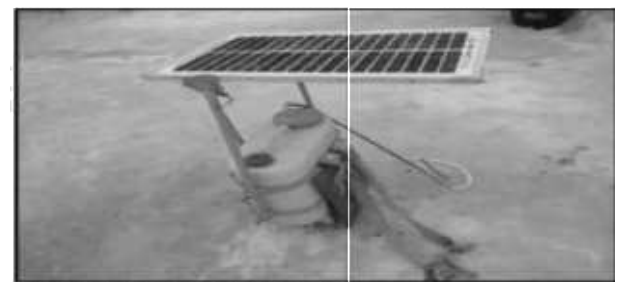
Fig.3 Solar operated knapsack sprayer



Fig.4 Field evaluation of trolley based solar sprayer



Fig.5 Portable solar powered sprayer



Swami et al.(2016) Trolley based solar sprayer Performance of the developed solar PV sprayer on manually drawn vehicle has been tested in field and found satisfactory to spray pesticide in different arid crops and the sprayer can be best operated during 9:00 AM to 3:00 PM for Jodhpur station.

Yallappa et al. (2016) Portable solar powered sprayer The theoretical field capacity and effective field capacity of the sprayer was observed to be of 0.17 ha/h and 0.14 ha/h respectively at 2.8 km/h walking speed and 0.60 m swath width.

RESULT AND DISCUSSION

40w 12v Solar panel converts sun energy into electricity (DC). That generated electricity charges battery of 12v 8amp. At a well condition of atmosphere charging time of battery is 2.8 hrs but in cloudy weather charging time is 5.9 hrs. For motor backup time is 2.66 hrs. While spraying liquid the 'ON' and 'OFF' of motor is controlled with switch. Thus motor sucks liquid and deliver it through delivery pipe towards nozzle.



Fig. 6. Pictorial representation of Solar Sprayer

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A Review on Blue Eye Technology

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Abstract:

Blue Eyes technology aims to create computational machines with perceptual and sensory abilities like those of human beings. The machine can understand what the user wants, where he or she looking, and realizes his physical or emotional state. The information is then analyzed to determine the user's physical, emotional, or informational state which in turn can be used to make the user more productive by performing expected actions or by providing expected information. Blue Eye Technology technology is used to simplify life by providing user-friendly facilities. It also helps in reducing the gap between the computer and humans.

Keywords: Blue Eye Technology, Emotion Mouse, PONG: A Robot by IBM, Expressions Glasses.

1. Introduction:

Imagine yourself in a world where humans interact with computers. You are sitting in front of your personal computer that can listen, talk, or even scream aloud. It can ability to gather information about you and interact with you through special techniques like facial recognition, speech recognition, etc. It can even understand your emotions at the touch of the mouse. It verifies your identity, feels your presents, and starts interacting with you. You ask the computer to dial your friend at his office. It realizes the urgency of the situation through the mouse, dials your friend at his office, and establishes a connection.

Human cognition depends primarily on perceiving, interpreting, and integrating audio-visuals and sensory information. Adding extraordinary perceptual abilities to computers would enable computers to work together with human beings as intimate partners. Researchers are attempting to add more capabilities to computers that will allow them to interact like humans, recognize human presents, talk, listen, or even guess their feelings.

The BLUE EYES technology aims at creating computational machines that have perceptual and sensory abilities like human beings. It uses a non-obtrusive sensing method, employing most modern video cameras and microphones to identify the user's action by the use of imparted sensory abilities. The machine can understand what a user wants, what he is looking at, and even realize his physical or emotional state.



Figure no. 1

All human beings have some perceptual capabilities, the ability to understand each other's emotional level or feelings from their facial expressions. Blue eyes technology aims at creating a computer that can the ability to understand the perceptual powers of human beings by recognizing their facial expressions and reacting accordingly to them.

All these perceptual capabilities are embedded in the gadgets using the Blue Eyes Technology. This shows how far science and technology can progress and develop. The Blue eyes technology identifies human emotions using image processing techniques by extracting the eye portion from the captured image and comparing it with the stored images in the database. This high-end technology facilitates the computers to talk, listen and feel our presence with various tools of artificial intelligence like face recognition, fingerprint, video calls, etc.

This technology is used to simplify life by providing user-friendly facilities. It also helps in reducing the gap between the computer and humans.

2. Literature Survey:

This paper [1] presents a technology that ensures a convenient way of simplifying life by providing more delicate and user-friendly facilities in computing devices. It seems to be fiction, but it will be the life led by "BLUE EYES" very soon. In Blue Eyes, the machines can identify minor variations in the moods of human beings. Say a person may strike the keyboard hastily or softly depending on his mood like happy or angry. The Blue Eyes technology enables the machines to identify these minor emotional variations of human beings even with a single touch on the mouse or keyboard and the machines started to react with the users according to these emotional levels. This is done with the guidance of intelligent devices like "The Temotionion Mouse" This Emotion Mouse is an input device to track the emotions of a user with a simple touch on it. The Emotion Mouse is designed to evaluate and identify the user's emotions such as fear, surprise, anger, sadness, happiness, disgust, etc. when he/she is interacting with a computer.

In this paper [2], technology reached enough that we are sitting in front of our personal computer that can sense and control human emotion known as "BLUE EYE TECHNOLOGY". In this technology gadgets are used which can sense the emotional level of the human body like facial and speech recognition etc. The technology which is used in Blue Eye Technology can understand our emotion with the mouse, it verifies our identity, feel our presents and start interacting with us. This paper is a discussion of new techniques known as the Emotion Sensory world of Blue Eye Technology which identifies human emotion (sad, happy, surprised) using image processing techniques.

In this paper [3] Emotions and facial expressions play an important role in communication in social Interaction with other human beings which delivers rich information about their mood. It uses a nonobtrusive sensing method, employing most modern video cameras and microphones to identify the users' actions through the use of imparted sensory abilities. The machine can understand what a user wants, and where he is looking, and even realize his physical or emotional state. In the name of BLUE EYES Blue in this term stands for blue tooth (which enables wireless communication) and eyes because eye movement enables us to obtain a lot of interesting information.

In this [4] technology gadgets are used which can sense the emotional level of the human body like facial and speech recognition. Visualize a world where humans interact with computers. It sounds to be a hallucination, but it is possible by "BLUE EYES TECHNOLOGY" in the immediate future. The main reason for making Blue Eyes technology successful is to make computers observe and records the user's conscious brain and their physiological condition. This technology can understand our emotions at the touch of sensing gadgets; it authenticates one's identity, feels one's presence, starts interacting with them, and extracts key information.

3. CASE STUDY

3.1 In Military Services:

There are many applications of blue eye technology one such is the military operation voice control of weapons is an example of reliable speech recognition equipment Pilots can view commands and information to the computer by simply speaking into their microphones.



Figure no. 2

They do not have to use their hands for this purpose voice recognition could also be used on computers for making Airline and hotel reservations a user needs just to state his obligations to make a reservation, cancel a reservation or make inquiries about the schedule. This technology helps to observe the physical condition of operators in several industries. There many toxic substances are produced. So if any harm is caused these operators can automatically generate a signal therefore preventing catastrophe. it can be helpful to all the people who are driving when a sensor is attached to the steering wheel it can assess the emotional stability of a driver and can guide him in traffic conditions on whether to stop and take a break or continue driving.

3.2 POD: Technology used in cars, by TOYOTA

There are some devices in which the **blue eyes technology** is enabled uh the first blue-eye-enabled mass production device was a pod it is a car manufactured by Toyota. It could keep the driver alert and active it could tell the driver to go slow if he is driving too fast.



Figure No. 3

3.3 PONG: A Robot by IBM

The next device installed with blue eyes technology is Pong a robot. IBM has released a robot called a PONG which is equipped with eye-blue technology. Pong is capable of perceiving the person standing in front of it. It could smile when the person calls his name and expresses loneliness when it loses sight of the person.

My company yearly organizes a Ping-Pong tournament to test the skills of its employees. The challenge is great, the atmosphere is exciting and the prizes are rewarding. However, I have taken part in the tournament for the past many years and I never succeeded in passing the first knock-out stage. My Chinese colleagues are simply too good for me to match. Out of frustration, I decided to cheat and build a robot that could compete with me. After all, the rules of the tournament do not specify (yet) that players have to be human. My vision was clear: I wanted to build a robot to win the cup, but I also wanted to show that machines can eventually play as well as, or maybe even better than people.



Figure no. 4

3.4 Surveillance systems:

Large retailers have implemented surveillance systems that record and interpret customer movements, using Blue Eye software.



Figure no. 5

Blue Eye software makes sense of what the cameras see to answer key questions for retailers, including, How many shoppers ignored a promotion? How many stopped? How long did they stay? Did their faces register boredom or delight? How many reached for the item and put it in their shopping carts? Blue Eye works by tracking pupil, eyebrow, and mouth movement. When monitoring pupils, the system uses a camera and two infrared light sources placed inside the product display.

One light source is aligned with the camera's focus; the other is slightly off-axis. When the eye looks into the camera-aligned light, the pupil appears bright to the sensor, and the software registers the customer's attention.

This is the way it captures the person's income and buying preferences. Blue Eye is actively been incorporated in some of the leading retail outlets.

4. CURRENT TREND

A. Facial Recognition

a) Face Recognition Software:

1. Ideal for collecting human emotions data from facial expressions.
2. The software analyses the expression happy, sad, angry, surprised, disgusted, and neutral.

B. Touch Recognition

a) Emotion Mouse:

1. An important element of incorporating emotion into computing is for productivity for computer users.
2. Track the emotions of a user just by touching on it.
3. Collect the user's physical and physiological information with just a mere touch.

C. Speech Recognition

a) Artificial Intelligence Speech Recognition:

1. It involves studying the thought processes of human beings and it deals with representing those processes via machines.
2. Natural language processing (NPL) refers to artificial Intelligence methods of communicating with a computer.
3. The input words are scanned and matched against internally stored known words.

D. Eye Tracking

a) Expression Glasses

1. A wearable device that allows any viewer to see a graphical view of the wearer's facial expression.

2. The image used for this glass uses electricity sensors.
3. Identify meaningful expressions such as confusion or interest using use pattern recognition.

b) Manual And Gaze Input Cascaded (MAGIC)

1. Computers could move the cursor in by direction of the user's eyes.
2. Improvement over the traditional eye gaze systems.
3. Reduce physical efforts and fatigue, with greater accuracy.

5. Conclusion

Human has tremendous expectations from human beings' future and present. This tends to innovate new helpful technologies which can make life more comfortable and reliable. This technology is one of them that can make so. The BLUE EYES technology ensures a convenient way of simplifying our life by providing more delicate and user-friendly facilities in computing devices. The whole approach is innovative since it helps supervise the operator, not the process, as it is in presently available solutions. We hope the system in its commercial release will help avoid potential threats resulting from human errors, such as weariness, oversight, tiredness, or temporal indisposition.

Instead of using cumbersome modules to gather information about the user, it will be better to use smaller and less intrusive units. The use of a miniature CMOS camera integrated into the eye movement sensor will enable the system to calculate the pointed gaze and observe what the operator is looking at. Introducing a voice recognition algorithm will facilitate communication between the operator and the central system and simplify the authorization process. Apart from considering instances of application mentioned in the report only, for example, the operators working in control rooms, our solution may well be applied to everyday life situations.

These new possibilities can cover areas such as industry, transportation, military command centers to even complex genetic and neurological research centers.

6. FUTURE SCOPE

In the future blue eyes technology helps us to detect our humor easily and can monitor our fitness with a single touch. We can also implement this technology with GPS, and it's used to detect our car traveling route. Technology also supports detecting people's conditions with reverence to meteorological conditions. We can also implement the technique in household electric devices, with the help of our vision. It will deeply reduce the space between humans and electronic appliances. We can use it in the army and security control. In the army, we can restrict the

terrorists by coming to the borders and with the help of biometrics found in the security camera to detect the person in remote spaces.

We can provide advanced development plans by using the technique, for this technology, the security camera should be connected with the detecting sensors. For security purposes for a house, we can restrict strangers from entering our private spaces. When the security camera finds a stranger (mismatch of biometrics) it will give a call to the police and gives an alarm sound to us.

While connecting the technique with a computer it provides us to work as a friend. It can be used in the medical field where it detects the patient's physiological mood and then gives counseling to them. Using eye movement, we can lock and unlock our details in devices that we use in real-time. It has limitless modules involved in this technology where we can find many interesting developments in our real life.

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Dynamic Load Enhancement in Multi-Machine Structures Employing UPFC

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Abstract— *The resilience of an integrated electric infrastructure is equated to routine or robust functioning following some type of disruption. Despite linked installations rising in scope and spanning broad territorial areas, maintaining controllability across diverse elements of power grid has become incredibly hard. One such research explores & compares the dynamic load threshold of a multi-machine power grid using a UPFC operating in transverse control mode.*

Keywords—FACTS, Transient Stability Limit, UPFC

I. INTRODUCTION

An integrated energy infrastructure is comprised of numerous indispensable aspects. They are the power modules, power grids, consumers, transformers, compensators, and, finally, Dc propagation lines. It can be certain disruptions during the functioning of machines, such as prolonged swings in the rate or intermittent fluctuations in the thrust provided to the engine. These disruptions may cause amplitude or spectrum fluctuations, which may have an impact on other elements of the linked electrical network. Stressors, such as thunder, can potentially disrupt the energy grid. All of these disruptions are referred to as "flaws." When a defect develops, the engine suffers dynamic stability if the inherent pattern of oscillations overlaps with activity rate of such turbines. With all these elements in perspective, comprises various would be the underlying need for a reliable electricity infrastructure. Aside from this requirement, additional essential criteria include stable consistency, dynamic response, aberrations & disruption, power quality & redox brownouts. Recent advancements in energy transistors, and hence in Flexible AC Transmission Systems (FACTS) innovation, allow for genuine management of electric grid aspects as well as better dynamic response. UPFC constitutes one of the most potent FACTS sensors because it is a mix of serial and flush converters connected by a shared DC connection and combines the capabilities of two FACTS gadgets, Static Synchronous Series Compensator (SSSC) and Static Compensator (STATCOM). UPFCs were observed during investigations to improve overall vibrant rebuttal of energy systems. Regarding computations, all of

the publications listed employ the Single Machine Infinite Bus (SMIB) battery architecture. According to data, quaternary wattage intravenous administration does have the greatest effect on improving transient stability. As previously stated, the impacts of UPFC on the predictive algorithm volatility enhancement of multi-machine energy supplies have received little emphasis. This work compares the resilience margin of multi-machine energy supplies employing UPFC.

II. MULTIPLE ENGINE RELIABILITY

The traditional paradigm of the electrical network, incorporating the rotating turbines illustrated in, is employed to investigate the infrastructure of the country. This is the most basic paradigm employed in the analysis of dynamical, and it demands the least quantity of variables to begin with. Furthermore, utilizing this paradigm, the assessment may be completed in a minimal period of space. For most electrical network, the duration is on the tune of one second, when the vibrant reactivity of the device is mostly determined by accumulated angular momentum with in spinning particles. This results in a multi-port formulation of a transmission system in which m is indeed smaller than n.

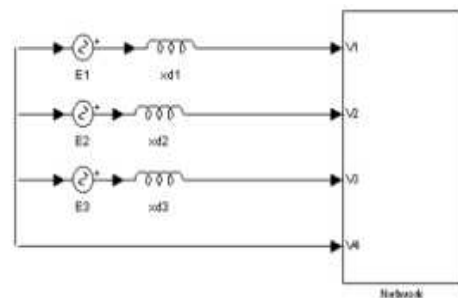


Fig. 1. Multiple Engine System

Contributions cannot be neglected in evaluating intermittent volatility due to related effects. As a result, the workloads are transformed into equal admittances between turbines and the substrate. If a voltages V_{Li} , real authority PL_i , power flow QL_i , and amperage IL are streaming into a demand susceptibility on the charge side,

$$Y_L = G_L + jB_L \quad \text{----- (1)}$$

$$P_L + jQ_L = V_L I_L^* = V_L^2 (G_L - jB_L) \quad \text{----- (2)}$$

$$Y_L^* = G_L - jB_L \quad \text{----- (3)}$$

Every turbine has a vibration input hidden underneath the transitory impedances of equal intensity. The interior value is computed using the system's transmission line analysis. The intrinsic orientation associated with this potential is derived as usual from post dc link: At a foreseeable being just use amplitude as the benchmark. The phrase connects V and I.

$$V I^* = P + jQ \quad \text{----- (4)}$$

$$I = \{(P + jQ) / V^*\}^* = (P - jQ) / V \quad \text{----- (5)}$$

However, a scientific formula that we may formulate is

$$E_i = V_i + jX_{di} I \quad \text{----- (6)}$$

$$E \angle \delta_i = V_i + jX_{di} \{ (P - jQ) / V \}^* = V_i + \frac{X_{di} Q}{V} + j \frac{X_{di} P}{V} \quad \text{----- (7)}$$

The pre-transient volt pitch was subsequently added to produce its initial generation pitch.

$$\delta_0 = \delta_i + \theta_i \quad \text{----- (8)}$$

To every entire service, the YBUS grid is created. Matching load admittances are linked between the power injection as well as the benchmark terminal.

$$[Y_{BUS}] = [Y_{BUS}] + \text{diag} [Y_L] \quad \text{----- (9)}$$

The transitory reactance of the producers can also be introduced to the YBUS to supplement it with the equivalent arrangement with a few changes at the transverse components.

$$[Y_{BUS}] = [Y_{BUS}] + \text{diag} [-jx_d] \quad \text{----- (10)}$$

Where $x_d = [x_{d1} \ x_{d2} \ x_{d3} \ \dots \ x_{dm} \ 0 \ 0 \ \dots \ n]$ where
m --- number of the machines n --- number of buses.

Eventually, all connections save the makers are removed, and the updated YBUS is produced. In addition, excluding its inside production vertices, all hubs have existing intrusion detection flow. The initial velocity injected into the channel is denoted by

$$I_{m \rightarrow j} = -\frac{E_m \angle \delta_{m0}}{X_{dj}} \text{ for } j = 1 \text{ to } m \quad \text{----- (11)}$$

$$I_{m \rightarrow j} = 0.0 \text{ for } j = m + 1 \text{ to } n \quad \text{----- (12)}$$

The board values at time $t = 0$ (fault incidence) may be determined using the aforementioned formulae.

$$[V_{BUS}] = [Y_{BUS}]^{-1} [I_{BUS}] \quad \text{----- (13)}$$

YBUS is different under malfunction and post-fault situations. As a result, by modifying the YBUS, the VBUS may be adjusted for a variety of operating situations. The overall energy released by each engine is determined using the aforementioned parameters as

$$P_{ei} = \{E_i V_i / X_{di}\} \sin(\delta_i - \theta_i) \quad \text{----- (14)}$$

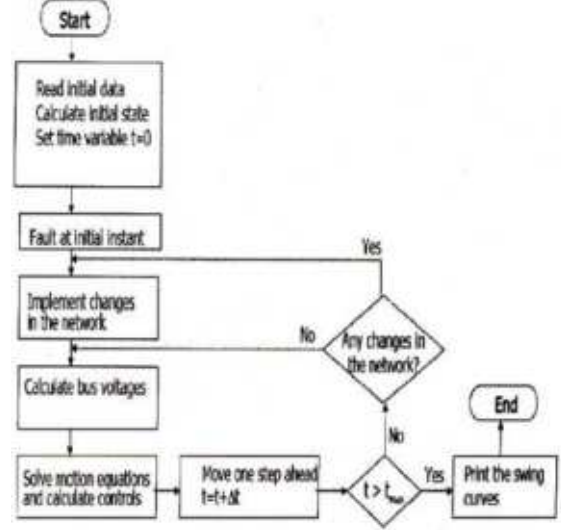


Fig. 2. Multiple Engine System

III. UNIFIED POWER FLOW CONTROLLER

The Unified Power Flow Controller (UPFC) is the most adaptable component of Flexibility Electrical Transmission Services (FACTS) group, which employs voltage regulators to govern energy flow across electricity utilities. The UPFC employs a shunted device (STATCOM) and a sequence operator (SSSC) that are linked via a shared DC bus. The Unified Power Flow Controller (UPFC) is a boost converter regulator that controls real and responsive modern flows in a network by injecting (changing) volt in serial and reactive energy in return.

Figure 3.1 depicts the Facts controllers model used in this work. It is made up of three components: a serial dc source that represents the UPFC serial arm, an I_q parallel current supply that represents the UPFC simultaneous responsive compensatory influence, and an I_p corresponding current source that represents the UPFC simultaneous dynamic current [5].

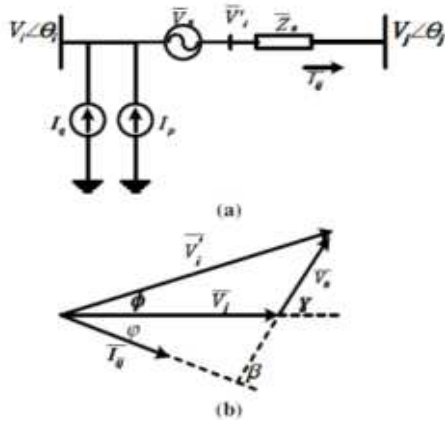


Fig. 3. UPFC exhibit

As previously stated, in order to ascertain transitory response, we must framework the UPFC with suitable pressures. The Facts controller's intravenous paradigm represents serial branches as demands that are dependent on associated system parameters. Figure 3.1 depicts such approach

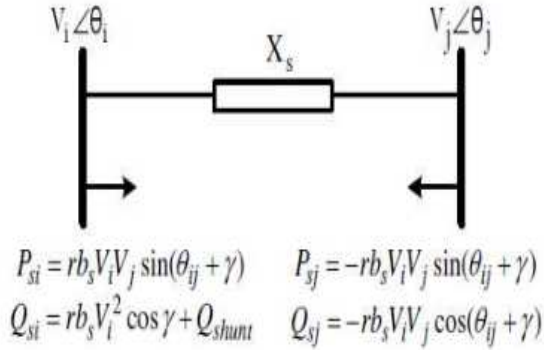


Fig. 4. UPFC's Intravenous Prototype

V_s represents the equivalent implanted controller parameters in this Paradigm, $V_s = V_i \cdot R$, X_s represents the serial characteristic impedance of series converter and I_s is inclination between serial infused potential and the sender extremity voltage profile

IV. SIMULATION RESULTS

For assess dynamic response, trials were conducted on the standard IEEE bus system. This was done to test the systems' robustness under different operative situations. These findings are based on a benchmarking tool known as the Transient Stability Index. This statistic is examined for various predetermined disruptions under diverse functioning settings and evaluated on the mainstream IEEE 30 connector infrastructure.

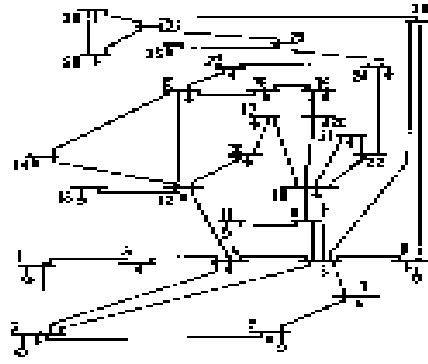


Fig. 5. IEEE 30 topological network

When a failure occurs on a bus or a network switch, numerous characteristics like as volts, energy of motion, enthalpy, blade spin orientation, and so on of the machineries linked to the relevant buses change. These variances are mostly crucial for the buses' instability and stability in the network. The following graphs depict these similarities in the characteristics of the equipment in the ordinary buses described above for the three-phase fault conditions at bus nos. 3s and 5, correspondingly.

Without UPFC

Fault clearing time=0.8 sec

Total analysis time=3 sec

Fault bus=Bus No 29

Trip [29, 30]

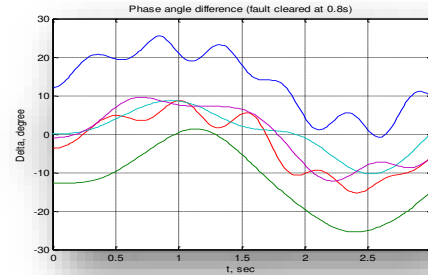


Fig. 6. Rotor Angle Variations



Fig. 7. Potential Thrust Variations

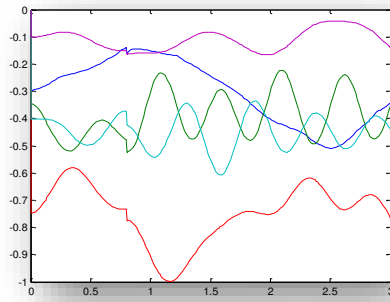


Fig. 8. Angular Momentum Reliability

With UPFC

FCT=0.8 sec

TAT=3 sec

FB=Bus No 29

Trip [29, 30]

Nearer bus=6 Far bus=21

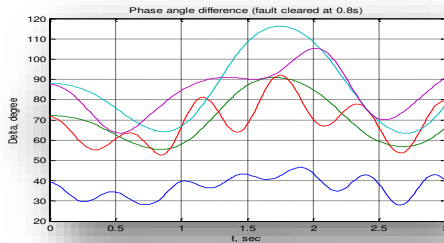


Fig. 9. Variability in pitch Tilt

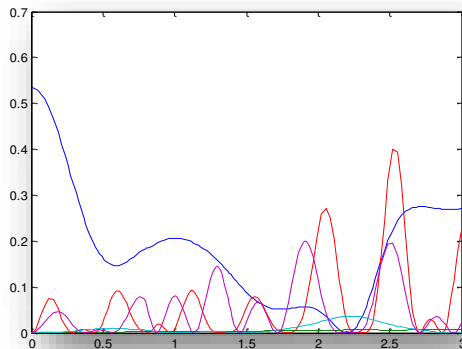


Fig. 10. Variability in Generating Capacity

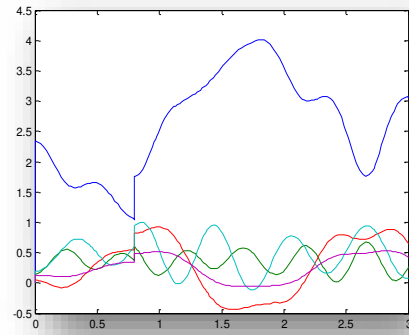


Fig. 11. Variability in pitch Momentum

V. CONCLUSION

The report describes its studies "A Novel Solitary Seven-Level Conversion Layout with Fewer Electric Aspects for the Street Transmission." The suggested control mechanism converter seems to be pulse dissemination for switches. The valves in the recommended inverter all perform at a fixed frequency. As a consequence, switching losses and THD rates were kept to a minimum in the converter. Throughout the end, a envisioned adapter are using photovoltaic power with energy backup. The concepts of high-level management and adaptive control have been discussed.

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Smart Irrigation System In Green Houses Using 8051

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Abstract- Agriculture plays an important role in India. We had seen our progenitor working in fields to get their basic necessities. Today almost all the ancestral practices are changed. We done our work very easier & even quicker.

Today's we introduce a new technology in the field of irrigation "Smart irrigation system in green houses". we are using here 8051 micro controllers for making cost effective product.

Keywords: 8051, Automation in irrigation system, green house, smart irrigation system.

I. Introduction

Exordium 8051 is a cost-effective system which can be readily garbled in entrenched C. Microcontroller is an 8-bit hardware which contains 40 leg DIP (Dual Inline Package) 1. This design uses detailed automated system which has been decoded to work in agreement with temperature. Some shops need specific temperature and terrain condition to get maximum yield from it. So, agronomists prefer growing some shops in temperature-controlled area like green houses. addict and water-cooling system. This system can help the farmers who stay down from the field. Agriculture system needs accurate monitoring system. The temperature sensors continuously smell the temperature of terrain when temperature is advanced than the demanded temperature. It drives the exhaust addict. If temperature is still advanced it drives the suction pump and cools the temperature. When temperature is cooled it automatically stops the exhaust addict and pump.

II. Literature Survey

Archana and Priya (1) published a paper in which determined value of soil and a temperature detector placed in roots of manufactory control the switch on and switch OFF the water motor. The liability of their ground plan is that they didn't include any methodology to transfer the status of the farming field to the dopehead.

Karan Kansara (2) confect an automatic irrigation system plan in which include the disbenefit of the Archana and Priya published paper. The handicap of this arrangement is that this system isn't able to determine the nutrient value of the mills.

Prof C.H. Chavan and P.V. Karnade proposed a system smart wireless detector network for watching environmental parameters using Zigbee. In this model, nodules can transmit data to a central waiter, which stores and farther process the data and also displayed it. The downside is precipitation forecast and nutrient content isn't determined in their proposed system.

III. Proposed Work

Continuously monitors temperature Different crops requires different temperature to get maximum yield so inside the greenhouse our system continuously checks the temperature and observers for the needed conditions by driving the pump and exhaust suckers. The temperature tasted will be continuously displayed on the TV screen from the microcontroller.

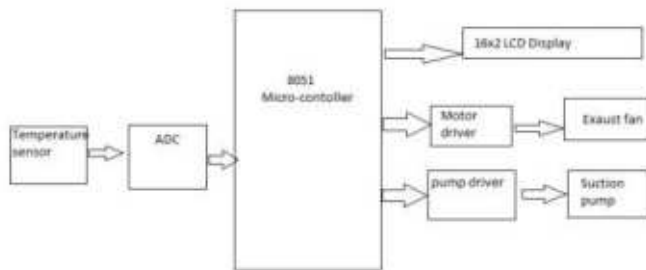


Figure 1: Block Diagram

Fig (1) shows the interfacing of microcontroller with other IC's. ADC converts analog signals into digital signal as 8051 does not support analog inputs. Microcontroller gives digital outputs for respective drivers and LCD display.

Table 1: Component Details

Sr. No	Component Name	Specification
1.	8051 Microcontroller	40 legs DIP (Dual Inline Package), 4kb of ROM repository and 128 bytes of RAM depository, two 16-bit chronometers.
2.	Temperature Sensor	They measure the resistance to measure the temperature. Extensively accurate between range 0 to 100 C
3.	ADC	High resolution conversion possible (up to 18-bit). Good response. Connecting to multiplexer to the input makes it easy to switch analog signal.
4.	Motor Driver	Control the direction of the motor predicted on the commands admitted from the controller.

IV. Software Required

Kiel micro vision 3(2) for writing embedded C program. Kiel is a cross compiler. The 8051-microcontroller construction contribute to each position of software innovator from the professional operations architect to the pupil just learning about bedded software development. Flash magic for ditching the program. Flash magic is software (3) set alight hex law to the 8051 microcontrollers fragment COM harbourages and DB9 connector and RS232. We used Proteus(4) for pretending the law on software.

Table (2) : Function Table

Sr. No	Temperature	Exhaust Motor	Suction Pump
01	Below 25	Off	Off
02	Between 25 to 30	On	Off
03	Over 30	On	On

Details of hardware used:



8051 Microcontroller is an 8-bit microcontroller created in 1981 by intel corporation. 8051 microcontroller has an 8-bit processor. It is most popular microcontroller. As it is an 8-bit microcontroller thus has 8-bit data bus, 16-bit address bus 8051 holds 4KB ROM with 128 bytes RAM. There are 3 introductory “sizes” of the 8051 short, standard,extended. The short and standard

chips are acquirable in DIP form. The extened 8051 models constantly have a unique factor and are not “drop-in compatible”.



ADC 0804:

ADC 0804 is a 20pin IC. The speed at which an analog input is converted into digital affair is an 8bit resemblant ADC in the family of the ADC0800 series from National Semi- captain. It works with 5V. Determination of 8-bits in Analog to Digital Conversion. Time variable conditioning on punching signals applicable to Culkin leg and it helpless briskly than 110us.

L293D motor drivers:

L293D apparatus are tetrad high-current half-H operators. The L293D is form to give both directional operation current up to 600-mA at voltages from 4.5v to 36v. L293D is a classic motor driver. It permit DC motor to drive. It is 16-pin IC. We can control two DC motor with a single L293D IC. The L293D motor can operate small as well as big motors. In L293D motor all inputs are TTL compatible. Drivers are authorize in pairs, with drivers 1&2 authorized by 1,2 EN and drivers 3&4 authorized by 3,4 EN. When an enable input is increases the related drivers are enable and their outputs are active and in phase with their inputs.

When the enable input is decreases, those drivers are weaken and their outputs are off and in the large impedance state.

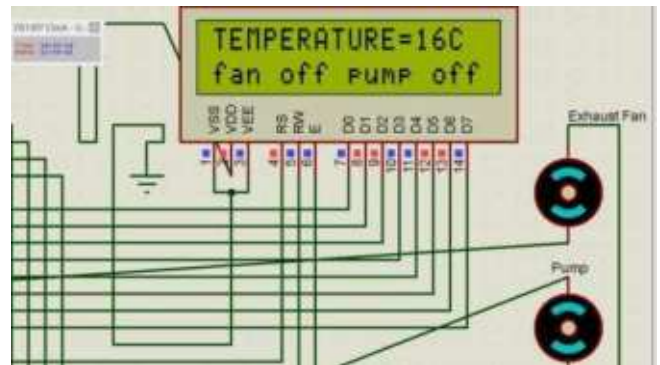
LM35 temperature sensor:

LM35 are precision IC temperature sensors. The amount produced of voltage LM35 is linearly proportionate to the temperature. It gives output voltage in Celsius. The responsibility of LM35 is 10 mv / degree Celsius. if the temperature increases as well as output also increases. It measure the temperature between -55 degree/Celsius to 150 degree/Celsius. The LM35 avoid any external evaluation to give accurate 1/4 degree/Celsius at room temperature and 3/4 degree/Celsius over a full -55 to +150 degree/Celsius temperature range.

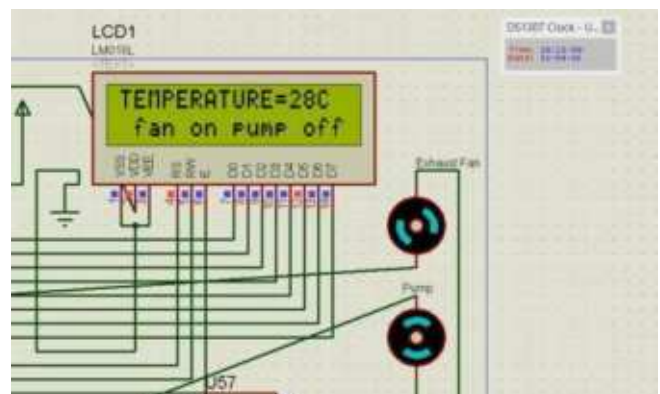
V. Result

The real time replication is done in proteous for Non-identical temperature condition. The program is dispose into the micro controller in the Porteous software by dispatching the created hex file. The result can be verified at three different conditions.

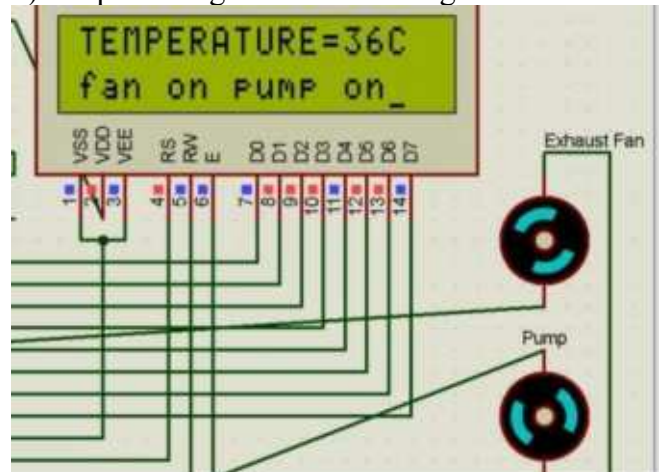
1)Temperature less than 25degree Celsius:



2)Temperature between 25 and 30 degrees Celsius:



3)Temperature greater than 30 degree Celsius:



VI. Conclusion

This paper involves establishing a contemporary design fashion of monitoring and controlling the humidity position of soil using LabVIEW. furnishing comprehensive tools that need to make any dimension or control operation in dramatically lower time. The design also includes rain detector, which is veritably important in the design to avoid gratuitous power destruction. No longer only are growers suitable to generally use much lower water to grow a crop, they are suitable to increase growth yields and the satisfactory of the crop by using better operation of soil humidity at some point of vital factory growth degrees. Bedded system for motorized irrigation of a husbandry subject gives an suitable result to help web runner-precise irrigation control that permits directors to maximize their productivity whilst saving the water.

VII. Future Scope

This is just a prototype. Its operations can be veritably extensively used. Some of the stylish styles of clapping this design are Interfacing duplex GSM to this microcontroller the law can be written in bedded C so that if the proprietor sends the request from his GSM sim, the GSM module which is connived should shoot a communication to that number regarding temperature. We can affiliate moisture detector to this prototype so that it should smell the air moisture and control the suction pump. Water position pointers can be introduced to microcontrollers so that proprietor can keep track on available water source. As microcontroller needs only 12V force solar energy can be used rather of power force.

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Information and Communication Technologies

AI BASED AUTOMATIC ANSWER CHECKER

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ABSTRACT –

Automatic answer checking process would not only relieve the exam checker but the checking process would also get way more transparent and fair as there would not be any chances of biasedness from the teacher side. An Automatic answer checker application that checks and marks written answers similar to the human being. It removes human errors that commonly occurring Answersheet checking.

In this modern age, where the world moves towards automation so, there is an need for in an Automatic Answer Checker system. Currently, the online answer checker is available for MCQ based question, hence Automatic Answer Checker is Used.

Keywords –

Automatic MCQ Answer checker, XAMPP , PHP.

INTRODUCTION -

In Today's World ,currently there are many exam conduction ways, be it online exams or MCQ types exam. Various Examinations are conducted every day around the world . The most Important aspect of any Examination is the checking of the answer sheet of the student.

Automatic answer checking process would not only relieve the exam checker but the checking process would also get way more transparent and fair as there would not be any chances of biasedness from the teacher side.

Nowdays various online tools are available for Checking multiple choice questions but there are very few tools to check Objective answer type Examination. This project aim to carry out the checking of Subjective and Objective answer type Examinations by Implementing the Data. This application can be used in various educational Institutes for Checking Objective answer type Examinations.

LITERATURE SURVEY –

An AI based Automatic Answer Checker describes how to check the Answer by using online software.

2.1 AUTOMATIC ANSWER CHECKER

[Lakshmi priya , Banbari Amman Institute of Technology]-

An automatic answer checker application that checks and marks answers similar to a human being. This software application is built to check subjective answers in an examination and allocate marks to the user after verifying the answer

2.2 AUTOMATIC ANSWER CHECKING SOFTWARE

[Vandana Bali , Vandhana Thevar , Asst. Prof. Samit Shivadekar] –

This software application is built to check subjective answers in an online/offline examination and allocate marks to the user after verifying the answer. The admin may insert questions and respective subjective answers in the system. These answers are stored as notepad files. When a user takes the test he is provided with questions and area to type his answers. Once the user enters his/her answers the system then compares this answer to original answer written in database and allocates marks accordingly. Both the answers need not be exactly same word to word.

2.3 ONLINE OBJECTIVE ANSWER CHECKER

[Merien Mathew, Ankit Chavan , Siddharth Baikar] –

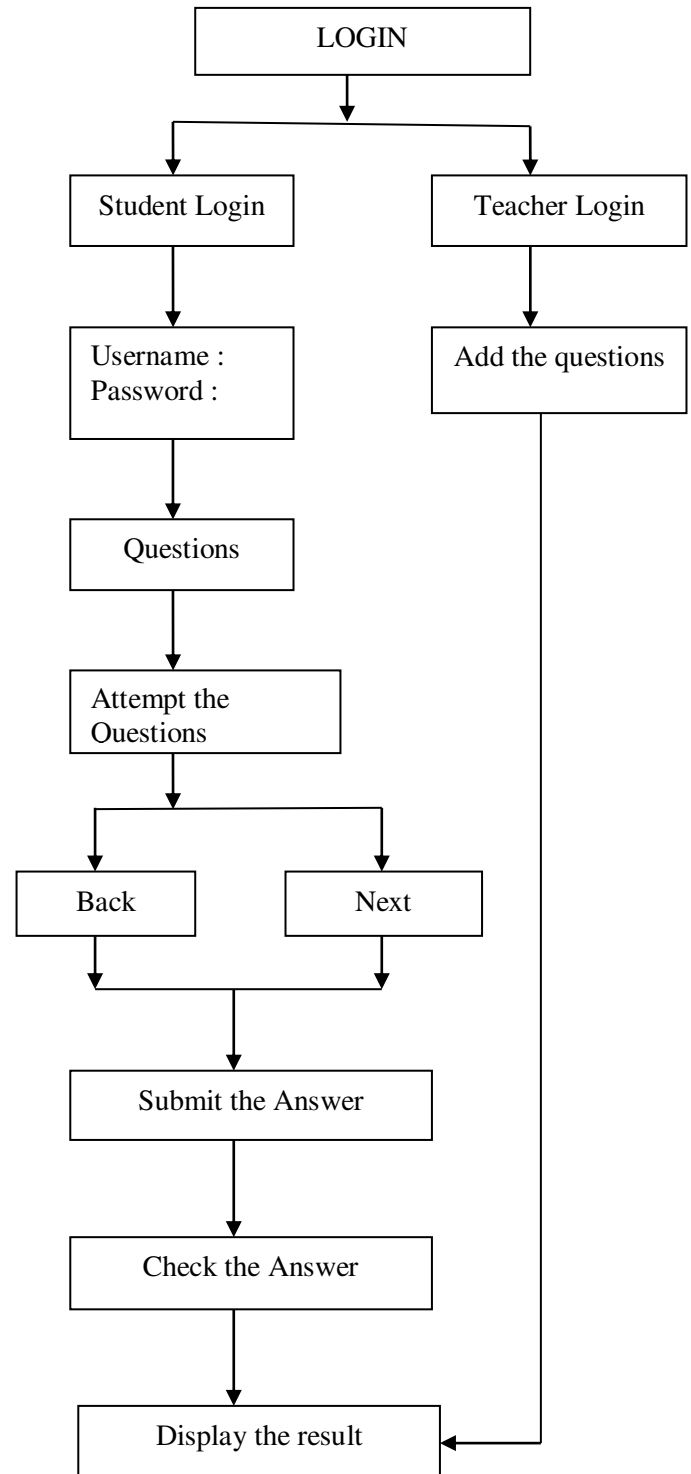
We are pleased to present Online Subjective Answer Checker that will ease out the process of checking of answer papers with accuracy. The system will let students give exam online, calculate the results automatically as well as produce a record for the administrator. The paper will focus on correcting on the basis of certain keywords that every answer will contain and give marks to the students according to the presence of the keywords in the answers. This system will help reduce all human errors thereby making the system more efficient.

2.4 AUTOMATIC ANSWER CHECKING

[Vasu Bansal , M.L. Sharma , Krishna Chandra Tripathi] –

We have seen that a number of students apply for various examination which may be institutional , non-institutional or even competitive . The competitive exams mostly have objective or multiple choice questions . This aims is focus on designing an efficient algorithm that will automatically evaluate the answers given by student and assign a score based on the AI technologies which is work like human being.

BLOCKDIAGRAM



OBJECTIVE -

An Automatic answer checker application that checks and marks written answers similar to human being. This Application built to check Subjective and Objective answers in an online examination and allocate marks to the user after verifying the Answer.

The System requires you to store the original answer for the system. This facility is provided to the Admin. The Admin may insert questions and Subjective and Objective answers in the System. These Answers Are Stored as Note pad files . When a user takes the test he is provided with questions and asked to type his answers.

The User Enter his/her answers the system then compares this answer original answer written data base and allocates marks Accordingly. Both the Answers need not be exactly same , word to word.

ADVANTAGES-

1. The system calculates the score and provides results instantly.
2. It removes human errors that commonly occur during manual checking.
3. The system provides an unbiased result. Thus the system excludes human efforts and saves time and resources.
4. Environmental Friendly
5. Save Time
6. Plugged into Technology
7. More secure less cheating

DISADVANTAGES

1. The system must be given proper inputs otherwise system can produce wrong results.
2. Challenge Of Technology
3. Infrastructure Problem

FUTURE SCOPE -

The system would be beneficial for the Universities , schools and colleges for the academic purpose by providing ease to faculties and the examination evaluation cell. Many Educational Institutes conduct their examinations Online. Our Solution can still be improved. This emerges from the nature of problems we were solving. For most of them , there is a wide range of various cases and each requires a slightly different approach. We can add more rules into SET grammar, to detect rarer type of Questions and answers. These system calculate the score and provides result instantly.

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IoT BASED DIGITAL NOTICE BOARD

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ABSTRACT –

This journal paper refers to the smart and digital notice board. Notice board could be a must have and a primary factor in our day to day life in various public places like schools, colleges, bus and railway stations, malls any other public places. In analog notice boards, sticking the notices everyday is a very tough and time consuming process. A separate person is needed to stick that notices on analog notice board day by day. So we are implementing this 'IoT based Digital Notice Board' so that by the use of digital notice board the consumption of time gets reduced and the usage of manpower also goes on decreasing.

Keywords - ESP-12E Module, LCD Display.

INTRODUCTION-

The main motive of designing this digital notice board is to connect it with the user's mobile phone for displaying the daily and latest information. Notice board is an essential information collective system in our day to day life. In our day to day life we can see notice boards in various places as we discussed before. So now we can say that notice boards are the places where sticking information like advertising events, announcing events and to providing people attention. Also in analog notice

board for sticking the notices everyday there is use of big amount of paper for displaying the never ending notices. So there is the wastage of paper in huge amount.

The various problems and barriers faced by the analog or wooden type notice boards will be resolved by the implementation of our smart as well as digital notice board. It comes within the advanced settings for the notices around the world in a easiest way. Due to the well liking of internet, we choose the internet as a medium for transferring such information. The IoT is the interconnected network for many things like home appliances, various electronic items, physical device.

OBJECTIVE -

The main aim of the notice board is to locate all events like international conference, workshop and other college event as well as to manage the daily notices in various places. The design is done in such a way that the system is consuming less space. This project highlighting on basic idea of IOT based digital display using raspberry pi. The first aim of the proposed system is to make sure that information send from remote place is displayed on digital screens. Notice boards are playing very important role in our day to day life

one of the major roles in mass communication medium. In order to reduce paper work, time and man power, the proposed project model

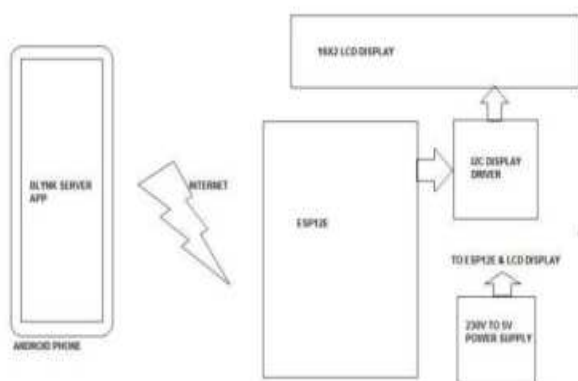
JUSTIFICATION -

From the past few years Display boards proposed

introduces an online digital notice board using IOT. IOT Connects things to the internet. So, we can access the Notice board from anywhere across the world through internet. The notice board is interfaced with the Wi-Fi module to provide

internet access to the board. The Wi-Fi module which is installed at the digital notice board receives the message from appointed user and gets presented on the notice board. From our model the authorized admin is able to post the message from any corner and this message can be displayed on the LCD Display.

BLOCK DIAGRAM-



WORKING -

We used ESP 12E ,is a wi-fi module that can receives the message from the appointed user and input from users mobile i.e, it receives a notice in the form of text or audio. The Blynk service app is installed in the android phone which can sends the data to the wi-fi module ESP 12E which is driven by that appointed user. The data is being sent to the wi-fi module by the use of internet. The power supply of 230v to 5v is given to the wireless fidelity module that is ESP12E. The output from the module is then applied to the 12C display driver. A typical I2C LCD display consists of an HD44780-based character LCD display and an I2C LCD adapter. The display driver may itself be an application-specific microcontroller and may incorporate RAM, Flash memory, EEPROM and/or ROM. Fixed ROM may contain firmware and display fonts. At the final stage ,the output of display driver is given to the 16*2 LCD Display, which can display the data or information of the given notice on the display board. After that the notices gets displayed day by day digitally on the notice board.

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CONCLUSION –

This article implemented an IoT-based digital notice board which assist the organizations, colleges and malls in time and resources saving by providing the information availability the respective receiver design of smart and efficient notice board which overcomes the disadvantages of the existing notice system. It accepts the message, stores it, and displays it on the LED screen and also gives out voice announcements. It is an eco-friendly design which uses less man power to display important information. It gives quick exchange of data and is less expensive to introduce and keep up. This project gives an effective method for showing messages on Notice Board utilizing Wireless Technology.

ACKNOWLEDGEMENT-

We are very thankful for the guidance and support of our project guide and co-ordinator Mrs.Ghadage S.N. We also grateful to Prof. Jagtap D. B., Head of E&TC Department. In the end , again our special thanks to Mrs.Ghadage S.N. for providing various resources such as laboratory with all needed software platforms, continuous Internet connection, for Our Project.

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Sign Language for Deaf and Mute People

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Abstract— This project presents a language converter for deaf and dumb people. In the present world it is very difficult for the deaf & dumb people to talk with the ordinary people. So, it becomes impossible for them to communicate with the ordinary people unless and until ordinary people like us learn the sign language for the purpose of communication. The sign language of deaf and dumb is quite difficult to learn and it is not possible for everybody to learn that language. So, every person cannot come and share their thoughts with these physically impaired people. So here is a system which would enable the deaf and dumb to communicate with each and everyone. In this system a webcam is placed in front of the physically impaired person. The co-ordinates captured will be mapped with the one previously stored and accordingly exact alphabet will be captured. Continuing in this way physically impaired person will be able to go through the entire sentence that he wants to communicate. Later on this sentence will be translated into speech so that it would be audible to Introduction everyone.

I. INTRODUCTION

Deaf is a disability that impair their hearing and make them unable to hear, while mute is a disability that impair their speaking and make them unable to speak. Both are only disabled at their hearing and/or speaking, therefore can still do much other things. The only thing that separates them and the normal people is communication. If there is a way for normal people and deaf-mute people to communicate, the deaf-mute people can easily live like a normal person. And the only way for them to communicate is through sign language. While sign language is very important to deaf-mute people, to communicate both with normal people and with themselves, is still getting little attention from the normal people. We as the normal people, tend to ignore the importance of sign language, unless there are loved ones who are deaf-mute. One of the solutions to communicate with the deaf-mute people is by using the services of sign language interpreter. But the usage of sign language interpreter can be costly. Cheap solution is required so that the deaf-mute and normal people can communicate normally.

II. LITERATURE REVIEW

Sign Language Converter for Deaf and Dumb People in Two Way Communication for Regional Languages. This project presents a language converter for deaf and dumb people. In the present world it is very difficult for the deaf & dumb people to talk with the ordinary people. So it becomes impossible for them to communicate with the ordinary people unless and until ordinary people like us learn the sign language for the purpose of communication. The sign language of deaf and dumb is quite difficult to learn and it is not possible for everybody to learn that language. So, every person cannot come and share their thoughts with these physically impaired people. So here is a system which would enable the deaf and dumb to communicate with each and every one. In this system a webcam is placed in front of the physically impaired person. The co-ordinates captured will be mapped with the one previously stored and accordingly exact alphabet will be captured. Continuing in this way physically impaired person will be able to go through the entire sentence that he wants to communicate. Later on, this sentence will be translated into speech so that it would be audible to everyone.

Sign Language Recognition System For Deaf And Dumb People. This paper proposes the method or algorithm for an application which would help in recognizing the different signs which is called Indian Sign Language. There are 26 signs in Indian Sign Language corresponding to each alphabet out which the proposed algorithm provided with 95% accurate results for 9 alphabets with their images captured at every possible angle and distance i.e. for every alphabet even if have approximately 5 images at different angles and distances then the algorithm is working accurately for 45 types of inputs.

generation, takes an image and transforms it into a "large collection of local feature vectors". Each of these feature vectors is invariant to any scaling, rotation or translation of the image.

III.3. Orientation Detection:-

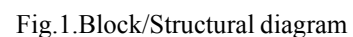
III.4. Gesture Recognition:-

The System uses Haar like method to track hand in the video frames and the bounded hand region becomes the area of interest. To bridge the gap by introducing inexpensive computer in the communication path so that the sign language can be automatically captured.

The proposed algorithm consisted of four major steps which are namely Image Acquisition, Feature Extraction, Orientation Detection and Gesture Recognition which is also shown in the below given Fig 1. All of the following steps are explained in details in the later part of the paper with all the information on how the module is working and what behavior the module is supposedly expected to portray. While deciding on the following algorithm it was observed that pre-processing steps that are to be applied on the images for removal of noise in the background was not at all required and the approach was concluded to be simple and easy to implement. The steps of the methodology are further explained in details.

The first step of Image Acquisition as the name suggests is of acquiring the image during runtime through integrated webcam and while acquiring. The images will be stored in the directory as soon as they are captured and the recently captured image will be acquired and will be compared with the images stored for specific letter in the database using the SIFT algorithm and the comparison will give the gesture that was done and the translated text for the following gesture.

For any object there are many features, interesting points on the object, that can be extracted to provide a "feature" description of the object. SIFT image features provide a set of features of an object that are not affected by many of the complications experienced in other methods, such as object scaling and rotation. The SIFT approach, for image feature



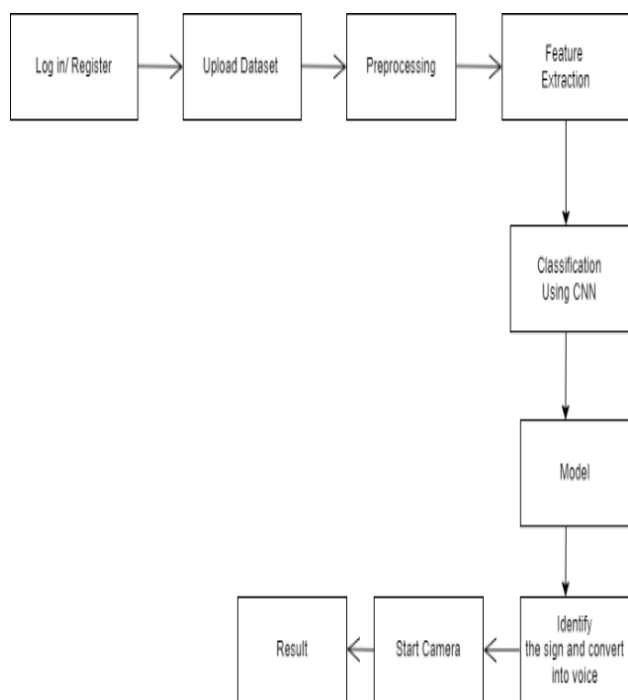


Fig.2.Data Flow Diagram

Working:-

The first process is registration or login ,if registration is done then login. The user have to upload the dataset which is in the form of hand motions , then the system will automatically preprocess the data(hand signs). The next process is feature extraction which is nothing but the process of transforming raw data into numerical features that can be processed while preserving the information in the original dataset. Classification is the next stage where the data is classified using CNN(Convolutional Neural Network). CNN is a network architecture for deep learning that learns directly from data. CNN is useful in finding patterns in images to recognize objects, classes and categories. CNN is built-in convolutional layer reduces the high dimensionality of images without losing its information so it is best suited for this application.

When login is done ,the system will automatically turn on the camera and then it will detect the hand signs and corresponding speech will be generated.



Fig.3.Login Window



Fig.4.Result of 1 sign among 43

IV. FUTURE SCOPE

In future work, proposed system can be developed and implemented using Raspberry Pi. Image Processing part should be improved so that System would be able to communicate in both directions i.e.it should be capable of converting normal language to sign language and vice versa. We will try to recognize signs which include motion that means we can add microcontroller for detection of hand motions ,it would be combination of hardware and software .The system would be installed into phones for portability and so it will be easy for the peoples.

V. CONCLUSION

Sign Language is a tool to reduce the communication gap between deaf-mute people and normal person. This system which is proposed above gives the methodology which aims to do the same as the two-way communication is possible. This method proposed here facilitates the conversion on the sign into speech. This overcomes the requirement of a translator since real time conversion is used. The system acts a voice of the person who is deaf-mute. This project is a step towards helping a specially challenged people. This can be further enhanced by making it more user friendly, efficient, portable, compatible for more signs and as well as dynamic signs.

VI. ACKNOWLEDGEMENT

We would like to thank our guide Ms. Deepali Shinde for their guidance and feedback during the course of the project. We would also like to thank our department for giving us the resources and the freedom to pursue this project.

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IOT BASED DAM IRRIGATION SYSTEM

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ABSTRACT - Now days, water shortage is becoming one of the biggest problem in the world. Many different methods are developed for conservation of water. We need water in each and every field. In our day to day life also water is essential. Wastage of water major problem in agriculture. Every time excess of water is given to the fields. Dams are crucial in holding and conserving water for optimum use according to seasonal needs. In order to mitigate the existing problems with water distribution and utilisation, water management is crucial. Due to the numerous risks associated with dams, it is now essential to have a proper monitoring system for the opening of the dam gate in order to maintain a safe water level in dams. Investigating the use of IoT to enhance dam safety, water flow, and corrosion prevention for dam gates. Using various sensors, control valves, and automatic & proactive outflow management during emergencies, this article aims to use microcontrollers for monitoring and managing water distribution management.

Keywords - Sensor, Motors, Wi-Fi Module

Introduction - Now days, water shortage is becoming one of the biggest problem in the world. We need water in each and every field. In our day to day life also water is essential. Wastage of water major problem in agriculture. Given the limited supply of drinkable water today, water management is a problem of significant concern. Unexpected weather events like heavy rain, abrupt tide changes, and other natural forces result in natural calamities, which have a negative effect on the country's economy by increasing mortality rates, contaminating drinking water, and causing problems in the agricultural sector. Dam construction creates water bodies for the future, safeguards the water that is now available from contamination and avoids disputes and overexploitation. Dams are important for managing water because of this. The proposed system will allow to continuously monitoring the water levels inside the dam and the moisture level in the field, controlling the supply remotely over the internet. Sensors detect the water and moisture level and send readings to a fixed access point, such as a personal computer, which in turn can access irrigation modules installed in the field or the physical module in the water tank, wirelessly over the internet.

LITERATURE SURVEY - An IoT Based Dam irrigation system describes how to monitor a water level & automatic gate control. A system is developed by using

sensors and according to the decision from a server based on sensed data, the irrigation system is automated.

2.1 IoT Based Smart Agriculture & Irrigation System [Sanket Deshmukh, Vishal Nalage, Raju Noronha, Dr. Prakash Patil: An IoT Based Crop-field monitoring an irrigation automation system describes how to monitor a crop field. system is created utilising sensors, and the irrigation system is automated based on a server's decision based on sensed data. The sensed data is transmitted wirelessly to a database on a web server. The moisture and temperature fields are reduced below the potential range if irrigation is automated.

2.2 IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM [R. Nageswara Rao and B Shridhar ISIC Paper.]

The aims at making agriculture smart using automation and IoT technologies. Internet of Things (IoT) enables various applications crop growth monitoring and selection, irrigation decision support, etc. A Raspberry Pi based automatic irrigation IOT system is proposed to modernization and improves productivity of the crop, 2013.

2.3 Mohit Bajaj, Overview of ESP8266 Wi-Fi module based smart Irrigation System using IOT This paper demonstrates the efficient use of Internet of Things for the traditional agriculture. It shows the use of Arduino and ESP8266 based monitored and controlled smart irrigation systems, which is also cost-effective and simple, 2018.

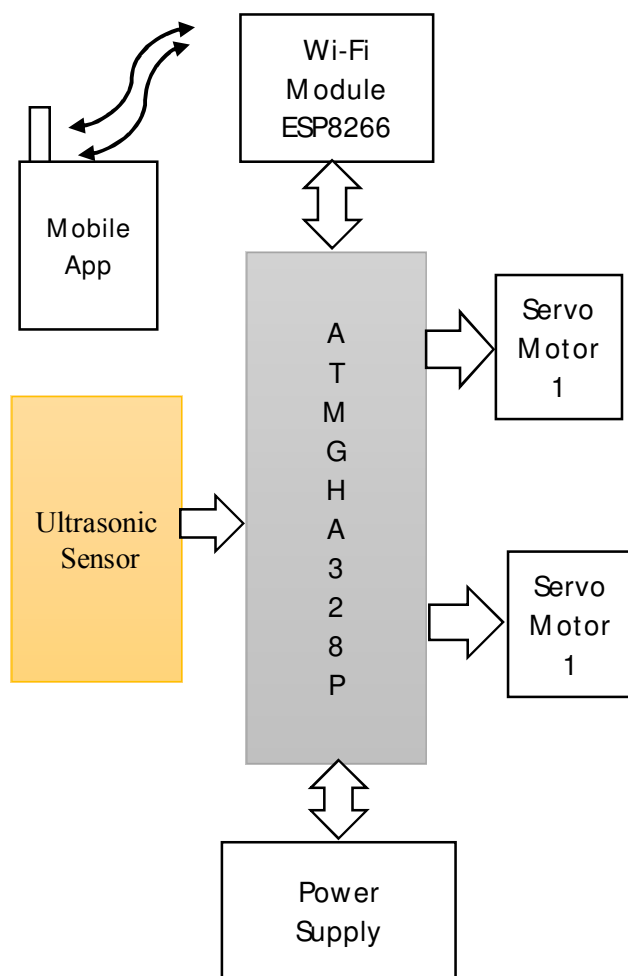
2.4 IoT Based Smart Agriculture System [G. Sushanth, S. Sujatha, "IoT Based Smart Agriculture System", 2018]

Smart Agriculture system is an aborning topic in this materialistic world. This paper describes the concept of featuring and elastigan agriculture platform to the internet world. Agriculture is the most important of human life so it can be improvised by using IoT technology. IoT technology gives a grasp to enhance the power of automation systems in agriculture. Smart agriculture System that uses the advantages of cutting-edge technologies such as Arduino and Wireless Sensor Network. This paper proposes the concept and features of the sensor world in the internet of things for agriculture which is used to enhance the production of crops.

2.5 Design of ZigBee based Wireless Sensor Network for early Flood Monitoring and Warning system” [Balaji.V, Akshaya.A, Jayashree.N, Karthika.T 2017]

“Design of ZigBee based Wireless Sensor Network for early Flood Monitoring and Warning system” 2017 IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2017) Floods are the result of prolonged rain or an abrupt discharge of water from a dam. Due to this, the public would suffer severe human and financial damage. The clearest illustration of such a natural calamity is the "Chennai Floods." The rapid release of water from the dams is unknown to the general public, and they were unable to get any information due to the complete loss of network connectivity

Architecture -



Wi-Fi module (ESP8266)-

It can be used to host the application or to offload Wi-Fi networking tasks from another application processor. The ESP8266EX provides a comprehensive and self-contained Wi-Fi networking solution. The ESP8266EX launches the application straight from an external flash when it serves as the host. To enhance the system's performance in certain applications, it features inbuilt cache. Alternatively, any microcontroller-based design with straightforward

connectivity (SPI/SDIO or I2C/UART interface) can be enhanced with wireless internet access by acting as a Wi-Fi adaptor. The ESP8266EX is one of the industry's most fully integrated Wi-Fi chips; it includes antenna switches, an RF balloon, a power amplifier, a low noise reception amplifier, filters, power management modules, and only a small amount of extra hardware.

Power Supply -

This circuit converts the AC power source into steady DC. Unregulated output will be fixed to a consistent voltage with the aid of a voltage regulator DC. The circuit consists of a bridge rectifier comprised of diodes, a linear voltage regulator (7805), capacitors, and resistors.

Ultrasonic Sensors-

Ultrasonic sensors detect objects regardless of the color, surface, or material (unless the material is very soft like wool, as it would absorb sound.) To detect transparent and other items where optical technologies may fail, ultrasonic sensors are a reliable choice.

PROPOSED METHODOLOGY

A more efficient use of water resources is required, as is an improvement in field output, hence irrigation system automation is becoming more and more important. The technology is used to automatically turn the valves ON or OFF. The system serves sensing, observation, control, and communication functions. Different sensors are used to measure the Water level.

FUTURE SCOPE

It can be utilised in industries for level monitoring and management. Since there are around 5200 dams in India, the control of irrigation dams and other large dams utilised for power generating and water delivery should be handled differently.

As a result, a significant project in the future may involve the centralised management of all the dams in a state using GPRS or other wireless technologies, which would be advantageous for the entire nation.

The project's third benefit and conclusion is that, in terms of the control system, the same control system may be used not only for straightforward and similar applications but also for a variety of other applications. Similar regions can be utilised to monitor a parking lot or any other application that calls for making decisions based on sensor inputs.

CONCLUSION - The adoption of an automated dam gate level controller is significant because it is both automatic and Internet of Things-based. In order to make our test model acceptable for all potential situations on conventional dams, we included a few characteristics. The additional advantages and conclusion from this paper can be that the control system in question is suitable not only for basic and comparable application but also for application in many various fields, in addition to the suitable requirement discussed in the aforementioned condition. To replicate the controlling and functioning of the proposed automated Dam, a small testing model of the dam was built. Almost every imaginable scenario was tested with the test model, and some extremely intriguing findings were made. The model of the aforementioned dam

demonstrated experimentally that, in addition to the automated control system implementation, a dam is very successful at producing hydroelectric power. To measure the amount of water in the dam, this technology replaces PC-based systems with mobile devices.

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Web Development based “Smart Agriculture System”

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Abstract— Smart Agriculture System website will provide a facility for farmers to sell their farm fresh organic products directly to the end users. Farmers can register and get authorized by admin to farmer’s portal. Also, they can add their product details on portal and current price of that product will get fetched from central market of metropolitan city like Pune, Mumbai, Delhi.

Customer will be able to contact directly to the Farmers and able to rate of products. In that the project website are totally useful for the farmer’s and also customer. Increasing demand of farm products led farmers to use of chemical fertilizers/insecticides/pesticides and other chemical medicines to increase the production.

Keywords— *Os: Windows, Linux, Visual studio code, MySQL, PHP, Laptop, Ram 4GB*

INTRODUCTION

Farm direct marketing involves selling organic agriculture product from the farm directly to customers. Often, the farmer receives a price similar to what the marketed grocery store charges. This method of marketing is more entrepreneurial or business-like than wholesale marketing. In a manner of speaking, the farmer using this method grows a “product” more than a crop. The opportunity to interact with growers is one of the reasons consumers like to purchase this way. The experience of the purchase of is often part of the product. As India is a country where more than 65% population is dependent on Agriculture and Agriculture related jobs.

MOTIVATION WORK

Traditional farming has been, is, and will continue in the future to be a manual and labor-intensive industry. Farmers being confronted with a labor shortage, more stringent legislation, increasing global population and the declining numbers of farmers, forces them to look to new solutions.

With technologies such as the Internet of Things (IoT), Big data & Analytics, Artificial Intelligence (AI) and Machine Learning (ML) entering almost all industries. How can modern technologies in the case of agriculture and farming make a difference? To address these challenges, efforts and research are in place to improve the quality and quantity of agriculture products by making them ‘connected’ and ‘intelligent’ through “smart farming”.

RESEARCH WORK

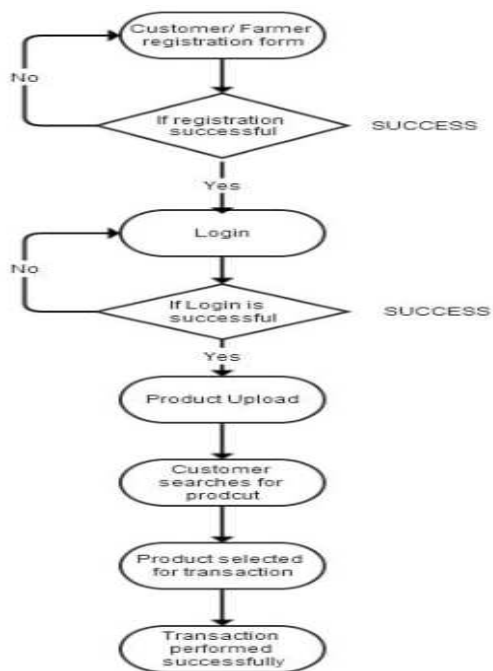
This IoT (Internet of Things) is achieved by wireless sensor networks, sensor networks, 2G/3G/4G, GSM, GPRS, RFID, WI-FI, GPS, microcontroller, microprocessor, etc. Empowering advancements for the Internet of Things are considered and gathered into 3 classifications. They are :

1. (Advance that empower “things” to accept contextual information.
2. (Advance that empower “things” to process the relevant data, and
3. (Innovation to enhance security and protection.

Accepting the information and processing the relevant data can provide an understanding which is needed to build the “intelligence” into “things”.

About a million solar panels were installed every day around the world last year. Solar PV leads providing almost 40% of global renewable electricity capacity growth over the medium-term. Finally, in analyzing the evolution of electricity and energy- consuming sectors, it explores the prime role solar energy could play in the long-term future of our energy system. Applications of the monitoring system are the Rooftop Solar, Ground mounted Solar, Solar cities, Smart villages, Micro grids and Solar Street lights. Consumer Products like solar water heating systems, Solar home lighting systems, solar lanterns, solar pumps, solar mobile chargers, solar cookers, LED solar torch, solar RO plant, solar fan, solar Inverters, etc. can be monitored through this project.

PROPOSED BLOCK DIAGRAM

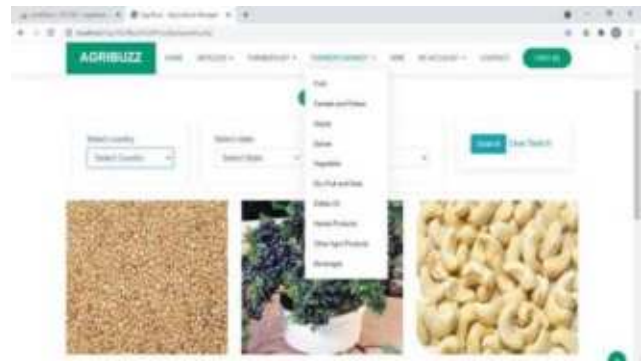


RESEARCH METHODOLOGY

This case study of the product is developed on the basis of secondary data. Published sources are taken into consideration for the analysis of the data. The information about the organic agricultural products and its farming practices in India and abroad is collected. The method for an Online organic product selling system is based on the farmer's farm product for directly marketed in the market. In that research of methodology of agricultural product based on agriculture farming products .

RESULT AND DISCUSSION

In that the Online Organic Agriculture product selling website are very useful for the farmers and also end user. In India Indian traditional farmers possess a deep insight based on their knowledge, extensive observation, perseverance and practices for maintaining soil fertility, the progress in organic agriculture is quite commendable. In discussion of that product for the farmer can easily export the product in market or home to home to end user. The product quality are good or bad are suggestion or compliant from the feedback form. This way of marketing the product are marketed easily.



CONCLUSION :

Better improvement of production in crop is a major requirement in the countries like India, where the majority people depend on agriculture for their livelihood. Implementing smart agriculture system using IoT in the field can definitely help to improve the yield of the crops and overall production. The system also provides cost effective method which can be carried out by the farmers easily. The system also consumes less power and reduces water consumption to a great extent. So this is very useful in areas where the water availability is a major problem. The system also provides a method for intruder detection which is a primary reason for reduction in crops

FUTURE SCOPE

After studying the remote monitoring architecture for solar panels, the next step will be to implement, test and achieve this IOT-based system in order to obtain a reliable and secure system which will allow data collection in real time.

Apart from that by using various Machine Learning algorithms and model it is possible to make system smart enough to take decision about data and performance.

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Adhyayan Online Platform

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Abstract- The main users of the Adhyayan Online Platform are students and teachers. Student problems with study materials, attendance, and assignment submission increased as a result of the pandemic scenario during the academic year. This kind of problem can be fixed on a single platform that uses a web application. This platform is quite helpful for a single educational establishment because it can correct manual mistakes and also care for time wastage, both of which will improve performance. This platform is incredibly important, and it also has an easy-to-understand interface. Teachers can provide study materials through the Adhyayan Online Platform, students can submit assignments through the platform, teachers can access those assignments, teachers can send notices to an entire class or a single student, and teachers can also manage student attendance there. All information is then sent to students via text message. This project is excellent for the entire collage. Each user involved in the module can handle this platform with ease.

Index terms- academic year, study material, educational institute, manual errors, wastage of time

Introduction

As a result of COVID-19's effects, we have encountered numerous issues. The circumstance has a significant impact on people's wealth, health, and education. The process of recovering everything takes longer. We are attempting to develop a platform that will assist students with a little number of recuperating educational institution issues. To make it simple to access study materials, submit assignments, receive notifications from colleges or teachers, and keep track of attendance, we developed the Adhyayan Online Platform. The usage of the internet and smart devices has increased due to recent studies. We turned that utilization into a chance for students who use our platform.

The primary goal of the designed web-based application is to foster communication between students and teachers. However, current systems are typically focused on a single method, whether it's related to attendance, submission of assignments, or study materials, but not all of them are in a single system, nor are they for a single educational institution. That kind of issue was discovered, and the planned work includes a solution. This session is extremely beneficial, clear, and practical for both students and teachers. The learner can quickly access that programmed from any device, including mobile, desktop, and tab

via a network connection. Students receive text updates from this module to their mobile devices.

The following are the module's three primary pillars

- The administrator has access to all of the data in that module, can manage it, and can update the system.
- The second is staff, who can offer study materials including PDF books, eBooks, YouTube links, and previous year's questions and answers pertaining to their field of study. Additionally, give the assignment to the student and check the student's completed work.
- A third option is for students to access the study materials and receive text-based notifications from this module on assignment updates.

The project's suggested task includes maintaining a record of student evaluations, attendance, and providing future-helping study materials. Additionally, watch out for time wastage and minimize manual errors.

Related work

Various platforms are available in the digital world today. There are many things pertaining to education. We looked at a few research publications during the literature review. The majority of platforms for online assignment submission, according to our survey. However, the system's test case for the application (Student Attendance management System 2018) showed that it is operational and ready to be used to manage students' attendance for any department of the University, College, or Institute.

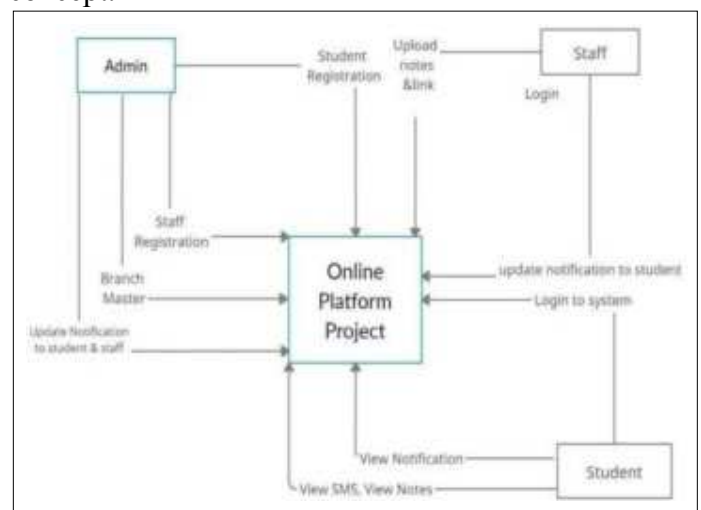
With the Open Assignment Submission (OAS) system, students can submit homework assignments of the right kind into a specially created open forum offered by the learning management system. There are numerous modules used at colleges for specific tasks like submitting assignments, recording attendance, giving out study materials, and giving comments.

According to every other paper that has been written about a specific method, such as online assignment submission, attendance tracking, or feedback systems. Because they are distinct but not combined, collage depends on a number of platforms. On that paper, we discovered a lot of problems that we then addressed in our project. The main problem, according to our research, is that students cannot communicate with teachers via the platform. We concentrate on those issues, talk about more research articles pertaining to those topics, then we used these papers to develop the Adhyayan Online Platform, which resolves that problem and offers one platform for collage. to offer an accessible, more engaging performance and sharing platform. Keeping student records is more advantageous for educational institutions. With this module, we can access any type of device, including mobile, desktop, and tab.

Design and Implementation

For college purposes, the Adhyayan Online Platform was built with more responsible activities. It is used in academic schedules most frequently in related ways. We followed these studies and developed a web-based application after studying research papers on topics like Open Assignment Submission (OAS), Student Attendance monitoring System, and others.

We used html5, css3, JavaScript, and asp.net to build this platform, and we used c# to provide responsive web design in the backend. Flowing Figure 1 illustrates the project's actual concept.



Below is an explanation of the three main sections that make up this module:

Admin- admin is the first section. This module's key component is the admin, who can register to add staff, students, and Branch masters. System wide administrative control. Update the staff and student notification. The administrator has the power to include the personnel and students that work at the collage. To manage a department of a college, an administrator also includes a branch master. In other words, the platform is just supersized for admin. Check the student's attendance information as well. If there are any issues directly affecting students, administrators may send a notice to a specific student or member of staff or may broadcast the notice. This provision grants authorized individuals a private part limit.

Staff- The second section relates to employees who will register with the admin. When a staff member registers, they must enter their full name, department, mobile number, address, education, specialization, preferred role, and photocopy of themselves in order to create an account. Following registration, staff can upload the student's assignments as well as the study materials organized by subject. Additionally, teachers should notify students of any updates regarding a specific term while also taking attendance of students via the platform.

Student-Students who register with administration make up the third and most crucial segment. When a student registers, they must give their full name, department, mobile number, address, and a photocopy of themselves in order to create an account and register. Students are notified through text message through this module on their mobile devices. After registering, students can access the study materials and receive department-specific assignments. Complete the assignment, then upload it using this platform so that the staff can review it. Additionally, students can post questions on the platform if they have any related to the subject. Last but not least, the branch master section acts as the department head by controlling the interaction between students and teachers. Branch master has the ability to add and remove departments.

This web-based module create interaction between staff, student and whole collage along with comfortable easy to manage work. We can edit the staff details or student details on admin side if any case. We have to trying to fulfill the functionality and add more features to improve performance. This is more necessary to higher education for better future of success. Module keep record of student. Also, keep details of attendance.

Conclusion and future work

Significant to a single college management system is the Adhyayan Online Platform. which is produced using a variety of tasks and multiple online platforms for the collage. The project's primary goal is to make lecturers' jobs easier by giving them more time to turn in assignments. information on attendance, the turn-in of assignments, and inquiries. sharing of files and study materials. The keeping of student records is another component of this subject. Make the study materials accessible to all students and teachers by storing them on a platform.

Since our module is very user-friendly and simple, the entire collage can use it. In order to achieve better success, we put a lot of emphasis on student and instructor interaction in that project. No other person is allowed to use any of the features or functions that admin manages without admin's consent, ensuring admin security. This module was created with appropriate features and cutting-edge technology so that both students and teachers will enjoy the platform.

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Harvest Bridge – One-stop platform for farmers

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Abstract – India has evolving economy, primarily dependent upon agricultural activities. Despite these facts, farmers of our country face many hurdles daily such as no fair prices in the market, little or no interaction with technology, and lack of decision-making support leading to risky decisions. Farmers don't get a proper price for their crops in mandi from middlemen and their abundance is causing their monopoly in controlling market prices. This causes the farmers to remain in poverty and have no authority over the market. Due to poor decision-making and having no information support from government officials regarding schemes, farmers tend to grow conventional crops and the wrong fertilizers for years and years which causes bad effects on soil. Also, being unable to identify which pests/diseases infected the crop, farmers tend to get poor yields. We have used various web and data analysis technologies like MERN and Machine learning to serve farmers of our country irrespective of their language, ethnicity, produce, etc. Thus, we aim to exploit technological resources for the betterment of the agriculture scene in India and across the world.

Keywords: MERN, Machine learning, CNN, E-Farming, Deep Learning, Precision Agriculture, social media, E-Mandi.

I. INTRODUCTION

Farming is an activity that depends upon decision-making by taking weather patterns, rainfall, soil quality, and proper timing for harvesting. Farmers also need to make sure that their products should get a proper price in the market. To overcome various decision-making dilemmas, the latest technologies like MERN stack and Machine Learning come into the picture. Doing work online saves a lot of time in comparison to offline activity. Any mistake done during choosing fertilizer or pesticide can have catastrophic effects on soil quality that can convert hectares of farmland into salt marshes. This paper addresses various such issues and digital solutions to them.

Farmers will go to the website and with a single click can choose a desired service for their daily farming chores. Farmers can also make decisions based on their location, rainfall, and soil quality calculated by using GPS data [6]. Not only that, farmers will get real-time recommendations

about fertilizers, government schemes, market trends, pesticides, which crop to grow, and many more.

Thus, we provide a one-stop platform for farmers to get everything they need with their farms including recommendation systems [2], detection systems, social media apps, buying-selling platforms, integrated chatbots, and local language support. We present various modules like Crop Care, Farm-Discuss [5], Harvest Bridge E-Commerce [1] and Agrobot to overcome farming-related issues, and ensure good yields for farmers.

II. RELATED WORKS

In web-based systems, various technology stacks are prevalent nowadays, the most used is MERN stack for both the backend and frontend.

Sneha Iyer R et al have proposed a system in which farmers can interact with customers without a middleman. Thus, providing farmers with the utmost margin and profit albeit we have also provided vendor profiles in our product. They have proposed max-priori algorithm. The max-priori algorithm is used to sort the producer and let the user (buyer) choose the farmer having the maximum quantity according to his requirement [1].

Jakia Sultana et al have given organic and inorganic methods to judge which fertilizer to grow based on soil test from this analysis and the notion that we are based in South Asia, we have concluded that prime contributors to prediction are N, P, and K (Nitrogen, Phosphorous and Potassium) as well as location [3].

Ankita Sharma et al have proposed an analysis of crop detection using various algorithms such as Decision Tree Classifier (DCT), Naïve Bayes Classifier, Random Forest Classifier, KNN (K-nearest neighbors), Gradient Boosting (GB), XG Boosting and considered various independent

variables such as rainfall, pH value, N, P, K values, temperature, humidity, etc [7].

III. BACKGROUND TOOLS

A. React: React.js is a free to license JavaScript library for building interactive User Interface having the ability to make calls with the backend.

B. Redux: Redux is used to divide website contents into various components such as dashboard component, cart component, and so on. It is used along with React.js.

C. Firebase: MongoDB is database used to store data that is not in rows and columns format such as video, audio and images, and not in .csv or table format. It offers access via REST APIs or a client library and stores data in JSON format. Firebase is used as a database for chatting apps and editing or image manipulation tools. It is developed by Google. While developing the social media module, we used Firebase as a database.

D. Flask: Flask is a backend web development framework based on Python. We have used Flask to connect ML modules with the backend.

E. Node.js: Node.js is JavaScript runtime environment used to create dynamic web applications. It is the most popular JavaScript library nowadays.

F. Mongo DB: MongoDB is a database used to store data that is not in rows and columns format such as video, audio, and images. Mongo DB is an unstructured database in which the user creates a schema. The user password and other details are stored in encrypted form using the encryption service of Mongo DB.

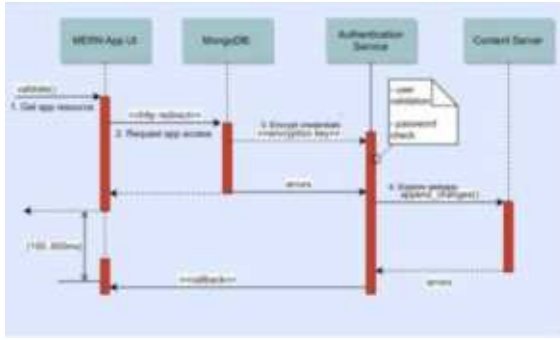


Fig1: Flow of web application

IV. PROPOSED SYSTEM

In the proposed system, the farmer first needs to submit credentials and register to the system to access various features of the website.

E-Commerce Website: Farmers will be able to buy and sell farming equipment, vehicles, seeds, fertilizers, fresh crops, vegetables, pesticides, etc. This module features an integrated chatbot, local language support (We have integrated Google Translate API with chatbot and website content. Farmers will be able to read website contents in their local mother tongues), an admin portal (graphical analysis of placed orders, added products and customer insights) and integrated payment gateway (PayPal). The Google map integration is a key feature in this module. When a seller adds a product for sale, it is displayed in real-time on this module. Farmers can lend various farming vehicles on a monthly rent basis for farming activities which can be ordered at their doorstep. Farmers and customers can write reviews and give ratings about products. The reviews are sorted in order. There is a cart system in which we can add products to a cart and buy them later [1].

Crop Care: Crop care is an ML-fuelled module that features three regression/classification models which predict the prescribed crop/fertilizer/pesticide.

The crop prediction used ensemble techniques that combine various machine learning models and collectively analyzed accuracies of models like SVM, KNN, Naïve Bayes', Random Forest, XG Boosting, Decision tree classifier (DTC), and Gradient Boosting [7]. We haven't used CNN because it has bias regarding crop prediction as CNN requires thousands and millions of neurons for computation. The dataset images can be of low resolution[8] [6].

In fertilizer, we created a dictionary in Python that stores outputs according to each condition and various if-else constructs (It compares the negative and positive values of N, P, K). Thus, by using imperative logic, we can predict which fertilizer to use.

In pesticide recommendation, we first predict diseases then we search and advise proper pesticide for the crop. We have implemented it using CNN. The pesticides are ISO certified. The output is infected pest detected and recommended dosage for the pest in terms of gram per hectare or gram per acre as directed by the company[4] [9].

It boasts multilingual support for all local languages present in India. The dataset is retrieved from various governmental and non-governmental organizations and the crop images can be fed to the model using any camera or sensor.

Agrobot: This is integrated chatbot based on Microsoft Azure's knowledge base used to provide QnA. We have included 19000 questions and answers. It also answers farmers' questions about existing government schemes which solved the problem of ineffective communication between remote farmers and government.

Farm Discuss – Farmers' social media: Farmers' social media app is intended to make farmers interact with the end user. It is developed using

React.js, Redux, and Firebase for backend and database activity technology stack and is a full-stack working web application. When the user visits the dashboard, relevant posts show up first. Users can comment, like, and share the posts. We have made the app look simple, attractive, fluid, and user-friendly using the Chakra UI. There are various post-filters such as trending, facts, news, technology, and hydro phonic (The latest agricultural technique in which we harvest without using soil). After following a particular user, his posts immediately show up. So, by using this social media app, farmers can remain in touch with the latest technologies such as hydro-phonic farming, agricultural drones, and vertical farming.

Methodology

We first identified who will be benefitted from this idea. We recognized that farmers, customers, and sellers will be benefitted while the farmers and customers will be benefitted the most. As admins or sellers cannot determine the selling price of the crops, therefore farmer has the freedom to choose the appropriate price. Thus, the predominance of middlemen in the mandi will be eliminated [1]. We also speculated that making the process online, it will also save the space of the market and prevent vegetables from wasting. Thus, we identified that four actors are participating in the system, the farmer, the customer, the vendor, and the admin.

Then we started designing features and use case diagrams, sequence diagrams, and data-flow diagrams which are shown below.

Use case illustration for the suggested model

There are maximum of three to four actors in the proposed system, an administrator, a farmer, and a seller. An administrator is responsible for verifying the data on the server side. Customers can also verify

the data on the client side. Any of the actors except the customer can edit the profile. Buyers can add the items to the cart, update the quality, checkout from the cart, move to the payment gateway, and finally make a transaction. Each of them except the admin can edit the address. Both sellers and consumers can buy materials and goods from farmers.

The below use case diagram illustrates various user-system interactions and actors involved in the system. Thus, showing the access control of various features of the application.

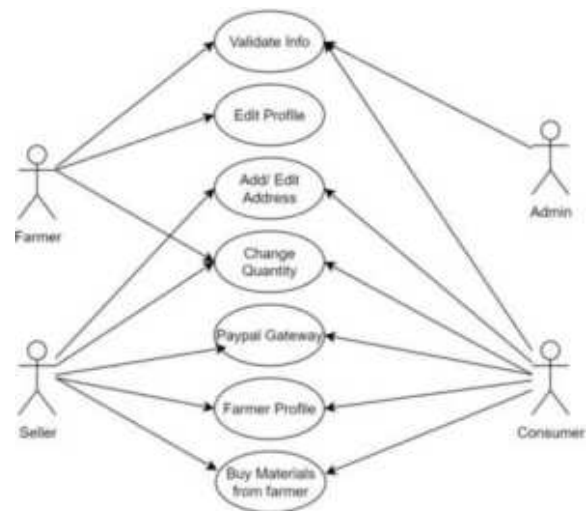


Fig2: Use case diagram

A. Workflow of the proposed model

To begin with, first farmers need to register on the page by providing appropriate credentials. Various validity checks have been designed for login use cases. The authentication keys are sent to the database server, then after validation, the user is redirected to the content server. If authentication keys don't match, we try reauthenticate and reset the API and also send an error message.

Farmers are provided with various dashboard features. Crop Care has 3 submodules: Crop prediction, Fertilizer recommendation, and pesticide recommendation system. For the crop recommendation system, we compared accuracies of

various statistical and probabilistic models such as Decision Tree Classifier, Random Forest, Naïve Bayes Classifier, SVM (Support Vector Machine), and XG Boosting. We found out random forest yields the most accuracy. The above screenshot shows one module of the app.

If farmers choose to use social media app, he needs to log in again with valid credentials. The social media app redirects users to the home page containing 4 main pages – Home, Explore, Bookmarks, and Profile. Users can either create new posts, search for users to follow, or like and comment on existing posts. There is a seamless scrolling option thereby making farmers interact and connect with other farmers. Though this app doesn't support chatting facilities as of now, farmers may give their mobile numbers and contact info in the comments down below.

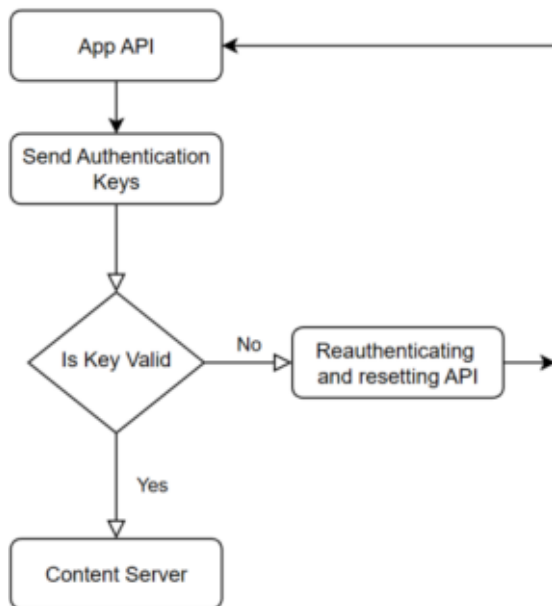


Fig3: Workflow of Proposed Model's API

Implementation details

Crop Care:

In crop recommendation models, we predict which crop will have most yield based on soil properties. Here independent property is crop and dependent properties are N, P, K ratios, temperature (in °C), relative humidity (in %), rainfall (in mm) and pH value. We have used ensemble learning method which makes use of a voting classifier. which combines various machine learning model and averages the result (soft voting). The algorithms contain SVM (with different kernel shapes – lines, polygons, softmax), KNN (with different number of neighbours), Gaussian Naïve Bayes, Random Forest [4][9].

In pesticide recommendation module, we have trained CNN (Convolutional Neural Network). In CNN, we add 3 layers (each comprising of one convolutional and pooling layer). The more the convolution layers, the more the accuracy [9]. It makes use of two activation functions ReLU and SoftMax. ReLU function is used along with Convolution layer. ReLU is used to rectify the values in CNN output. i.e., convert to non-negative values. We consider that in many cases problem space doesn't correspond to linear characteristic. We have chosen 85-15 dataset split.

Social Media:

The app dashboard contains four main pages with different feeds, Home Feed with sorted posts by Trending, Newest & Oldest Post.

Explore Page with Various Categories to filter posts by Trending, Facts, News, Technology, Hydroponic Farming, Single Post Page (User can like the post, add edit & delete a comment of post and add post to bookmark / remove from bookmark). Bookmark Page - This page consists of all posts bookmarked by the user.

Users can make the following actions:

Post CRUD Operations – The user can create a new post, add an image to the post, edit the post, update the image of the post, and delete the post.

Search Friends – Users can search for friends to follow/unfollow.

Who to Follow – The user can see the list of people whom he can follow/unfollow.

Profile Page – The profile Page shows the name, username, profile & cover image of the logged-in user and all posts created by the user. On the Profile Page, user can edit their all-profile info.

We have added Firebase authentication which checks whether login is correct or not.

V. RESULT

The implemented system resulted in a full-fledged web application for farmers. Several farmers were able to successfully register and log in to the system and make their profiles. Farmers can see various options belonging to each module. Crop care modules yield over 90% of accuracy.

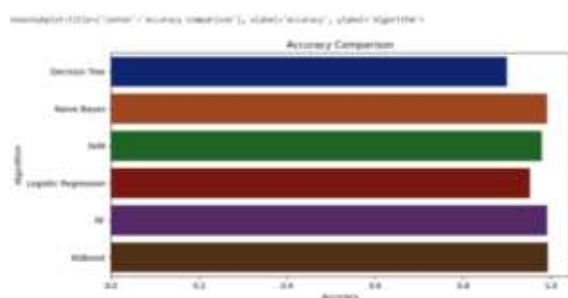


Fig4: Accuracy comparison of various ML models

In the case of the chatbot, farmers got relevant answers to their questions. E.g., farmers can get real-time weather updates, farmers can get information, and guidance about how to use modern equipment, it will also suggest fertilizers, irrigation systems, insecticides, and pesticides given the text data. In the above screenshot, you can see various products

listed. The products contain seeds, crops, vegetables, and farming equipment.



Fig5: Fertilizer recommendation output

The output reveals the difference between the expected value and current value of micro and macronutrients and also suggests organic measures for your soil. Thus, it suggests not only the implied fertilizer but also how to apply the fertilizer, which crops effectively grow on that fertilizer, and other suggestions. It finally suggests standard organic/inorganic fertilizers.

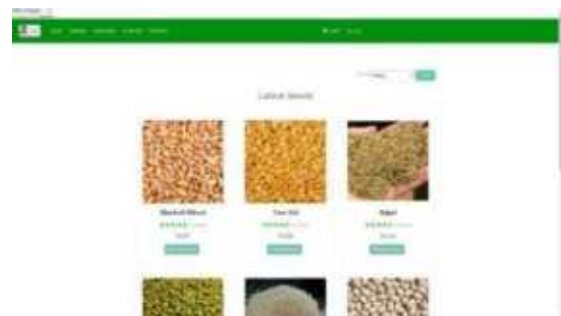


Fig6: Various products featured.

In the above screenshot, you can see various products listed. The products contain seeds, crops, vegetables, and farming equipment.



Fig7: E-Commerce App – Statistics of orders

The E-Commerce module is developed using the MERN stack. We first created an app using the npm command. The public folder contains index.html files which serve as the layout of the website. It renders options such as a dashboard, user list, product list, order list, harvest, map, and pages such as home, farmer, customer, supplier (various user roles), and insights. The source (src) folder contains JavaScript files (app.js) which are used to render components of the website.



Fig8: Farmer insights about crop demands

The E-Commerce app module also has a farmer insights feature. Farmers can see the demand for various crops and how it varies over time. This can help the farmer to decide which crop to plant for the next harvest season. Thus, it can flatten the curve of highly variant prices of crops such as onion and adjust inflation.

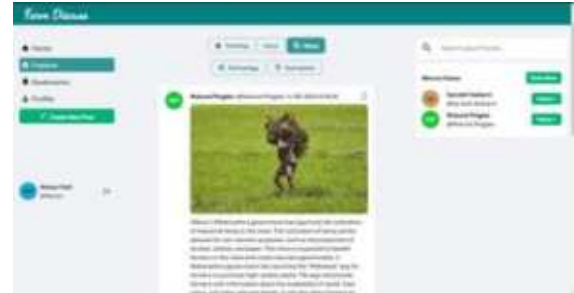


Fig9: Social Media App for farmers homepage

The above screenshot gives a glimpse of the UI of the web app. Name of the app is Farm Discuss. The app is developed using React, Redux tool kit, React Router, and Backend setup using Firebase Firestore database. React router is used for seamless redirecting from one page to another.

VI. CONCLUSION

Thus, by the amalgamation of various technologies like Machine Learning and the MERN web development stack, we have implemented an all-at-one-place web app for farmers. We were able to achieve 90% accuracy using datasets from various governmental and non-governmental organizations. Social media app made for farmers has been developed with full-fledged features and is able to show a positive impact. It will be efficient in creating a tech-savvy attitude among rural communities and farmers. Thus, we have achieved the dream of Mahatma Gandhi – Empowerment of rural India. While studying various farming goods, we got to see real India. Farmers will be in touch with all the latest technology paradigms such as Machine Learning, Blockchain, Web technologies, etc.

VII. FUTURE SCOPE

Although this project covers much of the farmer's requirements, we are eager to add as many requirements as we can. In this section, we are going to address the research gap in this field. Farmers can also search for supplemental workers around them

such as workers cutting crops, pesticide control workers, fertilizer sellers, and various workers for repairing tools. Recently, the Government of Maharashtra announced a scheme for sugarcane-cutting workers that allows them to have their unique identification and register through an app. Admins can conduct sentiment analysis of user reviews given on the E-Commerce app.

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A SURVEY ON VARIOUS PHISHING WEBSITE DETECTION TECHNIQUES AND METHODS.

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Abstract— With the escalation in demand of the internet in the last few decades, a greater number of users are growing, various organizations, banks are giving their services online, due to this delicate data of users is present on online databases. The rise in demand for the internet is a positive point for us but, it's also harmful, since attackers are doing their work between these services and users. A strong and accurate system is required to avoid this piracy done by these spammers.

In this survey paper, study is done on various malicious activities done by spammers and the techniques used to stop these activities to an optimal level. Also, studied the accuracy, advantages and disadvantages of the techniques used in these papers.

Keywords— Phishing, Machine Learning, Phishing detection techniques

1. Introduction

Nowadays the internet is becoming a bridge that connects people across the world. The internet is technology that connects various computers in the networks through standard internet protocol that serves billions of people worldwide. Mostly these users use the internet for social networking

applications, e-shopping, e-trading, online banking, data file media transfer and so many. As the internet is used by people for their benefits and convenience, but there are also some people with knowledge and intention to misuse the internet.

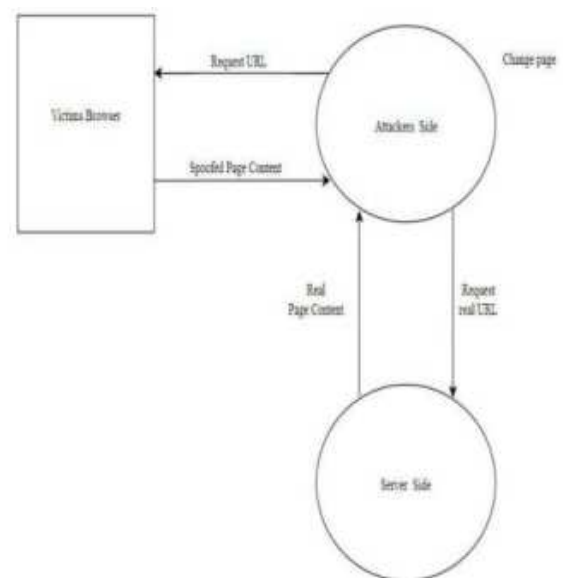


Fig 1: Steps involved in phishing attack

One of most misuse of the internet is to make money illegally. Attacker use identity theft which is stealing somebody's identity. By pretending to be someone they try to steal private information of the victim.

Phishing is sending a fraudulent email message that asks for private information of victims. Phishing is imitative and same with “fishing” which means catching fishes by trapping them. Phishing mainly starts by sending fake mails to the victims by pretending they are sent by the right and authorized party or organization [10]. The main motive and objective of such phishing mails is to blackmail and for finance gaining or other some kind of benefits.

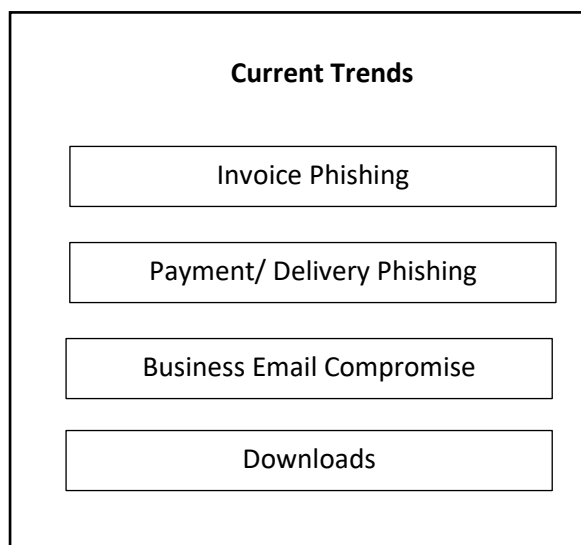


Fig 2: Current Trends in Phishing

There are various tools available which are detecting phishing websites and emails. In this survey there will be study of phishing detection tools and techniques and will review and analyse their working and the algorithms used to detect whether the site is original or not. Basically, website phishing detection is done by DNS Blacklist, Web Crawler, Heuristic Analysis, and Support Vector Machine (SVM).

2. Literature Survey

Lightweight machine-learning techniques can detect website phishing. These techniques can be applied to datasets from

Kaggle and the University of California. Algorithms used in this technique include URL similarity detection, CRNNs (Convolutional Recurrent Neural Networks), GIST vectors, and K-means clustering.

The study was conducted on Deep Convolutional Neural Networks that can detect website phishing. The phishing dataset, which contains 48 different features derived from more than 5000 various phishing or fake webpages and 5000 plus various legal websites. The algorithms used in this technique include Artificial Neural Networks (ANNs), Deep Belief Networks (DBNs), Support Vector Machines (SVMs), KNNs and Decision Tree.

The Detection of Phishing Websites can be done using Domain as well as Content analysis. Instead of using large dataset, they have proposed threshold below which websites will be considered as malicious. The algorithms used in this are the longest contiguous matching subsequence (LCS) algorithm) and compression algorithm.

The study was conducted on Phishing detection and prevention that is been done using Chrome Extension. The technique is been applied to datasets phishing tank, phishing website Dataset. The algorithms used in this technique include Support Vector Machines (SVM), Random Forest, and embedded algorithms.

A decision tree algorithm is used to determine whether the email is a phishing email or not. To train the model, dataset is generated by asking questions to the users but it is very costly to store information about all emails and this approach is mostly dependent on attached files to the emails.

Table 1: Taxonomy of Various phishing detection techniques

Sr No.	Dataset Used	Techniques /Algorithms	Limitations
[1]	Kaggle, Dataset is also obtained from University of California, Irvine's Machine Learning Repository.	URL Similarity Detection, Similarity detection module, Intention Detection, Module CRNN (Convolutional Recurrent Neural Network), GIST vector, k- means clustering algorithm.	It is not easy to find the malicious websites if the contents of websites are obvious. Use of various algorithms to reduce the dimensionality will tend to lose a lot of information of the web context.
[2]	Website Phishing dataset contains 48 different features derived from more than 5000 various phishing or fake webpages and 5000 plus various legal websites	Artificial Neural Network, Decision Tree, Deep Belief Networks (DBN), SVM (Support Vector Machine), DCNNs, KNN.	Due to lack of trained datasets, other ML algorithms are unable to perform analysing of data more precisely.
[3]	Instead of using large dataset, they have used they have proposed threshold below which websites will be considered as malicious.	Longest contiguous matching subsequence (LCS)	The tool generated by using domain content analysis is more suitable for technical users. Legitimate website with almost same names may be detected as malicious websites.
[4]	Data is gathered by asking users questions by conducting survey.	Compression algorithm, Decision tree.	It is very costly to store information about all emails. This approach is mostly dependent on attached files to the emails
[5]	Phish Tank, Phishing Website Dataset.	Support Vector Machines (SVM), Random Forest, Embedded algorithm.	Not much better features, Not capable for new systems, New pattern detection of phishing is not applied.

[6]	Various sites URL, Tools Used: Net craft, McAfee Site advisor, Avast, Quick Heal.	Blacklist Based Approach, Heuristic Based Approach, Content Based Approach	It is not effective for detecting all types of phishing and fake websites, especially for newly registered websites
[7]	It takes the web traffics, web content and Uniform Resource Locator (URL) as input features	DNS Blacklist, Web Crawler Heuristic Analysis	Blacklist as well as whitelist are used to effectively detect phishing accuracy, but must be maintained because the list of phishing website URLs must be updated manually.
[8]	RLILOJR Detecting-Malicious-URL-Using-Pyspark	Random Forest, Gradient Boosting, Neural Network, Support Vector Machine (SVM)	It only detects malicious fake websites from their URL lexical Analysis. It is not efficient when it comes to analyse using Web content.

Research Gap

As per the above study, every technique has its advantages and disadvantages. All the techniques have a single approach for detecting phishing websites. There can be a large number of scenarios of phishing on websites and emails. Detecting each phishing by using a single algorithm is tough. There is no efficient technique which is using more than one approach. The hybrid technique by using multiple algorithms can do well for a wide range of datasets of phishing.

The data set used in this technique is less so the efficiency of algorithms is moderate which can be improved by using a wide range of data and efficiency can be improved.

3. Discussion

The survey paper consists of a review and analysis of various tools that detects phishing. Table 1 summarizes the techniques discussed for the phishing detection tools available. It consists review

of all tools studied and their performance as well as efficiency. It also consists of proposed techniques for phishing detection, and the algorithms used in them, and listed out the limitations of each tool.

The techniques and algorithm used for phishing detection are URL Similarity Detection [9], Intention Detection model, CRNN (Convolutional Recurrent Neural Network), GIST vector, k- means clustering algorithm, Artificial Neural Network Deep Belief Networks (DBN), SVM (Support Vector Machine), DCNNs, KNN [12], Decision Tree, Longest contiguous matching subsequence (LCS) algorithm), Heuristic Based Approach [13], Blacklist Based Approach, Content-Based Approach [10], DNS Blacklist, Web Crawler, Heuristic Analysis[11]. There are several datasets used from Kaggle datasets and other websites.

4. Proposed system

The proposed system will be a chrome extension which will detect whether the

visited website is real or fake. The proposed chrome extension will be developed using flask for user interface.

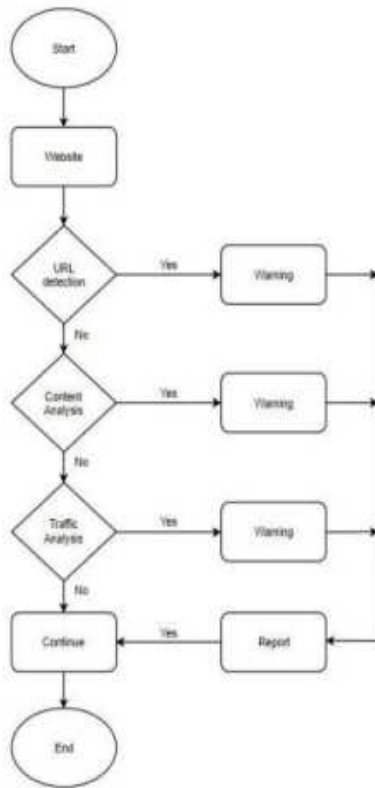


Fig 4.1 Flow chart of proposed extension

The proposed extension consists of following three phases:

1. *URL Detection*: In this phase, extension will compare the URL of visited website and the original website. The extension will perform an analysis based on the parameters such as, URL length, protocols, domain and IP address.
2. *Content Analysis*: In this phase, the extension will compare the web content of the visited website and the original website. Web content consist of images text redirecting links.
3. *Traffic analysis*: Traffic or the number of visit count of users on the actual website will be more than the

fake website. This Phase detects the traffic as well as number of visit count of users visited on the fake website and original website.

After passing through all of the above phases the chrome extension will alert the user whether the website is fake or not.

5. Conclusion

In conclusion, this study summarizes the various phishing detection techniques which describes their approach and algorithms used for detection. It also examines the limitations of each and every technique. As per above study every tool is lacking in detecting the phishing website accurately. The efficiency of algorithms or approach used by the tools can be improved by optimizing the approach or algorithms.

Some of tools are found to be non-user friendly which will be difficult for non-technical users to operate. This survey can be used to build an application for detecting phishing websites. With the algorithm studied in this survey paper, an extension-like thing for the browser can be developed.

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The Role of Media and Communication in the Science and Technology during the Covid-19 Pandemic

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ABSTRACT

The Covid-19 pandemic represents a massive impact on human health, causing sudden lifestyle changes, through social distancing and isolation at home, with social and economic consequences. Optimizing public health during this pandemic requires not only knowledge from the medical and biological sciences, but also of all human sciences related to lifestyle, social and behavioral studies, including dietary habits and lifestyle. The communication about food by governments, public health authorities, individual experts and influencers, using a wide variety of media channels is an integral element of Covid-19 information exchange has also increased, ranging from the sharing of information as to how to cope with changed food availability, to risks associated with purchase, storage and consumption of food. In this context, it is necessary to identify the relationship between the consumption of information and the appearance and worsening of psychological symptoms, as well as to map strategies to achieve effective communication of information based on scientific evidence. Through the construction of a synthesis of scientific evidence, measures to help this problem can be formulated, targeting society in general, and specifically, the health organizations and professionals. The widespread access of the population to the internet has increased the use of social media for health issues, which can contribute to the empowerment of patients and provide a closer relationship with health professionals. However, the use of social media not only provides benefits, it can be a source of inaccurate information that is not based on the science. In conclusion, we need to enhance large-scale collaborations, between industry and academia, various sectors, and different countries in this critical moment. In that sense, a cyber governance should be more concerned with the security processes that describe how people and technology interact to contribute towards building a healthy community with a shared future.

Keywords: Communication, Covid-19 pandemic, Cyber governance, Media, Science and Technology.

Use of Information Technologies in Logistics: Example of E-Logistics

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ABSTRACT

The fact that customers prefer e-commerce more in recent years as a shopping habit also increases their rate. Customer satisfaction is becoming as important a criterion as product quality. Even if e-logistics expenditures are applied correctly, customer satisfaction increases and companies' operations in e-commerce improve. In addition, as a result of this, the meeting of the order and the innovations of the product game do not affect e-logistics, a system that grows in harmony with the combi boiler. E-commerce isn't just about good product enclosures. To be successful in today's unit conditions, their groups must also have the capacity to deliver their equipment. Whether through a third-party logistics provider or by developing internal capacity; A strong e-commerce logistics process is the key to growing a successful e-commerce business.

Keywords: Information technologies, logistics, e-logistics

1. Introduction

Logistics; It is the transportation of all kinds of products, services and information flow from the arrival unit to the exit unit in order to meet the needs of people. The word logistics has emerged to describe the military function. Logistics has come to the fore with first export and import, then large-scale retailing and electronic commerce. Logistics needs to be used more and more in today's business world. E-Logistics has brought with it the spread of technology and electronic environments. The e-logistics sector is developing very rapidly in the world and in our country (Selamoğlu, 2022). The fact that countries have a larger share in the international market and that they can successfully continue their activities in the field of export has been an important factor in terms of e-logistics. To provide high quality and fastest service to customers; It is possible to evaluate the applications realized in terms of customers. The premise of the development of e-logistics is the widespread use of e-commerce (Öncel, 2022). The rapidly spreading internet has also contributed to the development of e-commerce by causing change in the business world - with the increase in commerce, the importance of e-logistics will increase. E-logistics activities require activities aimed at minimizing serious and lump-sum costs that require investing in logistics assets such as information networks or physical distribution centers. One of the benefits of using e-commerce in the logistics industry is to encourage companies to increase value by reducing costs (Akbal, 2022).

2. Logistics

Logistics refers to the process of planning, implementing and controlling the efficient flow and storage of goods, services and related information from their point of origin to their point of consumption. It involves managing the movement and storage of resources, including raw materials, inventory, finished products, and even people (Güzel & Kavalcı, 2023). It covers a wide range of activities, including logistics, transportation, warehousing, inventory management, packaging, order fulfillment, supply chain management and information systems. The main purpose of logistics is to ensure that the right product or service is delivered to the right place, at the right time and in the right condition, while minimizing costs and maximizing customer satisfaction (Selamoğlu, 2022).

3. E- Logistics and Information Technologies

Today, new information systems technologies in the logistics sector and the developments of these technologies provide very radical and deep changes in the sector. However, we can say that these changes have brought about more than one effect.

Logistics information systems are systems that are interrelated in the supplier and customer information-communication database. Chain markets can be given as an example of information systems that have a key-key role that connects the link between the supplier and the customer (Bakkal & Demir, 2011). For example, BIM. Numerical data directly reaching the supplier with the ERP & MRP software programs used in daily business activities that determine the shelf life periods, for example, show that the stock information of 10 boxes of biscuits has decreased. Logistics Information Systems combine under the roofs of planning-database-coordination-customer service communication-control to form Enterprise Resource Planning (ERP). The software systems used and the functions between the supplier and the customer, which we have given as examples above, are created by considering these frameworks (Karayün & Nagehan, 2018).

E-logistics, as the name suggests, is an electronic-based logistics. In other words; It is the use of systems based on internet technologies in the realization of logistics processes. Activities in e-logistics are supported by information technologies. Because; e-logistics includes more information and services compared to traditional logistics (Özaydın, 2003).

The e-commerce sector, which has become a very important instrument for the world economy in the past 20 years, is also transforming the logistics sector thanks to its dynamics. Today's people, while shopping in e-commerce environments, now see fast delivery as a must, in addition to all other criteria. In e-commerce, where efficient, fast and effective solutions have become more important than ever, smooth and fast running of business is about the best management of logistics (Sezgin, 2008). EDI (Electronic Data Interchange) or "Electronic Data Interchange Software" is an indispensable element of new generation logistics management. Thanks to EDI systems, businesses can share documents related to their commercial relations with each other in a completely electronic environment within a certain standard, so companies save significantly from paper transactions, time and human resources. In addition, thanks to EDI software, where all data flow is saved on the system in a redundant way, problems such as file loss and data flow disruption are eliminated. Another e-logistics software in logistics management is ERP, that is, "Enterprise Resource Planning" systems (Çelik, 2020).

3. Conclusion

Logistics is the planning, implementation and control of the movement of products and services from the point of origin to the point of consumption. In addition to this definition, knowledge

is also included in the business process. The expectations of the customers are that the logistics companies deliver the product or service to them while delivering the information about it. Today, in terms of information, the internet offers both individuals and institutions unlimited access to all over the world. Parallel to this development, e-commerce is growing rapidly, especially in the private sector. Logistics companies are at an important point in e-commerce activities. So much so that logistics companies are the only element that customers meet face to face in e-commerce applications. In addition, logistics companies are responsible for the representation of businesses engaged in e-commerce. In other words, we can say that e-commerce cannot realize itself without logistics. On the other hand, logistics companies have to keep up with this new trend. Because they can be one step ahead of their competitors by following technological developments and including technological applications in their business activities. At this point, e-logistics comes to the fore for logistics companies. In this fast-growing sector, logistics companies can ensure that the right product is available at the right place, at the right time and in the right quantity with e-logistics. In the coming years, logistics companies investing in e-logistics will be preferred and companies will be expected to focus on technological investments instead of vehicles.

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Review on Microstrip antenna technology for 5G and Applications

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Abstract— The mobile technology having large impact on social life. Antennas are core devices for wireless technology. The modern antenna designs allow a single element to be employed in many systems. The

microstrip patch antennas are essentially considered in the advancement of the latest communication mechanisms in contrast to the conventional type because they offer the advantage of being low profile along with simple or inexpensive manufacturing procedures. Mobile users need more features on their mobile phone. Service providers are in need to satisfy the needs of mobile users which is done by 5G technology. 5G technology provides very high bandwidth, reduced latency better Quality of Service, optimum capacity, wide band of spectrum availability. The main purpose of this review paper is the study of suitable antenna design for 5G technology for the use of mobile communication. 5G is operated at mm wave band in that we can provide high frequency range with large amount of bandwidth. By studying various parameters it is to check whether the microstrip patch antenna design is suitable for 5G mobile communication.

Keywords—5G technology, Mobile communication, Microstrip patch antenna, Millimeter wave spectrum

I. Introduction

Shortage in Bandwidth occurs for data devices like smart-phone, tabs. So advancement of wireless-based networks is essential. In order to increase transmission bit rates, The 5G technology employs high frequency bands and wide signal bandwidth, thereby providing better coverage with low battery consumption [1]. The conventional MPAs consists of a patch on one side of a dielectric substrate and ground plane on the other side of the substrate which is basically fed by a microstrip line or coaxial probe [2].

The proposed antenna configurations in Figure 1a[3], increasing the bandwidth of microstrip patch antennas as large as five times a single rectangular patch is obtained while in Figure 1b; a wide operating bandwidth for a single-layer coaxially fed obtained by cutting a U-shaped slot on the patch. This antenna structure with a thick substrate of $0.08\lambda_0$; has provided impedance bandwidths of 10% to 40% and high cross polarization in E plane.

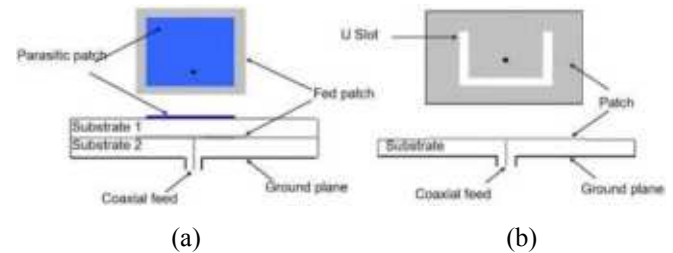


Fig. 1: Coaxial Fed Patches with Parasitic or Slot [17, 22]
(a) Stacked Parasitic Patch (double-layer), (b) U-Shaped Slot (Single-Layer)

II. Microstrip Patch Antenna

The microstrip patch antenna can be designed to integrated with much architecture to develop patterns for the current and future 5G applications system. The microstrip antenna is light, compact and integrated into the module circuit, it is essential to support the mobile terminal of wireless communication systems. The various types of systems considered for comparison include millimeter-wave, broadbanding techniques, dual/multi-band or reconfigurable structure, size-reduction, compact, low-profile, impedance bandwidth, high gain or linear and circular polarization applications [4].

III REVIEW OF MICROSTRIP PATCH ANTENNA DESIGN AT 28 GHZ FOR 5G APPLICATIONS

The antenna structure in Figure 1a [6] consist of a very thin ($0 < t \ll \lambda_0$), where λ_0 is the free-space wavelength), metallic strip (patch) placed a small fraction of a wavelength ($h \ll \lambda_0$, usually $0.003\lambda_0 \leq h \leq 0.05\lambda_0$) above a ground plane. [5] For a rectangular patch, L represents the length of the patch which usually $\lambda_0/3 < L < \lambda_0/2$, which controls the antenna frequency and W represents the patch width which is smaller than λ_0 [7].

The patch length L of the antenna is given as:

$$L = \frac{c_0}{2f_r \sqrt{\epsilon_{ref}}} \quad (1)$$

The patch width W of the antenna is given as:

$$W = \frac{C_0}{2f_0 \sqrt{\frac{2}{1+\epsilon_r}}} \quad (2)$$

The dimensions are determined by the permissibility of the substrate. The electrical resistance characteristic of the patch also depends on the size and the permittivity of the patch antenna. The length (L_g) and width (W_g) of the ground plane are calculated using equations (3) & (4).

$$L_g = 6h + L \quad (3)$$

$$W_g = 6h + W \quad (4)$$

Beamforming capability of the radiation pattern to perform spatial scanning is demanding antenna feature in the emerging of 5G technology.[4]

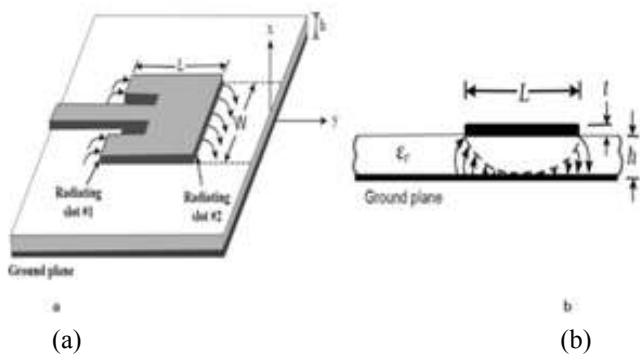


Fig. 2. Microstrip antenna structure from [6]: (a) Microstrip antenna and (b) side view

IV. COMPARATIVE ANALYSIS OF DIFFERENT ANTENNA DESIGN FOR 5G[8]

Different types of antennas are designed for 5G mobile phones are analyzed based on type of antenna, techniques and materials used for antenna design and their advantages are tabulated in table I.

TABLE I. COMPARATIVE ANALYSIS OF DIFFERENT ANTENNA DESIGN FOR 5G

Paper	Type of antenna used or materials used	Technology used	Features/ advantages
[11]	Rectangular shaped microstrip patch antenna, FR4 substrate and Coaxial feed	CMOS technology	Simultaneous use of mobile phones, Avoid shortage of bandwidth
[10]	Wideband slotted microstrip patch antenna, Roger RT/ Duroid 5880 substrate and microstrip line feed	MIMO technology	To improve gain
[9]	Microstrip patch antenna, CPW feed is used with Roger RT/ Duroid 5880 substrate	Fractal technology	Better impedance matching, multiple band spectrum

V. ARCHITECTURE OF 5G

5G technology depends on IP based. It is the stage where radio technology can improve through which enough connection of devices.

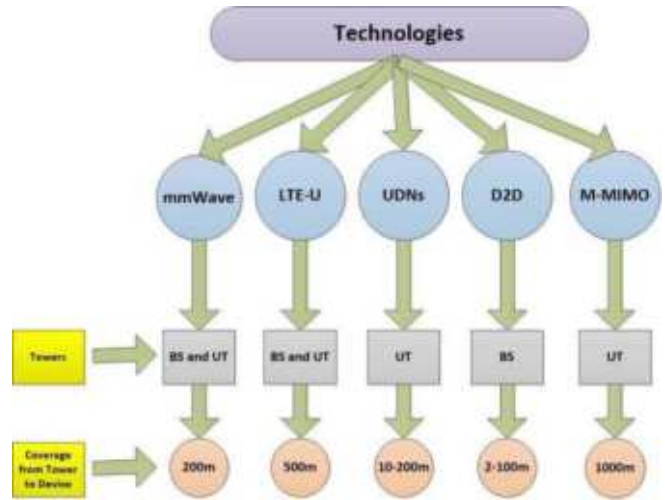


Fig.3. TAXONOMY OF 5G TECHNIQUES

Above taxonomy defines the connection of technologies with their respective techniques and their constraints which defined the range of accessing the tower to device.

VI. conclusion

The microstrip patch antenna can be designed to integrated with much architecture to develop patterns for the current and future 5G applications system. For conventional low-gain resonant antenna alternatives are MPAs at mm-wave.

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Voice Based Medical Assistant Chatbot

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Abstract - *The primary purpose of the healthcare chatbot system is to assist people who are unable to arrange consultations together with specialists at public hospitals or in remote places, and also to obtain medical information from them. They can use the chatbot to fix the issue they have. 1 Due to rising birth rates, dropping mortality rates, and medical developments, India does not have enough doctors to meet the demands of the country's growing population. Visits to local government medical facilities, where a scarcity of doctors is a major role in patients obtaining inadequate care, resulting in patient mortality in certain circumstances, may help one better grasp this scenario.*

Keywords - *NLP, Machine Learning , Chatbot, Medical Chatbot, Natural Language Processing, Machine Learning, Bot.*

1. INTRODUCTION

Welcome to the world of voice-based medical assistant chat bots, where cutting-edge technology meets healthcare. Here, cutting-edge technology converges with healthcare to create the realm of voice based medical assistant chat bots. This groundbreaking solution uses artificial intelligence and natural language processing to build a smart virtual assistant that can help you with a range of medical tasks and enquiries via the ease of voice communication.

The voice-based medical assistant chat bot's goal is to give people individualised, precise healthcare information, direction, and support. This chatbot is available to assist you whether you're looking for general health advice, details on particular medical concerns, or support managing your daily healthcare routine.

Powered by state-of-the-art algorithms and machine learning techniques, the chat bot can understand and interpret your voice commands and questions, providing you with relevant and reliable information in real-time. It has been trained on vast amounts of medical knowledge and continuously updated with the latest advancements in the field, ensuring that you receive the most up-to-date and accurate responses.

The voice-based medical assistant chat bot can perform a wide range of tasks, such as:

Providing general health information: You can ask questions about symptoms, treatments, and preventive measures for various health conditions.

Appointment scheduling: You can ask the chat bot to help you schedule appointments with healthcare providers based on your availability and location.

Wellness suggestions and guidance: The chat bot can provide personalised wellness tips and advice, including food and exercise recommendations.

Emergency assistance: In critical situations, the chat bot can guide you through basic first aid procedures or provide contact information for nearby emergency services.

Please note that while the voice-based medical assistant chat bot is designed to provide accurate and reliable information, it is not a substitute for professional medical advice. Always consult a healthcare professional for specific medical concerns or emergencies.

Embrace the future of healthcare and experience the convenience and efficiency of a voice-based medical assistant chat bot. Let this intelligent virtual assistant be your guide on your journey towards better health and well-being.

1.1. Problem Statement

Regularly having access to a hospital and a doctor is difficult. It takes time and money to get in touch with hospitals for standard consulting. Localised people must have simple access to medical specialists, which is made possible by a machine learning technology. In order to extract information about qualified doctors, open slots, and the hours when clinics and pharmacies are open, Chabot's is integrated into the medical facility's system.

1.2. OBJECTIVE & SCOPE OF PROJECT :

Scope:

Before reaching a doctor, the goal is to compose a chatbot for healthcare utilising intelligent technology that can identify the illness as well as provide basic information about it. The chatbot saves the information in a database to recognize the query terms, make a decision, and respond to the query.

Objectives:

- To provide medical information
- To Schedule medical appointments
- To collect patient data
- To provide mental health assistance
- To Request prescription refills

2. LITERATURE SURVEY

Humans typically need to visit a hospital or doctor for a routine checkup or worse, for a minor illness. It takes a lot of time and is really chaotic. Users need to contact a doctor because they are unable to identify all diseases' symptoms or treatments from this issue. Additionally, it is impossible if they begin dealing with their patients over telephone calls. Only technology can effectively address such issues. So let me introduce you to medical chatbots, which are very intelligent and have exceptional problem-solving abilities. The use of these chatbots has been proved to be quite beneficial for 3 advice for patients with minor illnesses who are on a daily basis. Natural language processing in medical chatbots allows them to quickly address people's health-related issues. Using Google's speech to text conversion and Chatbot's reverse functionality, even a beginner user may ask any query about their health with ease. On the designated 1screen of

an Android smartphone utilising the Android App, the medical chatbot gets the question and provides the response [1].

Patients and tasks in the medical profession have found virtual assistants to be of great assistance. Florence, Molly, and Ada, three of the most prominent chatbots, are extremely practical chatbots with strong algorithms that enable them to look after human health by offering medical aid whenever and wherever they are needed. These bots are created with a conversation with people in mind while adhering to the fundamental principles of artificial intelligence. Users can now speak with a medical chatbot straight from their homes, eliminating the need for them to physically visit the hospital. These chatbots have the special capacity to help people via apps, texts, and instant messages. In order to speed up, support, and improve operations, chatbots have previously been used in various industries, such as the manufacturing of automobiles, robotic hands, retail, etc. This technology is spreading throughout the healthcare industry as well, as Chatbots are assisting patients with a variety of duties [2].

The replacement of many human-performed duties by chat-bots includes online instructors and customer support representatives. Chatbots have undergone various adjustments and improvements since rule-based bots were originally created, eventually resulting in sophisticated artificial intelligence chatbots. When compared to an older chatbot, the work of an advanced chatbot has significantly enhanced. These days, these bots are able to communicate and interact with people while also learning from them. The major objective 1 of this study was to review previous research on chatbots, also known as conversational agents or chatbots, using bi-biometric analysis. This study can tremendously help other researchers by pointing up possible research areas in modern chatbots. The finding, which will lead to the creation of new learning methods, was rather unexpected given how amazing a new study opportunity chatbots offer. This ground breaking technology will advance chatbot research to a new level. The results of this analysis have been supported by multiple study references [3].

Chatbots converse with social users using human language, just as people do when speaking to one another. Software applications known as chatbots are designed to communicate with people using everyday language. These computer programmes sought to trick socially engaging people into believing they were conversing with someone else. This research paper's goal is to examine currently available chatbots, often known as; ELIZA, ALICE. Additionally, to clarify that since ALICE is built on straightforward pattern matching algorithms, creating chatbots with it is trivial. While ELIZA is built on rules, creating a chatbot with ELIZA is challenging. The intended answer is to deploy ALICE as a student information system, a domain-specific chatterbox that will assist students in resolving a variety of questions about colleges.[4]

The term "chatbot" refers to computer programmes that replicate human communication via either voice or text messages. They are frequently referred to as "chatter robots." The initial and primary purpose of chatbots was to appear intelligent and fool users about their true nature. The use of chatbots has considerably increased as more of them with different designs and capabilities have been developed [5].

3. SYSTEM ANALYSIS

3.1 SYSTEM ARCHITECTURE

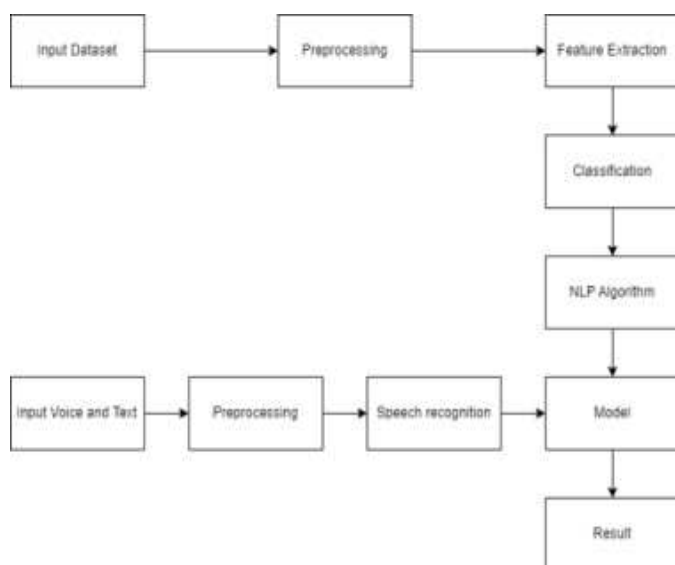


Fig. System Architecture

3.2 METHODOLOGY

Proposed System

Several phases are involved in creating a medical chatbot employing NLP algorithms, including data gathering, pre-processing, model training, and deployment. An overview of how to create a medical chatbot using NLP algorithms is given below:

- 1. Identify the use case:** The first stage is to decide what your medical chatbot will be used for. For instance, you might wish to create a chatbot that can assist patients in scheduling appointments, give general medical advice, or classify symptoms.
- 2 Gather and prepare data:** After determining your use case, you'll need to gather and prepare data in order to train your chatbot. You can either gather your own data or use pre-existing medical databases. To normalise the text data, preprocessing entails actions like cleaning, tokenization, and stemming/lemmatization.
- 3. The NLP model must be trained** in order to comprehend and reply to user inquiries. For this, you can utilise well-known NLP libraries as spaCy or NLTK. To train your model, you can use either supervised or unsupervised machine learning methods.
- 4. Build the chatbot:** After training your NLP model, you'll need to integrate it with a chatbot framework such as Dialogflow, Rasa, or Microsoft Bot Framework. You can use pre-built templates or create your own conversational flow.
- 5. Deploy the chatbot:** Once you've built your chatbot, you'll need to deploy it on a server or cloud platform. You can use platforms like AWS, Azure, or Google Cloud Platform to deploy your chatbot.
- 6. Continuously improve the chatbot:** After deploying your chatbot, you can continuously improve its performance by collecting user feedback, monitoring conversations, and refining your NLP model.

Overall, building a medical chatbot using NLP algorithms involves several technical challenges, but with the right tools and expertise, it is possible to create a useful and effective tool for patients and healthcare providers alike.

Module

•**Pre-processing**-In Natural Language Processing (NLP) approaches, cleaning and converting raw text input into a format suitable for analysis is a vital step.

Text Cleaning: Removing unnecessary characters or symbols like punctuation, special characters, or emojis. Converting the text to lowercase or uppercase, depending on the specific requirements of the algorithm. Removing or replacing numbers, URLs, email addresses, or other irrelevant information.

Tokenization: The division of the text into tokens, or individual words. This process aids in dividing the text into digestible chunks for further study. Tokenization can be carried out using straightforward methods like whitespace splitting or more complex ones such as employing tokenizers that are tailored to particular languages.

•**Feature extraction**- For it to use machine learning methods for analysing natural languages (NLP), raw text data must be converted into a numerical representation. The algorithm can identify patterns, make predictions about the future, and carry out other activities thanks to this numerical representation, known as vectors of features, which gathers pertinent data from the text.

Text Cleaning: Before extracting features, various cleaning procedures are routinely used to eliminate noise and superfluous information from the text. This could include removing punctuation, changing text to lowercase, removing stop words (common words like "the," "is," and so on), and dealing with uncommon letters or symbols.

Tokenization is the initial step in feature extraction, and it entails breaking down the text into smaller parts known as tokens. Individual words, phrases, or even characters can be used as tokens. Tokenization aids in the creation of standardised input for subsequent processing.

•**Classification**- The act of giving predefined labels or categories to raw textual information is referred to as the categorization stage in the processing of natural languages (NLP). With many applications, include sentiment analysis, identifying spam, topic classification, intent recognition, and others, this is a significant problem in NLP.

NLP -

Algorithms for natural language processing (NLP) are essential to a medical chatbot's operation. The application of NLP enables the chatbot to comprehend user questions and assertions and produce responses that resemble those of a human being. A medical chatbot's NLP algorithm is described in the following way:

1. Tokenization is the initial step in natural language processing (NLP), which comprises breaking the input text up into individual tokens or words. The programme can fully examine the text and understand sentence structure thanks to tokenization.

2. Stop Word Removal: Many words, such as "and," "the," or "is," in a phrase do not have a meaningful significance and can be disregarded. By removing these frequent terms from the text, stop word removal lowers noise and increases the effectiveness of following analysis.

3. NER recognises and categorises named entities in text, such as medical diseases, drugs, symptoms, or anatomical words. This stage is critical in medical chatbots since it aids in the extraction of essential information from user inquiries in order to offer proper responses.

4. By assigning grammatical tags to each word in the text, POS tagging clarifies each word's syntactic function and relationship to other words. The usage of POS tags makes it easier to understand a statement's context, which is essential for proper interpretation.

5. Lemmatization/Stemming: Lemmatization and stemming are processes that reduce words to their basic or root forms. This procedure guarantees that alternative spellings of the same word (for example, "running" and "ran") are regarded the same, boosting the algorithm's capacity to recognise and reply to comparable queries.

6. The user Sensation Disambiguation: A word may have several meanings, depending on its context. By assisting the algorithm in finding the proper meaning of ambiguous words, disambiguation of word sense enables more precise comprehension and response generation.

7. Sentiment Analysis: Sentiment analysis determines the sentiment or emotion expressed in a user's statement. This

analysis can help the chatbot understand the user's mood, satisfaction level, or urgency, allowing for appropriate responses and empathy.

8. Intent Recognition: Intent recognition identifies the purpose or intention behind the user's query. In a medical chatbot, it helps categorize user requests into relevant domains such as diagnosis, treatment, medication information, or appointment scheduling.

9. Dialogue Management: Maintaining the context and flow of the discourse is the goal of dialogue management. It enables the chatbot to keep track of user preferences, remember previous interactions, and produce meaningful responses based on the present and previous dialogue.

10. Answer Generation: After analysing the user's query and determining the intent, the chatbot delivers an appropriate response. Depending on the complexity of the medical chatbot system, this response can be based on pre-defined knowledge machine learning models or a combination of both.

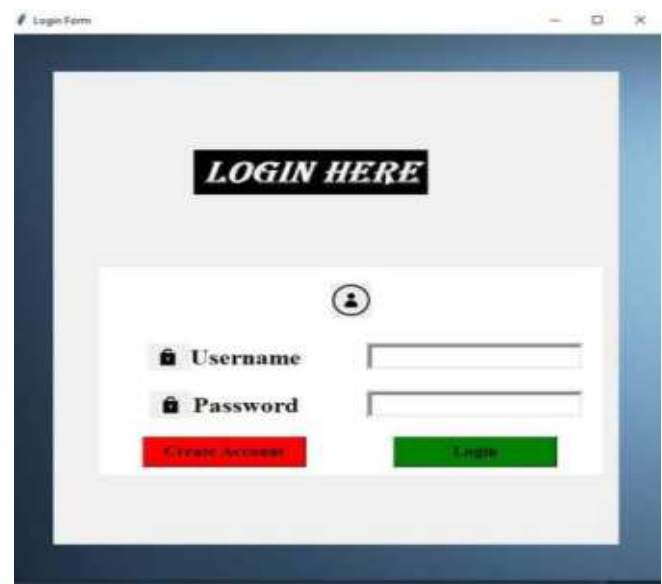
These NLP algorithms collaborate to allow a medical chatbot to properly interpret and reply to user queries. Using these strategies, the chatbot can deliver accurate information, offer medical advice, make recommendations, and assist users with their healthcare requirements.

4. RESULT



The image shows a web browser window titled "Registration Form". The form has a pink background and contains the following fields: Full Name, Address, Email, Phone number, Adhar number, User Name, Password, and Confirm Password. Each field has a corresponding input box. At the bottom of the form is a yellow button labeled "Register".

Figure: Registration Page



The image shows a web browser window titled "Login Form". The form has a white background with a blue border. At the top, there is a black button labeled "LOGIN HERE". Below this, there is a user icon, followed by fields for "Username" and "Password". At the bottom, there are two buttons: a red button labeled "Create Account" and a green button labeled "Login".

Figure: Login Page



Figure: Main Page

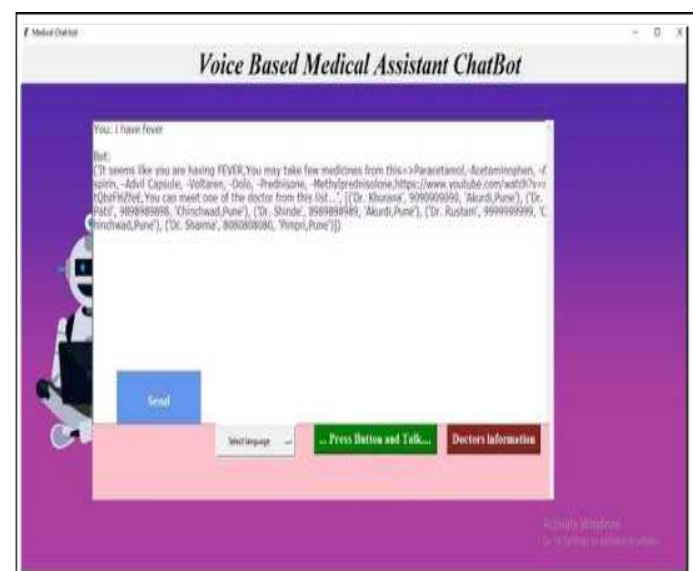


Figure: Output Page

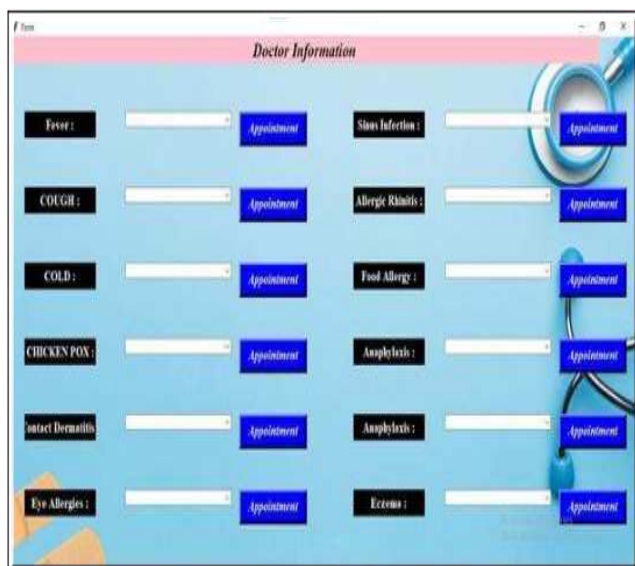


Figure: Appointment Page

5. CONCLUSIONS

According to a study of many journals, the use of Chatbot is user pleasant and can be used by anyone who knows how to text in their own language on the mobile app or desktop version. Based on symptoms, a medical chatbot gives personalised diagnoses. The bot's symptom recognition and diagnostic ability could be greatly improved in the future by adding support for more medical parameters, such as location, duration, and strength of symptoms, as well as more detailed symptom description.

FUTURE SCOPE

The future scope of medical chat using NLP (Natural Language Processing) algorithms is quite promising. Here are some potential areas where it can have a significant impact

Patient Triage and Symptom Analysis: NLP algorithms can help with patient triage by looking at their symptoms and making quick evaluations. Chatbots can converse with patients, posing pertinent questions and making suggestions in accordance with the symptoms mentioned. This can facilitate the healthcare procedure and provide patients some first direction.

Mental Health Support: NLP algorithms can be employed to provide mental health support through conversational agents. These chatbots can offer empathetic interactions, provide coping strategies, and monitor mental health symptoms. They can also help identify individuals in need of urgent mental health intervention and connect them with appropriate resources

Clinical Documentation and Data Entry: NLP algorithms can streamline clinical documentation and data entry processes. By automatically extracting information from patient-doctor conversations and populating electronic health records, NLP-powered chat systems can reduce administrative burdens on healthcare professionals and improve accuracy and efficiency.

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Voice Vault using Python

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Abstract— The Voice Authenticated Storage system is a Python-based desktop application that aims to provide secure cloud storage through advanced encryption algorithms. In addition to encrypted cloud storage, the system also provides robust user authentication using a Voice Recognition System. Voice characteristics are continuously measured using liveness detection, requiring users to utter a specific word to complete actions. Alternatively, voice patterns can be measured passively, adding an extra layer of security. User voices are locally verified against stored patterns, with a token sent to the service provider for access authorization. The team developed a voice recognition system using machine learning and the Python programming language. Access is only granted to users whose voice patterns match those previously stored in the system. The team utilized the python_speech_features and pyaudio modules for capturing voice samples, and the GMM model (Gaussian Mixture Model) for preprocessing them.

Keywords—Machine Learning, Encryption, , Voice, Secured.

I. INTRODUCTION

Data security is important for businesses because it helps to protect their most valuable assets. This includes customer data, financial information, and company secrets. When this data falls into the wrong hands, it can be used to commit fraud, identity theft, and other malicious activities. In some cases, sensitive data can be sold on the black market.

In today's environment, where insecurity is everywhere security has been one of the important issues. There are so many issues in today's world like password hacking and because of hacking there are cases of leaking of data that leads to violation of privacy. Regular security system contains passwords like character passwords her mixture of different characters this type of passwords can it can be easily hack , so there is a need to come with better authentication biometrics is the best option For providing security voice biometric is an emerging area especially for the purpose of authentication.

In voice biometric speaker recognition is performed with the help of the unique characteristics of human voice including physio-logical and behavioral characteristics. These characteristics have specific and appropriate features of voice and have potential to recognizing a person. With this approach it is also possible to authenticate a person irrespective of changes of environment or channel. This approach is very useful and cost effective as it is voice based biometric technique which is easily available in this digital era.

In this system, the main agenda is to Secure the Data Provided by Customers and provide secure storage for that data.

Voice recognition is a form of biometrics, and voice

authentication is the use of a user's speech to authenticate users. Like fingerprints and facial scans, voice and user speech can serve as a unique marker of a user's ID. This fact means that voice authentication carries many of the same advantages of other biometrics.

II. LITERATURE SURVEY

Name:- Z. Yan and S. Zhao, "A Usable Authentication System Based on Personal Voice Challenge," 2016 International Conference on Advanced Cloud and Big Data (CBD), 2016, pp. 194-199, doi: 10.1109/CBD.2016.042.

Description:- User authentication is a major approach to guarantee the security of online or cloud services when using user devices such as tablets or mobile phones to access remote servers. Usability is an important issue that greatly influences the acceptance of a user authentication mechanism. Nowadays, a very common way for user authentication is based on the match of the user's password with the registered one or using fingerprint.

Name:- A. Cocioceanu, M. Barbulescu, T. Ivanoaica, M. Raportaru and A. I. Nicolin, "Testing voice-based biometrics authentication platforms for Romanian utterances through infrequent consonant clusters," 2016 15th RoEduNet Conference: Networking in Education and Research, 2016, pp. 1-4, doi: 10.1109/RoEduNet.2016.7753205.

Description:- Investigating the occurrence rate of two-letters consonant clusters in the Romanian lexicon, we rank the clusters by their frequency and determine those with minimal occurrence rates. Our table of infrequent consonant clusters can be used to construct Romanian utterances for voice-based biometrics authentication platforms.
Name:- A. Boles and P. Rad, "Voice biometrics: Deep learning-based voiceprint authentication system," 2017 12th System of Systems Engineering Conference (SoSE), 2017, pp. 1-6, doi: 10.1109/SYSOSE.2017.7994971.

Description- In this article, an analysis of how a text-independent voice identification system can be built is presented. Extracting the Mel-Frequency Cepstral Coefficients is evaluated and a support vector machine is trained and tested on two different data sets, one from LibriSpeech and one from in-house recorded audio files.

Name:- 4. V. Lupu, "Securing Web Accounts by Graphical Password and Voice Notification," 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), 2018, pp. 1-5, doi: 10.1109/ICE.2018.8436303.

Description:- This thesis studies and implements voice biometric authentication system on Android smart phone platform. Firstly, the characteristics of voice database and voice recognition and authentication system flow are introduced. Then, a random shuffling algorithm is used to generate a voice cipher. After this, the voice feature extraction algorithm based on MFCC is introduced.

Name:- M. Pradhan, C. Pradhan, B. S. P. Mishra and A. Kaustav, "Authentication Using 3 Tier Biometric Modalities," 2018 International Conference on Communication and Signal Processing (ICCSP), 2018, pp. 0733-0736, doi: 10.1109/ICCSP.2018.8524318.

Description:- A real-time multi-factor authentication method that uses voice calls to communicate system generated one-time-passwords. The exploitation results are presented for the migration from the traditional authentication system to the proposed one.

Name:- X. Zhang, Q. Xiong, Y. Dai and X. Xu, "Voice Biometric Identity Authentication System Based on Android Smart Phone," 2018 IEEE 4th International Conference on Computer and Communications (ICCC), 2018, pp. 1440-1444, doi: 10.1109/CompComm.2018.8780990.

Description:- A 3 tier architecture is proposed and implemented with the help of biometric modalities. The security is provided by the combination of voice, face & fingerprint authentication by achieving 3 tier architecture. The performance of different biometric modalities is found to be quite secure.

Name:- S. V. Melnik and N. I. Smirnov, "Voice Authentication System for Cloud Network," 2019 Systems of Signals Generating and Processing in the Field of on Board Communications, 2019, pp. 1-4, doi: 10.1109/SOSG.2019.8706794.

Description:- SpeakPrint extracts MFCC feature in normal voice frequency and MMSI features from ultrasound signal. An SVM classifier is trained to detect these attacks by comparing above feature differences. We implemented SpeakPrint on Samsung S5 and conducted experiments on 40 users.

Name:- H. Dai, W. Wang, A. X. Liu, K. Ling and J. Sun, "Speech Based Human Authentication on Smartphones," 2019 16th Annual IEEE International Conference on Sensing, Communication, and Networking (SECON), 2019, pp. 1-9, doi: 10.1109/SAHCN.2019.8824958.

(B. Nithya, Dr.V.Ilango), ICICCS, 2017

Description:- Voice authentication is very perspective technology. It doesn't need any special biometrical devices, like finger scanner or face detector. It can be use in any place and in any channels. Our algorithm can help to recognize person by special digital voice portrait. It can be use in direct stream and in real time. It can also use in On-Board telecommunication components.

Name:- V. Vassilev, A. Phipps, M. Lane, K. Mohamed and A. Naciscionis, "Two-factor authentication for voice assistance in digital banking using public cloud services," 2020 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence), 2020, pp. 404-409, doi: 10.1109/Confluence47617.2020.9058332.

Description:- Several prototypes of authentication service with two-factor authentication for the purpose of voice-controlled digital banking and online payments have been developed at the Cyber Security Research Centre of London Metropolitan University.

Name- 10. C. Shayamunda, T. D. Ramotsoela and G. P. Hancke, "Biometric Authentication System for Industrial

Applications using Speaker Recognition," IECON 2020 The 46th Annual Conference of the IEEE Industrial Electronics Society, 2020, pp. 4459-4464, doi: 10.1109/IECON4339

Description- Biometric authentication has gained popularity in recent years as knowledge-based authentication methods overburden users. This is because users are required to remember distinct and secure passwords for each system where they are registered.

III. PROPOSED METHODOLOGY

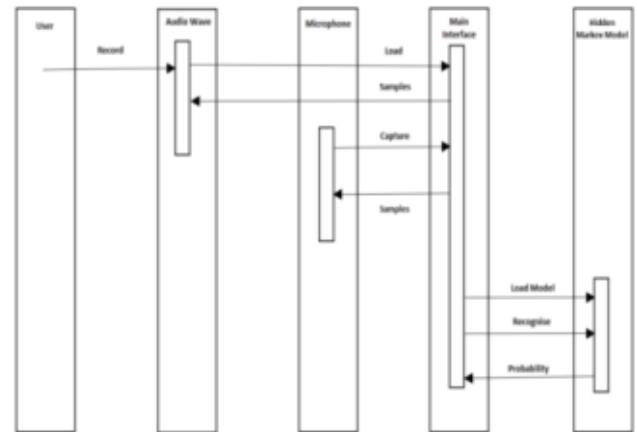


Fig 1. System architecture

When user wants to interact with the system, user must have login id which is register with the system and already have register voice samples for Authentication of their identity. First of all, when user interacts with the system, he gets login window which gives options like register new user, into the system. When he clicks on new registration user, he gets new window to register his voice sample and register himself. Or next option if user already register then he has to authenticate the voice when he input his voice then voice sample match with the stored sample After that extracted voice feature get matched with the new voice sample features if match score is greater than user gets authenticated and he get access to the stored data if features are not matched then user declared as an imposter. This authentication process is processed using API for online Authentication.

Description:

Module 1:

In this system we take the voice samples of the user using pyaudio and train model using those samples.

Module 2:

detecting voice and verification.

Algorithm:

To estimate the GMM model parameters from training data, we utilize the maximum likelihood (ML) estimation method. We repeatedly apply the expectation-maximization algorithm to acquire ML parameter estimates, which include mean, variance, weight, and log likelihood.

In developing this application, we utilize various algorithms related to cryptography and steganography. For instance, in AES encryption, plain text must be precisely 128 bits in length, while the key size may be 128, 192, or 256 bits. To implement 128-bit AES encryption, we first perform a one-time initialization

process, which involves expanding the key of a 16-byte block and initializing a 16-byte plain text block called "State." In each round, we continue with the next operation, which involves applying the S-Box to the state, rotating plaintext line K by K bytes, performing a column merge operation, and XORing state with the button.

A. An examination of the voice recognition technology.

The human voice is the most common and primary means of communication, making it a common method of interacting with computers. Voice is a natural and efficient way for people to exchange information. The process of converting a sound signal into a sequence of words using a computer program is called speech recognition. Voice processing is one of the most fascinating aspects of signal processing. However, digitalizing voice has been a significant challenge in recent years. Nonetheless, people expect computers to have voice interfaces since spoken language dominates human communication.

This paper explores the various types of voices, with voice recognition being a subset of pattern recognition. The voice recognition system can be thought of as having four stages of operation: 1) analysis, 2) feature extraction, 3) modeling, and 4) testing. For voice feature extraction, MFCC is used, with GMM and HMM being the optimal choices.

B. Using Mel frequency cepstral coefficients to identify voices.

To reduce data processing, we utilized the Mel Frequency Cepstrum Coefficient (MFCC) and vector quantization (VQ) techniques in voice identification. The goal of this process is to identify the speaker by using speech samples or speech from a group of speakers. Voice verification is used to confirm if the speaker is the person who claims to be. We used the MFCC technique for voice identification and VQ for data reduction of the extracted features. The results show that the system's identification rate improves as the number of centroids increases. The best outcomes were obtained with the combination of mel frequency and humming window. This study shows that even a linear scale can achieve reasonable detection rates by using more centroids, despite an increase in the number of votes. Therefore, increasing the number of centroids is necessary when the number of votes increases. However, the recognition rate on a linear scale decreases significantly as the number of voices increases. Mel scale is also less prone to changes in vocal cords over time. Incorporating Hidden Markov Model (HMM) can improve segmentation efficiency and accuracy while dealing with crosstalk, laughter, and different voices. The extracted parametric representation of the acoustic signal can be used to further enhance the identification rate using a more effective normalization algorithm.

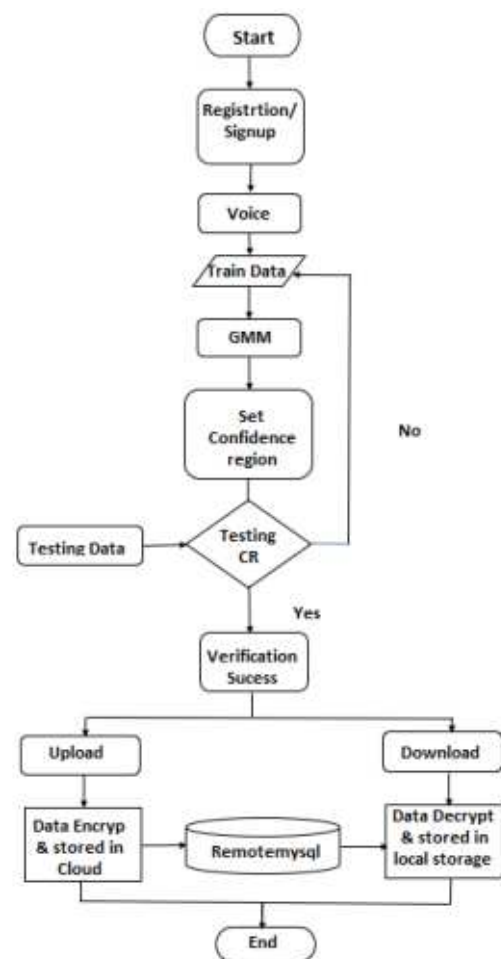
C. GMM Recognition

The speaker is identified via GMM recognition using log probability. It recalculates the speech vector's log likelihood and compares it to the value previously saved. Access to the full speaker is granted by a log likelihood equal to the stored value.

System Working

The first step for a user is to create an account by providing a username and a master password. Upon the initial login, the user will be authorized and subsequently logged in through voice recognition methods. All subsequent logins will be voice-based, confirmed, and logged in to the interface. Once logged in, the user will be directed to the home page. To secure the file, we use steganography technique along with the AES (Advanced Encryption Standard) algorithm, and the file will be uploaded to the cloud storage in its encrypted form. To access the text file, the user needs to locate and download the encrypted file from the database, which will then be saved in the Downloads folder. The user-friendly interface minimizes the need to remember multiple passwords, making the application efficient.

Flowchart



IV. RESULT AND DISCUSSION

This paper presents the proposed real-time voice identification system. To extract features, the system employs the use of MFCC, while GMM is used for training. The system captures the

user's voice via a microphone, after which voice features are retrieved. The hamming window technique is utilized to minimize dis-continuities at the frame's edge, resulting in smooth frequency transmission in speech signals. The use of Mel Frequency Cepstral Coefficients produces 15 coefficients, utilizing 40 Mel filters. These coefficients are then passed to GMM for use during the training phase. The identification of users is achieved by comparing the logarithmic probability with the threshold specified by the system, thereby minimizing the need to remember multiple passwords.

V. CONCLUSION

This application enhances the security of all media types, including text files, photos, and videos, by preventing unauthorized access. The application employs a voice security technique for authentication, followed by encryption of the files, making it even more secure. Cryptography technology, specifically the AES Encryption, further bolsters the security system by virtually eliminating the possibility of a breach. Consequently, a novel security solution has been developed, enabling users to lock and unlock their files while also storing them in the cloud. This program is user-friendly and cost-effective, adding to its appeal.

VI. REFERENCES

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Bigdata Analytics

Inventory Management System

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Abstract— Billing Android App is a service that enables you to sell digital products and content in your Android app. A Billing Android App is the method by which a company bills and invoices its clients. Payment software, which automates the process of collecting payments, sending out periodic invoices, expense tracking, and invoice tracking, is commonly included in billing systems. The billing system consists of procedures and processes that assist in the creation of client bills and invoices. Billing systems nowadays include software that allows clients to receive bills and invoices both offline and online. The billing software allows you to keep track of which items and services your customers utilize, as well as generate and send invoices and accept payments. Some billing platforms, on the other hand, can do a lot more. They can automate the mundane duties that your finance department faces on a regular basis.

Keywords—B2B, E-Commerce

I. INTRODUCTION

This project is aimed at developing a desktop-based application named Inventory Management System for managing the inventory system of any organization. The Inventory Management System (IMS) refers to the system and processes to manage the stock of an organization with the involvement of a Technology system. The project “Billing System” is an application to automate the process of ordering and billing of a “Departmental store”. This android-based application is designed considering the chain of departmental store which is located in various cities. This application also administrates its users and customers. This system can be used to store the details of the inventory, stock maintenance, update the inventory based on the sales details, and generate sales and inventory reports daily or weekly based. This software project is a traditional supermarket billing system with some added functionality. This system is built for fast data processing and bill generation for supermarket customers. The billing data is a vast collection of product names, prices, and other product-specific data. Its price is added to the bill based on the product quantity. The system also contains discounts on various products so that the product is offered at discounted price while billing. The billing system is built to help supermarkets calculate and display bills and serve the customer in a faster and more efficient manner. This system will provide the user with

precise details and a bill with zero error probability i.e. an extremely precise without-error bill.

This system will provide a much more convenient shopping experience for the shopper or customer. This project is categorize individual aspects of the sales and inventory management system. In this system, we are solving different problems affecting to direct sales management and purchase management. Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item.

A good inventory management system will alert the wholesaler when it is time to record. An inventory Management System is also an important means of automatically tracking large shipments. An automated Inventory Management System helps to minimize errors while recording the stock. Inventory management tracks how much physical inventory you have in your organization. It monitors stock at other locations, such as distributors or subcontractors. When you have clear visibility into your inventory, you know when to order, where to store it, and when you need to stop selling.

II. Scope of the Project

This project will help the storekeeper with fast billing. This project enables storekeepers to maintain a great database of all Customers who visited and purchase products from the store. The project will enable you to see reports regarding products and categories. It is easy to maintain in future prospects. It saves time and gives quick results. The scope of an inventory system can cover many needs, including valuing the inventory, measuring the change in inventory, and planning for future inventory levels. The value of the inventory at the end of each period provides a basis for financial reporting on the balance sheet.

This provides information for businesses that carry inventory in stores and vans (for example, manufacturers and service providers such as Independent Housing Associations, their contractors, facilities management businesses, and utility companies) that want to optimize their inventory to improve customer service, reduce costs and increase productivity by

increasing the number of jobs that can be completed each day. Inventory management helps to improve the profits of the company. it helps to provide proper information about stocks, which saves unnecessary expenses on stocks.

III. LITERATURE SURVEY

Author Name – Mr. Sumit Meshram, Mr. Sachin Murab

Title - International Journal of Aquatic Science

Publication Year- 2016

Technology Used The Project “Billing System In Supermarket” deals with the automation of supermarkets. This software will help salespersons in managing the various types of Records pertaining to his/her customer. The product will help the user to work in a highly effective and efficient environment. Salespersons have been recording customer information in the past and even in the present through their personal manual efforts. And indeed, it consumes their considerable time and energy that could be utilized in better productive activities. Apart from that, with increasing customer Strength, the task of managing the information of each individual customer is indeed a cumbersome task. There is a lot of reason for the introduction of this project.

Author Name – Mahadi Bahari

Title – Journal of Theoretical and Applied Information Technology

Publication Year- 2017

Technology Used - Technical issues found are; the immature nature of the B2B marketplace and the software available within it; the lack of universal standards for middleware that can integrate internal business processes with eBusiness messages and transactions; and a lack of evidence of the ability of B2B software to synchronize supply chains, to improve collaboration or to deliver sufficient return on investment.

Author Name – Mr. Sumit Meshram, Mr. Sachin Murab

Title - Growth of E-commerce in India: An Analytical Review of Literature

Publication Year- 2017

Technology Used E-commerce is one of the fastest-growing segments in the Indian Economy. Though marked by a high growth rate, the Indian e-commerce industry has been behind its counterparts in many developed and emerging economies, primarily due to a relatively low internet user base. In a study conducted by global management consultancy firm AT Kearney in 2015, there were only 39 million online buyers in India; a tiny fraction of the 1.2 billion who live in the country. However, increased technological proliferation combined with internet and mobile penetration presents a favorable ecosystem for the development of e-commerce in India. The country is currently at the cusp of a digital revolution. The launch of 4G services and the decline in the tariffs of data plans and prices of data cards/USB dongles have reduced the cost of ownership of an effective internet connection. The availability of low-cost smartphones and the extension of Internet and broadband to the remotest corners will boost the augmentation of the Internet user base, effectively bridging

the gap between potential online buyers and actual buyers. The demographic dividend of the country also seems to encourage and favor the growth of e-commerce. The survival of e-commerce firms in a highly dynamic environment becomes a challenging task when coupled with the cutthroat competition prevailing in the sector.

Author Name – Deborah Libu Paris

Title – Journal of Theoretical and Applied Information Technology

Publication Year- 2019

Technology Used - The benefits to companies that succeed in Business-to-Customer (B2C) e-Commerce are compelling. Effective B2C e-Commerce implementations can help organizations realize substantial cost savings, increase revenue, provide faster delivery, reduce administration costs, and improve customer service. The distribution of research approach and methodology applied to e-Commerce implementation studies. It shows that e-Commerce implementation studies in all pre-implementation, during-implementation, and post-implementation themes preferred a quantitative approach (64%) using survey methods. Thus, e-Commerce is a significant area for research because of its novelty and exploding growth. E-Commerce implementation studies are always related to eCommerce adoption. ECommerce implementation is a crucial process for an organization to make it successful and beneficial. As a consequence, intensive research works in the area of e-Commerce implementation from a diverse range of views and findings have been studied by many researchers.

Author Name – Mr. Barclay

Title – Inventory Management

Publication Year- 2021

Technology Used - Satisfactory level of service

Most company measures the ability to satisfy the customer by the following 3 factors/methods Number of order which act per schedule Number of order which are shipped as per schedule The idle time in inventory as well as shortage Minimizing inventory investments Most companies try to minimize the money associated with inventory so as to improve the profitability of the company. This is measured using the inventory turnover ratio (Measures how quickly the inventory is getting out of the system to the consumer) It's calculated using the formula Sales/inventory or cost of goods sold / average inventory Efficient inventory control includes how inventory is scheduled properly, no delays between sniffing of raw materials and goods.. There should be a balance between the fixed cost and variable cost

IV. PROPOSED METHODOLOGY

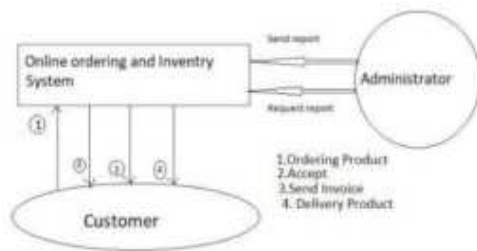


FIG. 1. BLOCK DIAGRAM OF SIGN LANGUAGE RECOGNITION.

Customers build up a sense of loyalty to those e-commerce websites that offer them a good user experience, and that transmit confidence and reliability. There are various factors that influence this: how easy it is to find the product they are looking for, how easy/difficult it is to make the payment, and how fast the order was executed. All of these factors determine whether the customer will shop at that website again or not. In general, potential buyers are more and more impatient, which means they do not have much time to find what they are looking for or to receive a positive first impression. Our e-commerce module, which is part of our Content Management System, takes these needs into consideration as well as others. Attracting and retaining customers Gaining high visibility on search engines is key to attracting new customers. This is why our e-commerce projects make the Google indexation easy, as well as that of the other main search engines. With regards customer retention, our Content Management System includes some online Marketing and customer services, such as forums, e-magazines, surveys, etc., and also recognizes returning customers in order to facilitate the payment process, and thus help with customer retention.

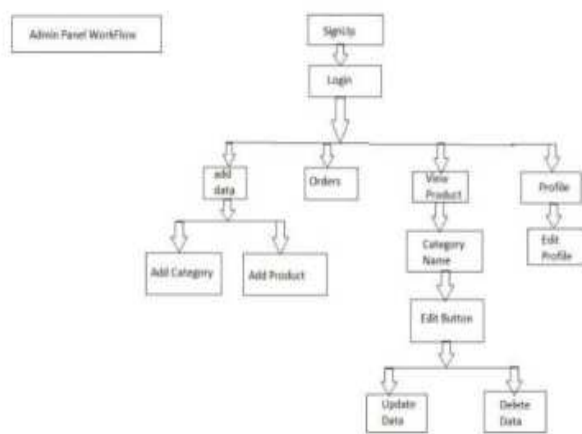


Fig. 2. Flow chart

Need For Feasibility Study: The feasibility study is carried out to test whether the proposed system is worth being implemented. A feasibility study is a test of a system proposed regarding its workability, its impact on the organization's ability to meet user needs and its effective use of resources. It is usually carried out by a small number of people who are familiar with the information system techniques, understand the part of the business or organization that will be involved or effected by the project and are skilled in the system analysis and design process. The key consideration involve in the feasibility study are:

1. Technical
2. Behavioural
3. Economic.

1. Technical feasibility:

Technical feasibility centers on the existing computer system (hardware, Software etc) and to what extent it can support the proposed system Addition. For example, if the current system is operating at 70% capacity (an Arbitrary value), then another application could overload the system or require additional hardware. If the budget is serious constrain then the project is judged not feasible. The technologies ant the environment which are used in this project are.

2. Behavioral Feasibility:

An evaluation of the behavior of the end users, which may effect the Envelopment of the system. People are inherently resistant to change and Computers have to know to facilitate changes and computers have to known To facilitate changes. An estimate should be made of how strong a reaction The user staffs is likely to have towards the development of a computerized System. It is a common knowledge that a computer installation has something to do with turnover, transfer, retraining and changes in employee job status, therefore the introduction of a candidate system requires special effort to educate, sell and train the staff on new ways of conducting business. The personal of the user organization will be affected by the proposed system. As the aim of the system is only to satisfy the information needs, no employees will loose their position by the proposed system. In fact the proposed system will help the organization in reducing the voluminous work involved. Also the involvement of users in every stage of the project is going to increase the success factor. The staff in not well educated for running a computerized system. They are adamant in perceiving a mechanical process of working as they have long been used to the manual entry system. This aspect needs considerable amount of attention. Our system is also feasible for organization because it supports of the organization and its strategic plan.

3. Economic Feasibility:

The procedure is to determine the benefits and savings that are expected from a candidate system and compare it with the costs. If a benefit outweighs costs, then the decision is made to design and implement the

system. Otherwise further alterations are made in the proposed system

V. RESULT AND DISCUSSION

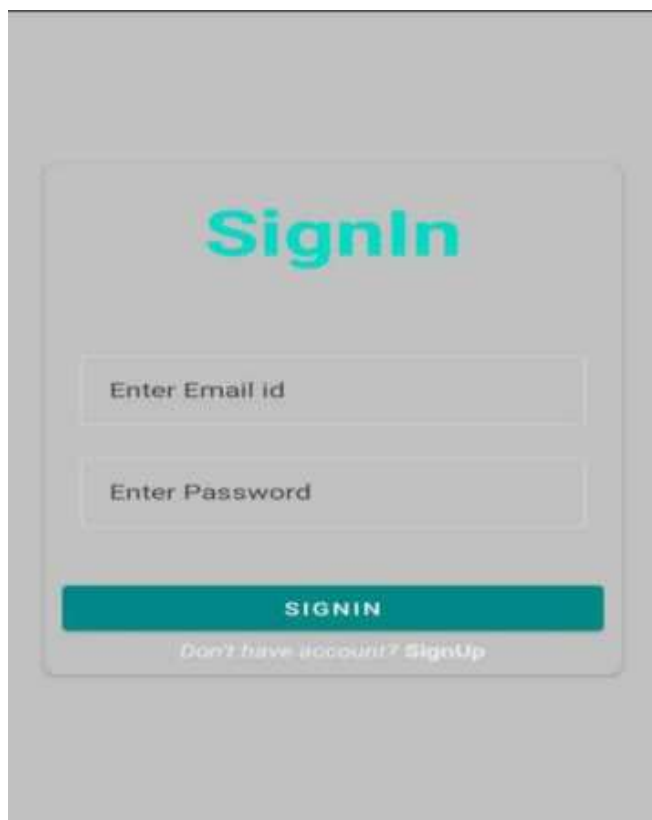


Fig3. Registration page

E-Commerce makes the business grow globally with the least investment. The benefits of E-commerce to customers are many like time-saving. The highest theme on e-Commerce implementation in the during-implementation phase is system design. Many studies on this theme have looked into the structure of e-commerce applications and have also elaborated on the customer preference for website design. For instance, has developed a B2C e-Commerce website design features in different countries based on the evaluation of participants from Australians and Koreans' favorite sites. The global site based in the USA provided similar design features to the Australian site that looks relatively simple except for the display of local products and images. Contrary, Koreans' favorite sites feature more collective such as the use of multiple menus and contents containing various types of information, products promoted for shopping, and community communication tools. Besides, a large number of studies contributed to framework design and model design.



VI. CONCLUSION

Research in e-commerce implementation can give a significant result. In order to get an overview of the current research in this area, a systematic literature search was undertaken to identify e-commerce implementation articles from four databases. We have found 65 most related articles after the inclusion and exclusion criteria process for obtaining the maximum relevance to our study objectives. The articles were published between 2006 and 2015. The results of this review indicate the e-commerce implementation as a whole process is rather inadequately addressed. Although there are extensive studies of factors in e-commerce implementation, we have found the utmost relevant factors. There are no research efforts, at least in our selected papers, which have actually provided the solution or activities in the e-commerce implementation. Nevertheless, we feel that the results presented in this paper have few imperative implications. This study contributes to the first systematic literature review of the e-commerce implementation area. Hence the results from this review may assist researchers in the area of e-commerce implementation..

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Online RTO Service Management System

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Abstract—The Regional Transport Office (RTO) is a government organization responsible for issuing driving licenses, maintaining databases of vehicles and sells personalized registration of vehicles. It has been observed since years that the RTO is not able to deliver quality public services to the citizen without delay. That is, it has been a difficult job for citizens to get a driving license and to register their vehicles. Hence, this project is aimed at developing a computerized system for the functioning of RTO. This system will reduce the manpower required in the RTO and make the existing system fast and efficient. The aim is to build a user-friendly web page where the citizens can apply for learner's license, driving license and vehicle registration. The web page also provides provision for citizens to submit their complaints. The project intends to provide quality services to the citizens of the state. Imagine if the RTO system was offline based, then the citizens must go to any one of the RTO offices just to apply for learner's license, driving license and vehicle registration. This is not an easy job for citizens and even for the RTO officials too where they must maintain huge of offline records. This also reduces the burden on manpower working in the RTO. Since the project is web based, the changes or modifications required by the system over a long term of period can be done very easily. This helps in easy system maintenance and be up to date with the user requirements. Mainly, the website is used for issuing of license. An individual can apply for learning license and driving license online. Moreover, this application sends an alert message for renewal of driving license to an individual when his driving license is about to expire. The applications received will be verified and approved by the RTO officials.

Keywords—Smart RTO, Vehicle Registration, Chatbot, Vehicle authentication, Account Control.

I. INTRODUCTION

The project intends to provide quality services to the citizens the state. It does so by reducing the delay in services provided by the RTO through computerization of the system. This also reduces the burden on manpower working in the RTO. Since the project is web based, the changes or modifications required by the system over a long term of period can be done very easily. This helps in easy system maintenance and be up to date with the user requirements. That means updating the system as per the user requirements will be an effortless job to the system maintenance group. Mainly the website is used for issuing for license. An Individual can apply for learning license and driving license online. The applications received will be verified and approved by RTO officials. The applicant

can monitor the status of their application and download the approved license. Regional Transport Office (RTO) is an Indian government bureau which is responsible for the registration of vehicles and issue of Driver's License in India. RTO management will be having a lot of work regarding registration of vehicles and issue of driver's license. Similarly, the vehicle owner sometimes forgets to carry the license and forgets the insurance at the time of inquiry.

This paper proposed an approach to solving such problems that are by storing all the information related to vehicle and driver at database by RTO administrator. RTO is an advanced "RTO management System" which is design keeping in a view to make the existing registration and issues of information about license easier and faster. It includes the entire registration and insurance procedure starting from the initial phase of entering till the result. It is a more reliable, accurate, time-saving and free from any misuse. The system provides information regarding RTO application. The RTO vehicle registration system has been developed to override the problems prevailing in the practicing manual system. The software is supported to eliminate and in some case reduce the hardship faced by the existing system. It is also designed to carry out all the operations in a smooth manner.

The purpose of RTO system is to automate the existing manual system with the help of computerized equipment by fulfilling the requirement so that their information is secure and can be easily accessed and managed. This lead to the error free, secure, well grounded and fast management system. It will provide the user with many facilities like registration, insurance, tracking of vehicles. It can maintain the computerized records without having the redundant records. This will result in better utilization of the resource. It will describe how to manage for good performance and better service for better clients may happen that at times the Driver forgets to carry his driving license with him. This paper is put forward to solve such problems in such a situation if he is registered with our website then he can download his driving license immediately from our website and in this way he is not always bound to carry the hard copy of his driving license with him. As in this website the data is stored regarding the driver and their vehicle by the Database Administrator.

II. LITERATURE REVIEW

Today, making of driving license is large time consuming process. Also every time, it is not possible to carry whole documents by driver. Current vehicle registration systems for RTO services are very critical & there is no any updating to RTO office. Totally whole processes are conducted manually. In current market there are no any applications to provide all the above features together in one application. We all know existing RTO office work is how much lengthy as well as very lengthy process. In many villages there is only one day camp of RTO and the people who want driving license they should remain present on that day if they missed that day then they have to go to the district RTO office. So it is disadvantage because that may be not able to go or he having work on that day. so that here we are developing one web application which provide easiest and efficient way for RTO works like making driving license, insurance of vehicle, registration number of vehicle etc. In many cases we found that RTO office work get complete through third party called agent. When a person go to the RTO office for driving license, vehicle passing, and registration number of vehicle then a person go through the agent will complete person work by taking lot of money and that person is unaware about all this system.

Literature survey is that the most vital step in software development process. Before developing the new application or model, it's necessary to work out the time factor, economy and company strength. Once all these factors are confirmed and got an approval then we can start building the application. There are multiple components in the user module such as insurance forms, licenses, and vehicle registration. The traffic module is not only tasked with producing all the data related to the ownership of a vehicle and its details regarding its insurance but also is responsible for bringing about fines if there's any violation of traffic rules by a user. RTO admin validates all the data given by a user and is then responsible for producing license and vehicle numbers. Measures to ensure data integrity and security are simply not discussed in this system and hence are therefore a major limitation to the same. RTO Management System comprises the authorizing of a vehicle and keeping track of its related information and its owner. Moreover in this system, the verification of a vehicle is done using RFID which is published by the RTO after successful authentication. This in turn puts RTO in a position of high power as it's the only decision-making authority related to verifying users' credentials.

III. RELATED WORK

We all know existing RTO office work is how much length well as very time-consuming process. In many villages, there is only one day camp of RTO and the people who want driving license they should remain present on that day if they missed that day then they have to go to the district RTO office. So it is a disadvantage because that may be not able to go or he having worked on that day. so that here we are developing one web application which provides easiest and efficient way for RTO works like making driving license, the registration number of the vehicle, etc. we are developing a web application for RTO so here we give a brief description of our project overview.

First, we provide familiar environment means the needy user can access this site for their work purpose related to RTO. First user needs to fill the registration form so that we provide authentication to him and then user can choose option he wants means if he select to making a driving license then we provide driving license requirement details and give available date to him so that he come on that date direct give the test so that he can save his time as well as money. If user wants to pass his vehicle number then also it takes time in old system but here we provide facility that user he buy new vehicle he should have to first register on our site and fill all the required and importance details of vehicle and we gives this details to RTO office directly so that this work will get complete within less time and the user get his number template easily.

The administrator is providing for authentication purpose as well as it handles all the database of RTO and manages all the process. He has authority to approved learning license number, permanent license number pass the vehicle registration number, etc. Facilities are provided by the administrator. In many cases, we found that RTO office work gets complete through the third party called agent. When a person goes to the RTO office for a driving license, vehicle passing, and registration number of the vehicle then a person go through the agent and agent will complete person work by taking a lot of money and that person is unaware of all this system. According to the TOI new on dated 3 September 2015 RTO office is the more corrupted area. So using our web application we are somewhere to help to reduce corruption.

In today's scenario people are just so busy with their work and just going to the RTO office for issuing the DL increases their work load somehow. This website will reduce this and going just for the driving test they can get their license which will ultimately reduce their extra time. In the existing system the user has to spend a lot of time and money in making of driving license. At every step he has to spend some money so that his work can be done quickly. In doing this work manually, it's quite difficult to manage all the documents. At times the documents are lost and then the client has to suffer the loss. Even sometimes if the driver forgets his Driving License then he has to send someone back to home to get it, in this a lot of time is wasted.

IV. IMPLEMENTATION

RTO Information System is an online information source developed for Road Transport Authority to facilitate the users in applying for various licenses and registrations. This tool has been designed to facilitate the flow of information within the organization. In this System It is not efficient in performing office work in RTO services, It includes much manual process and time consuming, It is not user friendly, Maintains local data base.

In this block diagram we get information about the basic idea of our project. It basically means to computerize the existing system to gain accuracy. It is divided into five sub parts like LLR, registration, DL, Complaint, gallery. First user needs to fill the registration form so that we

provide authentication to him and then user can choose option he wants means if he select to making a driving license then we provide driving license requirement details and give available date to him so that he come on that date direct give the test so that he can save his time as well as a money.

A. Block Diagram

Effective training begins well before a trainer delivers a private training session and continues then training session is complete. Training are often viewed as a process comprised of 5 related stages or activities: assessment, motivation, design, delivery, and evaluation. If user wants to pass his vehicle number then also it takes time in old system but here we provide facility that user he buy new vehicle he should have to first register on our site and fill all the required and importance details of vehicle and we gives this details to RTO office directly so that this work will get complete within less time and the user get his number template easily. The administrator is providing for authentication purpose as well as it handles all the database of RTO and manages all the process. He has authority to approved learning license number, permanent license number; pass the vehicle registration number, etc. Facilities are provided by the administrator.

RTO Information System is an online information source developed for Road Transport Authority to facilitate the users in applying for various licenses and registrations. This tool has been designed to facilitate the flow of information within the organization. RTO provides the facility of applying licenses online, issuance of permanent license, and receiving complaints. In this System It is not efficient in performing office work in RTO services, It includes much manual process and time consuming, It is not user friendly, Maintains local data base. It is not Generating Accurate Reports. To overcome problems in the existing System a new RTO services “Road Transport Authority Information System” is proposed after study of system. The software is supported to eliminate and in some case reduce the hardship faced by the existing system. It is also designed to carry out all the operations in a smooth manner.

The purpose of RTO system is to automate the existing manual system with the help of computerized equipment by fulfilling the requirement so that their information is secure and can be easily accessed and managed. This lead to the error free, secure, well grounded and fast management system. It will provide the user with many facilities like registration, insurance, tracking of vehicles. It can maintain the computerized records without having the redundant records. This will result in better utilization of the resource. It will describe how to manage for good performance and better service for better clients It may happen that at times the Driver forgets to carry his driving license with him. This paper is put forward to solve such problems in such a situation if he is registered with our website then he can download his driving license immediately from our website.

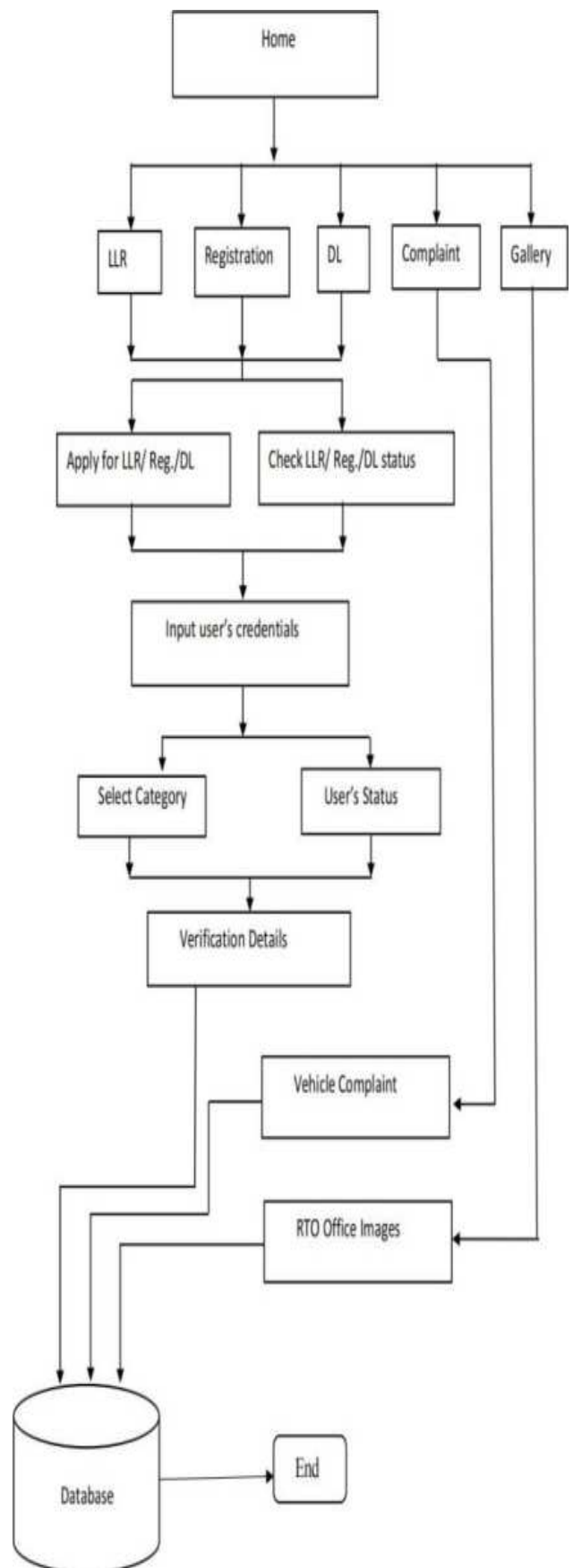


FIGURE :4.1. SYSTEM ARCHITECTURE

V. METHODOLOGY

Modules used :

User module :

- License Registration form
- Vehicle Registration form

Traffic Module :

- Check License
- Check Vehicle
- Generate Fine

RTO Admin

Chatbot

- User Module

User will fill the online form followings are:

License Registration Form :

The below figure shows the user license registration form. This form display information of particular license holder with photo and other details such as first name, middle name, last name, email, date of birth, gender, taluka, contact number, ration card number, address, Aadhar card number, and voter ID.

Vehicle Registration Form :

In vehicle Registration form the RTO administrator gets various details of vehicle and to enter vehicle information first select the vehicle type such as two wheeler, three wheeler, four wheeler, and other types. After entering Registration no such as KA 22 CA 7613 then click check vehicle button it gives pop up message found or not found and displays all records in the data grid below figure shows the vehicle registration form of two wheeler vehicle.

- Traffic Module

This module mainly focuses on providing the information only to the traffic police officers it consists of checks license checks vehicle information check insurance and also generate fines.

Check License :

The Check License module takes a License number. as an input and returns the respective License information like Name, Photo, address, DOB, issued date, License status and Validity of the license. In case if the record doesn't exist it shows a respective message that record not found.

Check Vehicle :

The Check Vehicle module takes a Vehicle Registration number as an input and returns the Respective Owner details like Name and Address. It also includes the Vehicle issued date and valid date of vehicle.

Generate Fine :

The Generate Fine module mainly focuses on generating fines for the offences committed. It provides for selecting a variety of offences from a set of given offences for which the fine is generated.

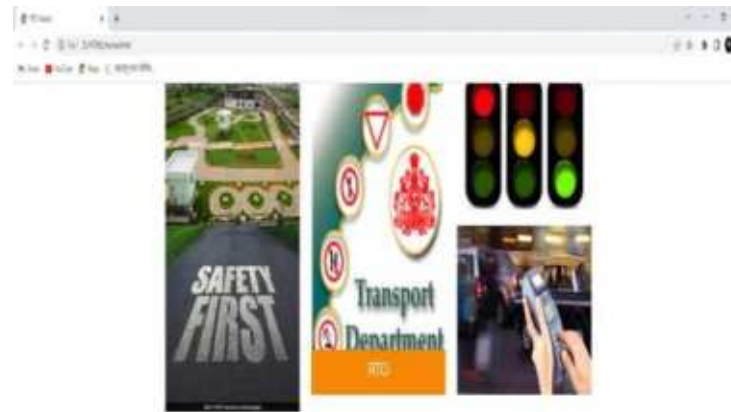


FIGURE : 5.1. RTO SYSTEM



FIGURE : 5.2. HOME PAGE

VI. ACKNOWLEDGEMENT

We would like to show our sincere gratitude towards Prof. R.M Mandhare, Assistant Professor Department of Computer Science and Engineering AGCE, Satara for her valuable guidance and encouragement. We would also like to thank for their support and continuous guidance throughout the development of this project.

VII. CONCLUSION

It can be concluded that " smart RTO web based android application" ,effectively verifies documents related to vehicle and license this system introduced facility for RTO officer to platform verification of license and vehicle and vehicle documents .It also helps RTO officials to maintain records systematically and reduce a lot of paper work and manual efforts. Hence drivers are totally independent of vehicle related documents. The implemented project RTO Management System brings out an improvement over the existing.

RTO system by reducing the processing delay and allowing RTO to provide quality of service the citizen. It overall increases the efficiency of the RTO office and effectively reduces the burden on the RTO officials. People need not stand in long queues just to apply for LLR or DL at RTO offices. This entire pre-registration task can be done online through the implemented system. Any doubts or queries can be submitted which will be responded by the officials. This project even eliminates the presence of middle man from the entire process and thereby decreasing the degree of corruption in the state. The other ways in which the system helps is by publishing the latest news and events. The project is mainly built using web scripting languages. So, in the future, updating the system or adding extra features to the system as per the requirements will not be difficult as simple web scripting languages will help us in accomplishing it. The drivers data will be fetched from RTO server. This RTO application aims to serve the people with digitalized documents like License, Vehicle, and Insurance for easy use as these documents can be lost. This process intends to help the customer in saving their time if these documents are misplaced somewhere and helps in tracking out thefts through location based service. We conclude that this project will be applicable for various RTO services .These project will be provide application easily. The purpose of this project is to create a application for RTO services. This application

provides registration for the license, vehicles registrations and other documentation. In this application investigation functions like checking of license, documents, PUC etc. for help of RTO officers are provided. By using this android application traffic police can verify the whole details of person and vehicle. In this application investigation functions like checking of license, documents, PUC etc. for help of RTO officers are provided. By using this android application traffic police can verify the whole details of person and vehicle. This application provides registration for the license, vehicles registrations and other documentation. In this application investigation functions like checking of license, documents, PUC.

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Product Recommendation System

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Abstract— Collaborative filtering is one of the well-known and most extensive ways in recommendation system its introductory idea is to prognosticate which particulars a user would be interested in predicated on their preferences. Recommendation systems using collaborative filtering are capable to offer an accurate prophecy when enough data is delivered, because this approach is predicated on the user's preference. user- predicated collaborative filtering has been truly successful in the history to predict the customer's actions as the most important part of the recommendation system. Still, their wide use has disclosed some real challenges, analogous as data sparsity and data scalability, with gradually adding the number of addicts and particulars. To enhance the performance time and perfection of the prophecy problem, this paper proposed item-predicated cooperative filtering applying dimension reduction in a recommendation system. It demonstrates that the proposed approach can achieve better performance.

I. INTRODUCTION

User has additional chance to access different information and the volume of information that can be collected has exponentially increased. The immense growth of the World Wide Web has led to an information load problem. It is delicate for druggies to snappily gain what they want from massive information. In recent times, each client can laboriously partake their review and get a reduction grounded on client participation similar as in social checks on E-commerce spots. It has come essential for E-commerce requests to effectively take advantage of these data by evolving new marketing strategy grounded on similar data. Besides, E-commerce requests have laboriously introduced an automated personalization service to dissect the client's geste and patterns as purchase factors. E-commerce spots try to collect user interests, similar as purchase history, product information in the wain, product conditions, and product reviews in order to recommend new applicable products to guests. Collaborative filtering is the most generally used

algorithm to make substantiated recommendations on the website. CF can be divided into two main branches: memory-based and model-based.

A. Basic Memory-Based Algorithm

Memory-Based algorithms, also known as neighbor-based algorithms, operate on entire database of conditions collected by the seller or service supplier. The Memory based algorithms are extensively used in numerous large marketable spots, similar as Amazon etc. It substantially divided into two branches stoner-acquainted and item-acquainted. In this paper, we will bandy the stoner-acquainted algorithm. Suppose we want to calculate the vaticination score r , for stoner u on items.

First, cipher the similarity among druggies and get the line $N(u)$ for each stoner. Sort druggies by similarity with stoner u , from largest to lowest.

Second, select the top- N druggies from $N(u)$ to form the set $T(u, N)$ for each stoner u . also filter the data which r , are unknown $N(u, i) = T(u, N) \cap R(i)$. Eventually, we calculate the vaticination score by (1):

$$\hat{r}_{u,i} = \bar{r}_u + \frac{\sum_{v \in N(u,i)} s_{u,v} (r_{v,i} - \bar{r}_v)}{\sum_{v \in N(u,i)} s_{u,v}} \quad (1)$$

Where u and v independently denotes the average item standing for stoner and, denotes the similarity between stoner u and v .

B. Basic Matrix Factorization Techniques

The most well-known algorithm to model-grounded is the matrix factorization (MF). Compared to the Memory-grounded algorithms, MF generally has advanced delicacy. The idea behind MF is simple. For a given dimension, the MF aims to approximate R as the product of too much lower matrixes.

$$R \approx PQ^T = \begin{bmatrix} p_1 \\ p_2 \\ \vdots \end{bmatrix}_{n_u \times n_f} \begin{bmatrix} q_1^T & q_2^T & \dots \end{bmatrix}_{n_f \times n_m} \quad (2)$$

Where P is a $n_u \times n_f$ matrix and Q is a $n_m \times n_f$ matrix. We call P stoner factor matrix and Q item factor matrix. P_u namely the u -th row of P is a factor vector for stoner u and q_i the i -th row of Q is a factor vector for item i . The

algorithm aims to learn P and Q and makes the product as close as possible to the matrix R. Thus, the vaticination score r_{ui} , for each user u and each item i can be calculated by (3)

$$\hat{r}_{ui} = \mathbf{p}_u \times \mathbf{q}_i^T = \sum_{k=1}^{n_f} p_{u,k} q_{k,i} \quad (3)$$

In order to avoid over-fitting, Takes et al., proposed to add a parameter λ for chastising the forecourt of the Euclidean norm of weights. The system also known as weight decay, is widely used in neural networks.

$$(\mathbf{P}^*, \mathbf{Q}^*) = \min_{(\mathbf{P}, \mathbf{Q})} \sum_{(u,i) \in \tau} (r_{u,i} - \mathbf{p}_u \mathbf{q}_i^T)^2 + \lambda (\|\mathbf{p}_u\|^2 + \|\mathbf{q}_i\|^2) \quad (4)$$

Where H is the training set and E is the regularization factor. Equation(4) states that learning P and Q on the training set to minimize the sum of squared errors. Generally speaking, we generally take the interspersing grade descent algorithm to find an original minimum of the sum of squared errors.

Suppose: $e_{u,i} = r_{u,i} - \hat{r}_{u,i}$ for each $(u, i) \in \tau$

$$e'_{u,i} = \frac{1}{2} e_{u,i}^2 + \frac{\lambda}{2} (\|\mathbf{p}_u\|^2 + \|\mathbf{q}_i\|^2) \quad (5)$$

First compute the gradient of $e'_{u,i}$.

$$\begin{aligned} \frac{\partial}{\partial p_{u,k}} e'_{u,i} &= -e_{u,i} \cdot q_{k,i} + \lambda \cdot p_{u,k}, \\ \frac{\partial}{\partial q_{k,i}} e'_{u,i} &= -e_{u,i} \cdot p_{u,k} + \lambda \cdot q_{k,i} \end{aligned} \quad (6)$$

Then update the weights by moving in the direction opposite to the gradient.

$$\begin{aligned} p'_{u,k} &= p_{u,k} + \eta \cdot (e_{u,i} \cdot q_{k,i} - \lambda \cdot p_{u,k}), \\ q'_{k,i} &= q_{k,i} + \eta \cdot (e_{u,i} \cdot p_{u,k} - \lambda \cdot q_{k,i}) \end{aligned} \quad (7)$$

Where X is the knowledge rate.

Indeed, though the CF has been proved to be effective for working the information cargo problem, it still performs not truly well in terms of delicacy. The reasons are as follows First, ultimate of the present inquiries meliorate the delicacy of Memory-Based algorithms only by perfecting the similarity measures and numerous inquiries concentrated on the prophecy score models which we believe are more important than the similarity measure. Second, the being matrix factorization styles discard the adaption process after the training process. In this paper, we propose various results to make a quality recommendation. And we will point out that the Neighbour-Based algorithms are more accurate than Matrix factorization algorithms, but

may not be suitable for some situations. The trial results on Movie Lens datasets show that our methods could increase the accuracy of the recommender system.

II. RELATED WORK

The first workshop on the field of cooperative filtering were proposed by Goldberg et al. To filter matters from several mailing lists(4). Breeze et al. Divided the cooperative filtering into two main groups – Memory-grounded and Model based.

A. Memory-Based Algorithm

Memory-Based algorithms, also known as neighbor-based algorithms, operate on entire database of conditions collected by the seller or service supplier. The Memory based algorithms are extensively used in numerous large marketable spots, similar as Amazon etc. At present, there have been numerous ongoing inquiries concentrated on developing largely dependable Memory-Based algorithms. Utmost of the inquiries ameliorate the delicacy of Memory-grounded algorithms only by perfecting the similarity measures. Generally, there are two models to measure the similarity of druggies. They're Pearson Correlation Measure PCC (6) and Vector similarity (VS)(5). PCC and VS are veritably simple, but they both have a failing which only consider decorated particulars. It could lead to a problem that two druggies may have a high similarity only because they have many co-rated particulars and concurrently ranked this similarity. Thus, Hao Ma et al, proposed to add a correlation significance weighting factor that would cheapen similarity weights that were grounded on a few coated particulars (7). In addition to the below styles, reference (8)(9) also proposed similarity measures by using the graph proposition. Indeed, more, Heng Luo et al, proposed a Collaborative filtering frame grounded on both of original stoner similarity and global stoner similarity (10). The below exploration about the similarity measure does ameliorate the delicacy of the Memory-Based algorithms. But many inquiries concentrated on the vaticination score models which we believe are more important than the similarity measure. In this paper, our study will fill the gap.

B. Model-Based Algorithm

Model-grounded algorithms are different with Memory based algorithms. It first uses the database to estimate or learn a model and also apply this model for vaticination. Generally speaking, the Model-grounded algorithms generally have advanced delicacy than the Memory-grounded algorithms. Among the model-grounded algorithms, the most representative is the matrix factorization. Over the once times, a lot of matrix factorization ways have been proposed, including singular value corruption, probabilistic idle semantic analysis, probabilistic matrix factorization etc. Taking into consideration the particular difference, reference proposed

a bias point idea. Still, the algorithms mentioned above only consider the literacy process, and ignoring the adaptation process after training. In this paper, we proposed a discrimination model which can be applied to any matrix factorization.

C. Hybrid Algorithms

Hybrid recommender systems by combining each strategy together can give better performance rather than either strategy alone. The most notorious is the Bell Kor's result winning the Netflix prize, which combines prognostications from 107 different birth recommender systems. By Burke's check, the mongrel recommender systems are substantially divided into the following classes. They are mixed, switched, ladened, feature argumentation and meta-position mongrels. In this paper, we proposed a weighted mongrel style which can avoid or compensate for the failings of matrix factorization and neighbor-grounded styles. The rest of the paper is organized as follows. The coming section provides a description of the discrimination model proposed by us. Section 4 provides a description of the advanced Neighbor-Based styles proposed by us. In section 5, we describe the mongrel system in detail. Section 6 provides the experimental results.

TABLE I. MATHEMATICAL NOTATIONS

Notation	Description
n_u	Number of users
n_m	Number of items
n_f	Number of factors
τ	Training set
T	Test set
$R(u)$	A set of items rated by user u
$R(i)$	A set of users who actually rated item i
$N(u)$	The neighbor queue of user u , sort items by similarity with user u , from largest to smallest.
$T(u, N)$	A set consist of the first N users in $N(u)$
$N(u, i)$	$N(u, i) = T(u, N) \cap R(i)$
$U(u, v)$	$U(u, v) = R(u) \cap R(v)$, a set of items both rated by u and v

III. IMPROVED MATRIX FACTORIZATION ALGORITHMS

In this section, we first introduce BRISMF system proposed by Takes. Also the discrimination model proposed by us is outlined which can apply to any matrix factorization and make a quality recommendation. Table 6 lists fine memos used in this paper.

A. BRISMF

Considering the particular difference, for illustration, some druggies tend to rate all particulars advanced or lower than the normal, Paterek et al, proposed the bias point idea which by extending Matrix Factorization (MF) with impulses for druggies and particulars. At the same time, Takes et al, proposed a BRISMF which partake some common features with Paterek's algorithm, see (8)

$$\hat{r}_{u,i} = \mathbf{p}_u \cdot \mathbf{q}_i^T + b_u + b_i' \quad (8)$$

Where b denotes the partiality for druggies and b_P denotes the partiality for particulars. Equation (8) could similarly be written as follows:

$$\hat{r}_{u,i} = \sum_{k=1}^{n_f} p_{u,k} \cdot q_{k,i} + b_u \times 1 + 1 \times b_i' \quad (9)$$

Suppose $p_{u,n_f+1} = b_u$, $q_{n_f+1,i} = 1$ and $p_{u,n_f+2} = 1, q_{n_f+2,i} = b_i'$ then:

$$\begin{aligned} \hat{r}_{u,i} &= \sum_{k=1}^{n_f} p_{u,k} \cdot q_{k,i} + p_{u,n_f+1} \cdot q_{n_f+1,i} + p_{u,n_f+2} \cdot q_{n_f+2,i} \\ &= \sum_{k=1}^{n_f+2} p_{u,k} \cdot q_{k,i} \end{aligned} \quad (10)$$

FROM (10) WE CAN OBSERVE THAT BRISMF IS ALSO A PRODUCT OF TWO MUCH SMALLER MATRIXES. THE ONLY DIFFERENCE BETWEEN BRISMF AND MF IS THE $N_f + 2$ COLUMN OF P AND THE $N_f + 1$ ROW OF Q ARE CONSTANT VALUE 1. THEREFORE, BRISMF INCORPORATE BIAS FEATURES INTO MF BY FIXING THE $N_f + 2$ COLUMN OF P AND THE $N_f + 1$ ROW OF Q TO THE CONSTANT VALUE OF 1 AND DROP THE APPLICATION OF (7) WHEN UPDATE P_{N_f+2} AND Q_{N_f+1} IN THE LEARNING PROCESS P_{N_f+2} DENOTES THE BIAS FOR USERS AND Q_{N_f+2} DENOTES THE BIAS FOR ITEMS. THEN, THE PREDICTION SCORE CAN BE CALCULATED BY (10)

B. Differential Model

Matrix factorization algorithm may fall into original optimum in the literacy process which leads to shy literacy. If the problem mentioned over is ineluctable or the model has been trained and cannot be modified, we need some remedy after literacy. Still, utmost of the matrix factorization ways at present only considering the literacy process, and ignoring the adaptation process after training. In this paper, we proposed a discrimination model which can be applied to any matrix factorization algorithms. The trial result on Movie lens data set show that the discrimination model can greatly ameliorate the delicacy of matrix factorization.

The idea behind discrimination model is simple. After getting the stoner factor matrix P and the item factor matrix Q , we calculate I and IP on training data sets. Then, I am the average difference between the vaticination standing and the reality standing for though a row of P , and IP is the

average difference between the vaticination standing and the reality standing for the i - the column.

For each $(u, i) \in \tau$:

$$e_{u,i} = r_{u,i} - \hat{r}_{u,i} \quad (11)$$

Then, e_u and e_i can be calculated as follows:

$$e_u = \frac{\sum_{j \in R(u)} e_{u,j}}{\text{card}(R(u))}, e_i' = \frac{\sum_{v \in R(i)} e_{v,i}}{\text{card}(R(i))} \quad (12)$$

WHERE $R(U)$ IS A SET OF ITEMS RATED BY A USER U AND $R(I)$ IS A SET OF USERS WHO ACTUALLY RATED AN ITEM I . THEN WE MODIFIED THE FINAL RESULT BY ADDING E_u AND E_i .

$$\hat{r}'_{u,i} = \hat{r}_{u,i} + e_u + e_i' \quad (13)$$

This network not just related to MF, but also can work well with BRISMF. MF and BRISMF join the demarcation model are expressed by DMF and DBRISMF single-handed. We will compare this form with MF and BRISMF in the following trial.

IV. IMPROVED NEIGHBOR- BASED ALGORITHM

In this section, we first bandy the similarity measures in Neighbour- based algorithm. Also, we point out the weakness of the vaticination score model and present the two plans proposed by us.

A. Similarity Measures

Similarity measures play an important part in neighbour-based algorithm since they are used both for opting the neighbour members and for weighting, so how to calculate the similarity between two druggies/ particulars is a crucial issue of cooperative filtering algorithm. Generally, there are two models to measure the similarity of druggies. They're Pearson Correlation Measure (PCC) and Vector similarity (VS).

The PCC method defines the similarity between user u and v as:

$$s_{u,v} = \frac{\sum_{i \in U(u,v)} (r_{u,i} - \bar{r}_u)(r_{v,i} - \bar{r}_v)}{\sqrt{\sum_{i \in U(u,v)} (r_{u,i} - \bar{r}_u)^2} \sqrt{\sum_{i \in U(u,v)} (r_{v,i} - \bar{r}_v)^2}} \quad (14)$$

While the VS method defines the similarity as

$$s_{u,v} = \frac{\sum_{i \in U(u,v)} r_{u,i} r_{v,i}}{\sqrt{\sum_{i \in U(u,v)} r_{u,i}^2} \sqrt{\sum_{i \in U(u,v)} r_{v,i}^2}} \quad (15)$$

Where $U(u,v) = \{i | r_{u,i} \neq \emptyset \cap r_{v,i} \neq \emptyset\}$ denotes the item set which both rated by user and. PCC and VS are truly simple, but they both have a failing which only considering the co-rated particulars. Since the data set is stingy, it may lead to two bad consequences. First, there are no co- rated particulars between user and render the similarity measure useless. Alternate, there are many co- rated particulars between user and, maybe only one or two, render the result unreliable. Still, the user factor matrix P in the matrix factorization knowledge

process is not stingy. Therefore, we can run the PCC and VS styles on user factor matrix P rather of the user item matrix R . Since the user factor matrix P is much lower than R , the styles run on P are hastily. VS system runs on user factor matrix P , called VS- P for short:

$$s_{u,v} = \frac{\sum_{k=1}^{n_f} p_{u,k} p_{v,k}}{\sqrt{\sum_{k=1}^{n_f} p_{u,k}^2} \sqrt{\sum_{k=1}^{n_f} p_{v,k}^2}} \quad (16)$$

PCC method runs on user factor matrix P , called PCC- P for short:

$$s_{u,v} = \frac{\sum_{k=1}^{n_f} (p_{u,k} - \bar{p}_u)(p_{v,k} - \bar{p}_v)}{\sqrt{\sum_{k=1}^{n_f} (p_{u,k} - \bar{p}_u)^2} \sqrt{\sum_{k=1}^{n_f} (p_{v,k} - \bar{p}_v)^2}} \quad (17)$$

Where

$$\bar{p}_u = \frac{\sum_{k=1}^{n_f} p_{u,k}}{n_f}, \bar{p}_v = \frac{\sum_{k=1}^{n_f} p_{v,k}}{n_f} \quad (18)$$

B. Improved Neighbour- Based Algorithm

At present, there have been numerous ongoing inquiries concentrated on developing largely dependable Memory-grounded algorithms. utmost of the inquiries ameliorates the delicacy of Memory- grounded algorithms only by perfecting the similarity measures. But many inquiries concentrated on the vaticination score models which we believe are more important than the similarity measure.

The prediction score model can be written as follows:

$$\hat{r}_{u,i} = \frac{\sum_{v \in N(u,i)} s_{u,v} (r_{v,i} + dvi_{u,v})}{\sum_{v \in N(u,i)} s_{u,v}} \quad (19)$$

While the most significant move is computing the divagation between stoner and. At current, is extensively applied as the vaticination model in numerous papers. It can also write as follows:

$$\hat{r}_{u,i} = \frac{\sum_{v \in N(u,i)} s_{u,v} (r_{v,i} + \hat{r}_u - \hat{r}_v)}{\sum_{v \in N(u,i)} s_{u,v}} \quad (20)$$

It can be obeyed from(20), the divagation| $dvi_{u,v}$ between druggie u and v are calculating by $r_u - r_v$. still, utmost stoners only partial rate the particulars. Since the particulars are different with each other, some particulars are good(ie, the medium standing is high) and some particulars are bad(ie, the medium standing is low), the system take in(20) is not a good option. For illustration, suppose user u 's rated particulars are mainly good and user v 's rated particulars are mainly bad, the divagation $dvi_{u,v}$, calculating by $r_u - r_v$. are advanced than the real value. For that reason, in this paper we suggested two plans.

Plan 1:

$$dvi_{u,v} = \frac{\sum_{j \in U(u,v)} (r_{u,j} - r_{v,j})}{|U(u,v)|} \quad (21)$$

Where $U(u,v) = \text{card}(U(u,v))$. We exactly hold the co-rated particulars when computing the divagation $dvi_{u,v}$ between stoner and.

Plan 2

Plan 1 only considers the co-rated particulars render large quantum of data useless. If the co-rated particulars between two druggies are many, the divagation is calculating by Plan 1 is unreliable. Thus, we proposed Plan 2. First, we calculate the bias for stoner u and v .

$$B_u = \frac{\sum_{i \in R(u)} (r_{u,i} - B'_i)}{|R(u)|}, B_v = \frac{\sum_{i \in R(v)} (r_{v,i} - B'_i)}{|R(v)|} \quad (22)$$

In an order to exclude the goods caused by particulars difference, we minus P for each particular when calculating and. Where.

$$B'_i = \frac{\sum_{u \in R(i)} (r_{u,i} - B_u)}{|R(i)|}, \quad (23)$$

denotes the bias for item i . Then we can calculate the deviation $dvi_{u,v}$ by (24)

$$dvi_{u,v} = B_u - B_v \quad (24)$$

We can see that there's across-dependence between and That is, to find the values of and one needs to know the values of P and vice-versa. For convenience, we borrow to calculate the approximation value of P .

$$B'_i = \frac{\sum_{u \in R(i)} r_{u,i}}{|R(i)|} \quad (25)$$

The experiment results show that the two plans improve the accuracy of neighbour-based algorithms.

V. HYBRID COLLABORATIVE FILTERING ALGORITHMS

Generally speaking, the matrix factorization styles generally yield a better delicacy than Neighbour- predicated algorithms. But it is not always right. According to our observation, the neighbour- predicated algorithms perform well when the available neighbour is large and perform poor when the available neighbour is numerous. sometimes the available neighbour is zero render the neighbour- predicated styles useless. For that reason, we proposed a weighted crossbred styles which can avoid or compensate for the shortcomings of matrix factorization and neighbour- predicated styles. We first explain what the available neighbour is?

In the neighbour- grounded algorithm we want to elect the top- N druggies from $N(u)$ to form the set $T(u,N)$ for each stoner u . Then $N = |T(u,N)|$ denotes the number of neighbours which is parameter can set by us.

Still, not all of the druggies in $T(u,N)$ are available. We need to filter the data which, $r_{u,i}$ are unknown, i.e., $N(u,i) = T(u,N) \cap R(i)$. Then $r = |N(u,i)|$ is the number of available neighbour.

The hybrid model suggested by us as follows:

$$\hat{r}_{u,i} = \omega_1 \cdot \hat{r}_{u,i}^{NB} + \omega_2 \cdot \hat{r}_{u,i}^{MF}, \quad \omega_1 = r/N, \omega_2 = (N-r)/N \quad (26)$$

Then $r_{u,i}^{MF}$ is the vaticination score calculate by DBRISMF, $r_{u,i}^{NB}$ is the vaticination score calculate by Plan 1. We will compare this model with the approach Neighbour Based Correction of MF proposed by Takes [23] in the coming section.

VI. EXPERIMENT

In, this, we are about to give a detailed description of the data set and the evaluation criteria. We will verify all the styles mentioned over, and donate the results and conclusions.

A. Data Set

In this document, we hold the 100k Movie Lens data set. The data was collected through the Movie Lens web point by the Group Lens Research Project at the University of Minnesota. This data set consists of 100,000 conditions (1- 5) from 943 druggies on 1682 pictures, each stoner has rated at least 20 movies.

B. Evaluation Metrics

In order to certify the accurateness of the algorithms, we have used the Mean Absolute Error (MAE) and Root mean squared Error (RMSE) criteria as evaluation criteria. The MAE and RMSE were two amounts utilized to measure how close vaticinations or vaticinations are to the eventual issues in statistics.

$$\text{MAE} = \frac{1}{|T|} \sum_{(u,i) \in T} |r_{ui} - \hat{r}_{ui}|$$

$$\text{RMSE} = \sqrt{\frac{1}{|T|} \sum_{(u,i) \in T} (r_{ui} - \hat{r}_{ui})^2}. \quad (27)$$

C. Experimental Result

1) Certify the effectiveness of the differential model

In this section, we will compare MF, BRISMF, DMF and BRIEF in terms of delicacy. Also, the main training parameters were set to $\eta = 0.001$ and $\lambda = 0.07$. To eliminates the effect of the arbitrary concluding and gets a more correct cross validation to try the algorithm in the whole experiment.

It can be observed from Fig. 1, the MAE and RMSE come lower as the factor increase and at about Factor = 350 reached minimum. In each factor the styles proposed by us(i.e. DMF and detail) yield a better delicacy than MF and BRISMF as the MAE and RMSE is significantly lower. This indicates that the offered discriminative model can apply to any matrix factorization ways and meliorate the quality of recommendation. From Fig. 1, we can also see the DMF algorithm not only performed better than MF but also performed more than BRISMF. Therefore, we can say that the discriminative model offered by us can dramatically meliorate the quality of recommendation.

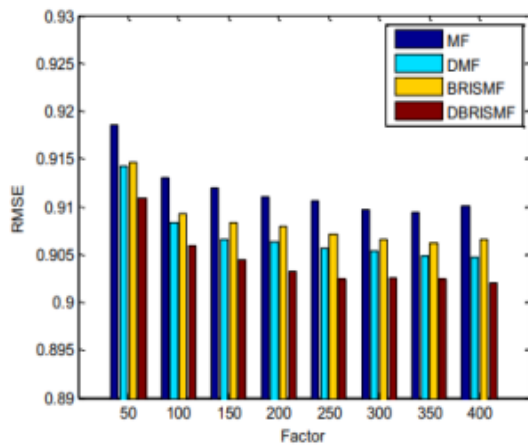
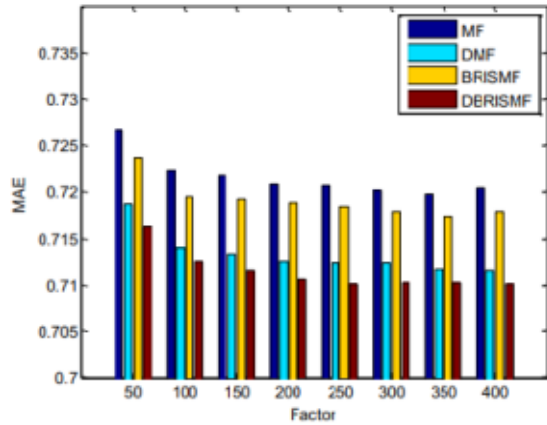


Figure 1. Experiment result on different matrix factorization techniques

2) Comparison of similarity measures

PCC and VS are two excellent algorithms to calculate the similarity between addicts. But the data set is stingy there are many co- rated particulars, render the algorithm useless. Considering the user factor matrix P is not stingy VS and PCC run on P can easily count the problems. The styles run on user factor matrix P denote PCC- P and VS- P singly, and the styles run on user item matrix R denote PCC- R and VS- R singly. also, the user factor matrix P is get from BRISMF at Factor = 350. For each algorithm, we executed(1) to induce the prophecy .

From Fig. 2 we can see that the PCC system yield a better delicacy than. That is because the PCC system takes the particular difference into consideration. We can also see that the styles run on P are better than the styles run on R , especially when a multitudinous neighbours. That's because for PCC- R and VS- R , two addicts may have a high similarity only because they have many co- rated particulars and coincidentally ranked these particular's similarity. Since there are only numerous neighbours, those unreliable neighbours may reduce the delicacy of the algorithm. As the neighbours increased, the other neighbours may cheapen the effect of the unreliable neighbours. In the coming section, we will take PCC- P as the similarity measure as the PCC- P performed swish in all the similarity measures.

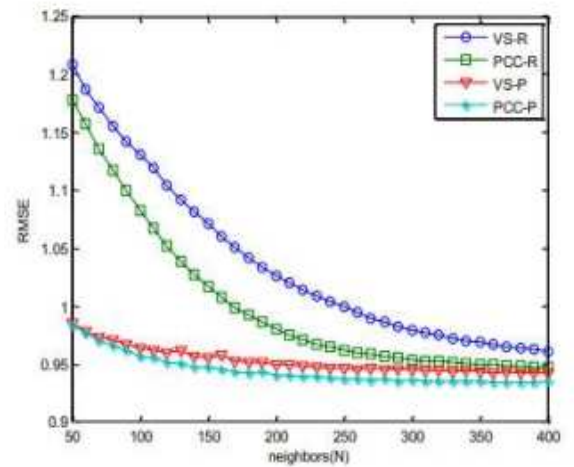
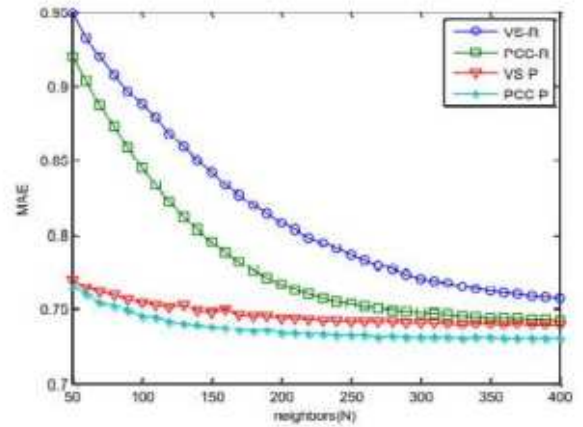


Figure 2. Experiment result on different similarity measures

3) Comparison of neighbor-based algorithms

We have got the exact similarity measures, currently we will dissect the goods of vaticination score model on neighbour-based algorithms. As we banded in 2.3.3, the most important step for vaticination score model is to compute the divagation[9, between stoner and. The two plans offered by us are expressed as DVI1 and DVI2 independently. In this section, we will compare the designs offered by us with the NB system which hold the (1) as the vaticination score model. For each algorithm, we enforced PCC- P to compute the similarity between druggies and applied the algorithm to induce the vaticination. Since the similarity measure run on stoner factor matrix P , the results may have some small floating. From Fig3 we can see that the styles offered by us submit a better delicacy than NB. We can also see that the DVI2 performed stylish when there are many neighbours and DVI1 performed stylish when there is a large quantum of neighbours. That is because the DVI1 only considering decorated particulars render a big quantum of data unusable. Occasionally the divagation[9, calculates by DVI1 is unreliable when there are a many neighbour. As because DVI2 performed not better than DVI1 when there are a lot of neighbours, the reason is presumably because we take (23) to compute the almost value of B_i and to some extent deduce the accuracy of the algorithm.

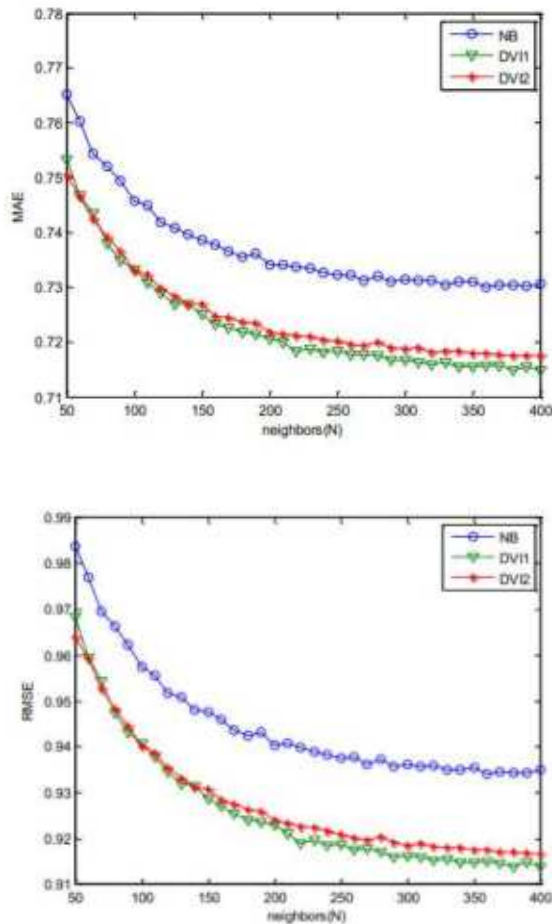


Figure 3. Experiment result on different neighbour-based algorithms

4) Comparison of hybrid methods

The matrix factorization algorithm yields a better accuracy than neighbor-based algorithm. However, it not always right.

TABLE II. BRISMF VS DV11

Algorithms	MAE	RMSE	
BRISMF	0.71737	0.90620	Factor=350
DV11	0.71490	0.91385	Neighbors=400

The data in table 1 are the result performed by 5-fold cross validation. 350 and 400 were alone taken as the number of Factors and the number of neighbours because BRISMF and DV11 accomplished swish in this case. From TABLE C we can have that BRISMF RMSE is lower than DV11, but DV11 submit a better delicacy in terms of MAE. The only difference between MAE and RMSE is the RMSE discipline those incorrect vaticinations. The experimental results in TABLE C show that DV11 is more accurate algorithm than BRISMF, but may not be capable for some situations. The incorrect vaticinations increased the value of RMSE. From 3 we can see that as the neighbours increase, MAE and RMSE come lower. therefore, we draw a conclusion that the neighbour- rested algorithms perform well when the available neighbour is large and perform poor when the available neighbour is numerous. For that

reason, we proposed a weighted crossbred styles which can avoid or compensate for the shortcomings of matrix factorization and neighbour- rested styles. For detailed description, see section 5.

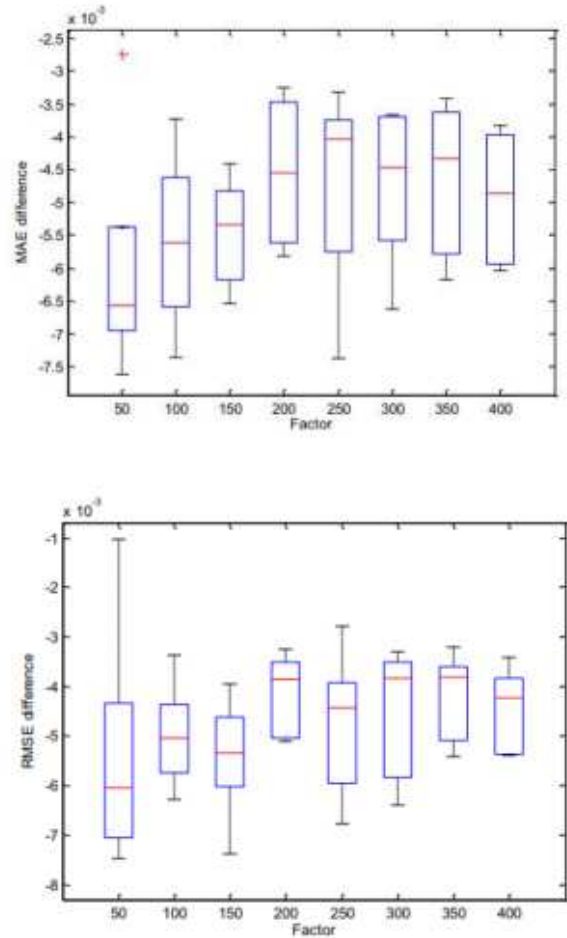


Fig. 4 is a box plot on five samples. The data in Fig. 4 is the MAE difference and RMSE difference between the hybrid system offered by us and the NB- MF system. For 0.001 means that the MAE or RMSE of the system offered by us is 0.001 lower than NB- MF. It can be obeyed from Fig. 4, the hybrid system offered by us submit a better delicacy than NB- MF on different Factor or different samples. MAE and RMSE are both at least 0.003 lower than NB- MF. The offered hybrid model is proved to enhance the quality of recommendation. In the following we give a table that records the swish results of each system. From table C, we can see that the crossbred system offered by us submit a better delicacy than DEBRIS and DV11. The trial result in table C vindicated the effectiveness of our styles.

TABLE III. BEST RESULT FOR EACH ALGORITHMS

Algorithms	Evaluation metrics		
	MAE	RMSE	
VS-R	0.75707	0.96126	Neighbors=400
PCC-R	0.74296	0.94750	Neighbors=400
VS-P	0.73956	0.94242	Neighbors=400, Factor=350
NB(PCC-P)	0.73063	0.93499	Neighbors=400, Factor=350
DVI1	0.71490	0.91385	Neighbors=400, Factor=350
DVI2	0.71742	0.91677	Neighbors=400, Factor=350
MF	0.71985	0.90939	Factor=350
DMF	0.71180	0.90478	Factor=350
BRISMF	0.71737	0.90620	Factor=350
DBRISMF	0.71023	0.90243	Factor=350
NB-MF	0.71292	0.90482	Factor=350
HYBRID	0.70827	0.90059	Neighbors=400, Factor=350

VII. CONCLUSION

In this paper, we propose colourful results to make a quality recommendation. The styles we mentioned in this paper are related to numerous cooperative filtering ways include the matrix factorization ways and the neighbours-Based styles. The trial result on Movie Lens data sets verified the effectiveness of our styles. In the unborn work, we will apply these styles to some larger data sets to corroborate the feasibility.

ACKNOWLEDGMENT

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A Novel Online Medicine Donation System

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Abstract— This project targets to donate remedies (medicine) that are unused. The unused remedies can be given for further utilization by poor people. This application helps the user to donate Unused remedies to NGOs. In this organization, there are three people namely, Admin, NGO, and User. In this project, we can provide unused medicine to indeed the person free of cost. To reduce the wastage of medicines we are developing software where unused medicines can be donated to indeed person. With the help of web-based tools, NGOs can be directly connected to this software for medicines. Actual donation practices can provide savings in budgets for development funding, so these facilities can be used for other purposes. The "Online Medicine Donation System" serves as a very user-friendly website by using web technologies like React Js.

I. INTRODUCTION

India is developing at a fast pace and has made quick walks in many fields since its autonomy. But, according to many researchers and National Family Health Survey (NFHS), it is clear that admittance to medical care is still a rising issue in many slums and rural areas. Tough India is classified as a developing country, poverty is still a major challenge. The Per Capita GDP in India is still around \$1900, by which it is clear that many people in India still lack expensive medical care and are deprived of healthcare facilities. There are many reasons for the above statements and the poor availability of medical care to many people in India: 1. India's current population is estimated at 1.3 billion. Nearly 17.7 percent of the world's population lives in India. 2. In a country where 50 million people live on less than USD 2 a day and nearly 200 million people are undernourished, the growing population will only make the food security situation worse. 3. There is one doctor for every 1,445 Indians as per the country's current population estimate of 135 crore, which is lower than the WHO's prescribed norm of one doctor for 1,000 people. 4. India's literacy rate is about 74% - leaving a quarter of the population without basic reading and writing skills. Poverty and illiteracy are closely linked - and

with the second largest population in the world, India is home to one-third of all world poverty. 5. Poverty erodes the good health status of a populace and further deepens individual and national poverty while creating a public health concern for society. Due to poverty and illiteracy, the people below the poverty line cannot/do not want to pay for expensive medical care because the cost of many medicines is so high that they prefer to buy food over medicines. Due to this issue, they suffer many diseases that turn into life-threatening issues if not taken care of in time. Whereas, people whose per capita income is more stable can afford these medical products and also preserve them for future needs. But according to various research and surveys, it is found that the prevalence of unused medications in homes has dramatically increased in recent decades, which has resulted in medication wastage.

In the rest of the paper, we have compiled and shortlisted all the research that we conducted on this issue and as well as a detailed walkthrough of how we are going to implement this software. The following section II consists of the background of the related works performed before and our review and study of it. Section III consists of the conceptual design, the architecture diagrams, DFD, and other related structural works

II. RELATED WORKS

We conducted a survey of various applications related to our project and tested various systems that follow the same principle. We also conducted a walkthrough of various guidelines related to Drug Donation and what policies and programs are followed throughout the world in this area. We researched the Guidelines released by WHO is used to implement such Medicine Donation Programs and found out about various new factors and precautions that should be taken while this donation process takes place. The following is the gathered data that we collected by reading and shortlisting the references we followed. We also studied the various drug donation campaigns that take place in India and prepared a detailed analysis on the topic.

Existing Systems -The existing systems proposed asked the donor to check the expiry date of the medicines and asked them to avoid the medicines if they are near to their expiry after checking. What the proposed system by us does is, it takes care of checking the medicine's expiry date, all you have to do is donate and the proposed system, i.e. the portal, automatically assigns the Collection Center following the required Procedure. Unlike some medicine donation apps, which are Android apps, this can run on any system without the need for you to download the application. The existing systems lacked many features like checking the user validity, inventory management, Donor-to- Receiver flow of the donation, Doctor Consultation Modules, Drug Information, and Education, and Forums, which are for the donors to help them to work easier. Here is some literature from those systems: They only had the necessary modules like Login, Donation, and Collection. It missed many important guidance modules that are necessary to help users get familiar with the application. There are many drawbacks as mentioned above that we have covered and fixed in the proposed application. The proposed application will be fully fetched and will repair all the errors and corrections that we have mentioned and sorted from the existing systems. Existing systems are based on outdated guidelines from WHO, which are related to donations related to drugs and medicine. These guidelines are updated after a particular period of time and need to be updated as per the current requirements. They also are not standardized and are not affiliated with NGOs. Many applications have the option to select the NGO as an option from Multiple choices. This leads to many complex difficulties that the application cannot manage. It can also lead to false expectations from the system to the NGOs and can cause internal conflicts. To prevent this, we have selected a particular NGO that we are affiliated with and that will manage all the received donations. This already solved the major issue mentioned above.

2.2 Proposed System

The proposed medicine donator project will be to prepare a portal for the collection of unused medicine for further utilization by a needy person. The website will be made so that the user can donate unused medicine to NGOs. That NGO can help needy people. The user can donate the medicine. Many poor people who could not afford to buy their own medicines, will get help from this website, where people can get the treatment and medicines to cure the respective diseases, and also the unused medicine will be utilized. The proposed system will also ask the user for the images of the medicines that he/she wants to donate so that there will be no further confusion on the NGO side. An additional feature that will add will be AI Image Search where the portal will search for the medicine on the Internet and provide the condition of the medicine that is to be donated. This will help to determine the condition in which the medicine is and also prove beneficial for the segregation of the medicines at NGO and Collection Center Level. This feature is completely new in our portal and is revolutionary in many ways. When the user is asked to click a picture of the medication, let's consider a Syrup Bottle, the portal will take that image and compare it with a new packed bottle image on the Web. Collection Center will accept it only if

the condition of the bottle is as per the requirements. Currently, we will be providing the services of login and registration to users and NGOs, and the donation of medicines carried out in the moderation of admin. But, in the future, it can be expanded to provide treatment to the user via video consultancy with doctors providing a prescription upload feature. It can be very beneficial to the user because as per the current situation of COVID-19, it is very important to follow government rules and regulations. The aim of the suggested system is to enable using of information and communication technologies in order to unite and offer a more effective way for arranging common activities of the NGOs. The modules included in the proposed system that are lacking in the previous systems are Donations Tracking and Status of the medicines, Doctors Consultation, Drug Information and Education, Guidance on Medicines and Proper Donation Methods Education to the users, Proper Inventory Management System, Medicine Sorting, User Validation using authentic details, Forums, and Emergency Notifications to the registered users, etc.

III. DESIGN AND DEVELOPMENT

System architecture is the conceptual model that defines the structure, behavior, and views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. This is the system architecture model that we will be focusing on.

3.1 System Context/Level Diagram

As you can see in the block diagram above (see Fig. 1), there are four external entities, namely: the Admin, Member Users (Donors and Receivers), the Collection Centers, and the Doctors. The task and functionalities of each user is listed alongside them and the data flow between them is also specified. As listed, the functionalities of Admin are: Login and Management of all the users (donors and receivers), appointment approvals from receivers, and management of the database with the total medicine distribution; the functionalities of the Donor are: Login and Donate Medicines, see the medicines donated by other users, check the status of the donated medicines; the functionalities of the Receiver are: Register, Login, Add prescription, and receive medications; the functionalities of Collection Center are: Login and Accept the medicines from donors, collect and segregate the medicines, and updating of the database; while the functionalities of the Doctors are: to view Patient Prescriptions, Consult them and Specify the proper treatment.

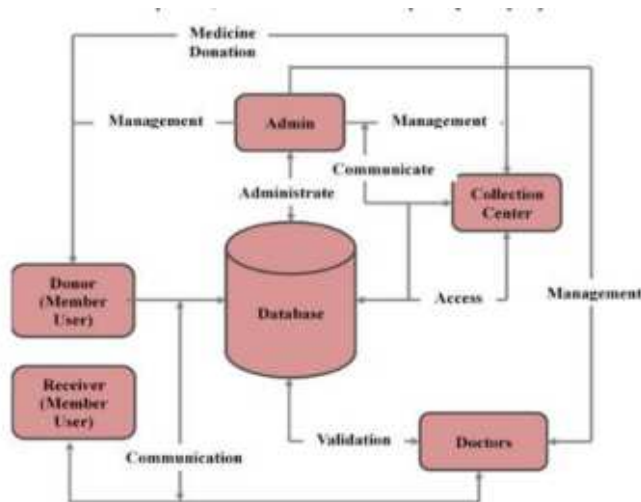


Figure 1: Block/Structural Diagram

3.2 Component Design

This section is focused on the conceptual design of our system which is the representation of the system composing the key concepts which can be used for knowing, understanding, and simulating our system. The web-based system will be the interface between the users (donors, doctors) and the trusted sources (government organizations/ NGOs) that will distribute medicines to the poor. The donors can donate their medicines through this web-portal and registered doctors can prescribe medicines for their patients who are unable to buy the costly medicines. The conceptual model for the system is depicted in Fig 1. The medicine provider or donor as well as the doctor needs to create an account in our software system through which the system would be able to verify the account as well as all the information given by the donor or the doctor. For this process, registration name, address, sign-up as (whether doctor or general), registration ID (for doctors only), email, and password would be mandatory. During registration, the provided information is crosschecked to verify as this system is used for very delicate purposes and therefore, we handled the authentication system (especially for doctors) very cautiously. The doctor and donor both can access his/her account after this registration process and would be able to see the medicine list, from which the registered doctor can prescribe medicine and a PDF report would be generated also the donor can donate medicine after providing the necessary information.

3.3 Module Analysis and Design

In this system, the administrator is the super user of this system. Only the admin has access to this admin page. The administrator has all the information about all the users, Volunteers, and Available Medicines. This module is divided into different sub-modules. Admin approves volunteer requests because without approval volunteers cannot log in. Admin selects volunteers and assigns respective medicines. This system aims to provide unused or leftover stuff or items to the poor and the needy. This site has collaborated with various NGOs through this site

the NGOs will come to know about the client's gift. The clients can have full records of the donations made by them. [5] The Modules with their functionalities are as specified:

A. Admin

The Admin will have all the permissions with access controls to all the databases. He will also have full control over the user's actions with total control and admin administration of the Collection Centers. The NGO will go through all the requests from the receivers and will distribute the medications through the Collection Centers.

Functionalities of Admin

- **Login:** The admin can log in using credentials.
- **Manage Members:** Admin analyses and deletes or blocks the member donating unwanted drugs that pass their expiry dates.
- **Manage Approvals:** The appointments by NGOs are managed by approving appointment requests.
 - **Reporting:** The monthly report of the members who donated medicine.

B. Member Users (Donors and Receivers)

The Donors can log in to the portal and donate the medications at the user's convenience. For donation, the criteria are: The Medications must be a minimum of two months away from their expiration date; If syrups and other bottled products, they must not be leaking and also must be in a proper condition and quantity; The value of the medications to be donated must be above Rs. 200 and above. The Receivers can log in and specify the prescriptions and required medications as per the doctor's consultancy. The receivers must have a valid proof of their income with their ID (like an Aadhar Card, etc.)

Functionalities of Member Users

- **Registration:** The user can register to the portal as either Donor or Receiver using the set credentials.
- **Login:** The user can log in to the portal using the credentials.
- **Donate:** Donors can select the 'Donate' option and follow the required procedure to give the medicines to the nearest Collection Center.
- **Search & Request:** The receiver can search the required medications through the portal and request for it.

C. Non-Governmental Organization (NGO)

The user (donor) who accepts the request and donates the particular medicine will automatically send a request to NGO's volunteer for pickup. It will consist of the medicine description sender's address and delivery to (NGO's address) he will receive the notification and as soon as he accepts it, he will go for the pickup to the user address and scan the medicine if it is right as per mentioned before he will accept the medicine and deliver it to the NGO's who had requested it.

Functionalities of NGOs

- Collection: The entire collection of donated medicines.
- Distribution: Distribution of medicines to the deprived and needy.

they get the treatment but not the costly prescribed medicines. So in the bigger picture, this incredible act of giving free treatment to the people becomes useless as they would need to buy the costly prescribed medicines by themselves. This paper gives a brief outline of the plan and improvement of our proposed online portal, which will be extremely successful and will bear incredible commitment to get the wellbeing administrations for these needy people. Because of this portal we hope that even the wastage of medication will be diminished. This project or this online medicine donation portal in the future has the ability to become a full fledged application wherein all the facilities will be provided on this portal. In future, it can be expanded to provide treatment to user via video consultancy with doctors providing prescription upload feature. It can be very beneficial to user because as per the current situation of COVID-19, it is very important to follow governments rule and regulations. The feature of video consultancy with doctor is very best option of future scope for the portal. For better suggestions, we are merging all the medication facility like consultation, medicine donation, blood donation, etc. like facilities are part of the portal in future. So, in future, it can also become a commercial portal and app which will be unique in its nature and availability. That said, we would like to conclude this presentation with the hope that our proposed system will be beneficial for the poor and needy and will help to create a better society where the benefits of modern and expensive medication can be received by all the masses. We would like to request each individual to help us and contribute to the society through such a simple and noble deed. We would also like to request to the people to help us spread awareness about the conditions that the deprived face and what a huge miracle it would be if each and every individual takes responsibility and donate as much leftover medicines as possible.

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The Dashboard Creation and Data Analytics using Visualization view with Tableau

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Abstract:

This paper explains how to utilize Tableau Public, a popular, free, and highly effective data visualization tool. An essential part of undergraduate research projects is data literacy. In order to construct charts and graphs, put them together, and use them to illustrate patterns found in data, this paper provides an exercise that explains the essential Tableau ideas and instructions. Our strategy is embedding the guidelines and justifications within a Tableau file. Experience has shown us that this method of learning is more intuitive than having the instructions in a separate ".doc" or ".pdf" file. We selected an excel file and used customer data to carry out the studies.

Keywords: Tableau, External files, data visualization, Graph, Chart, Pattern

Introduction

This information provides instructions for utilising a popular free data visualisation tool. Free, capable, and extensively used software for data visualisation is called Tableau Public. In order to achieve Hanson's goal of "doing economics," data literacy is a crucial skill (Hanson 2001). The goal is to make Tableau's learning curve less extreme. In order to construct charts and graphs, put them together, and use them to illustrate patterns found in data, this paper provides an exercise that explains the essential Tableau ideas and instructions. Our strategy is embedding the guidelines and justifications within a Tableau file. Reading instructions and explanations and dragging and dropping objects into the same file are both available in this way.

It is possible to display customer data using preloaded data from the excel file. The results are presented on a Tableau dashboard at the conclusion of the exercise through visuals. The dashboard has been placed on a totally free public server.

The remaining portions of the essay are divided into three groups. The first step is a review that situates data visualisation in relation to the various city statistics.

The worksheet, dashboard, and graph are the three basic parts of a Tableau visualisation that are described in the section that follows. The summary is in the final section.

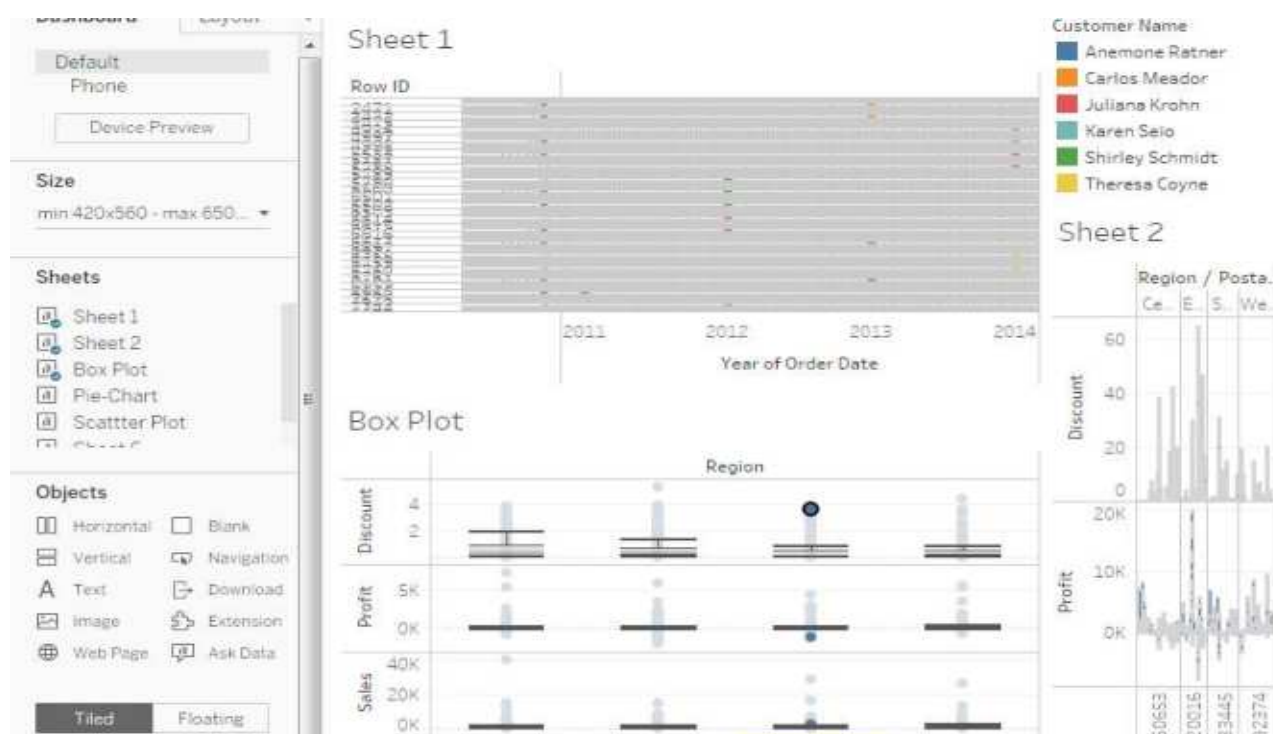
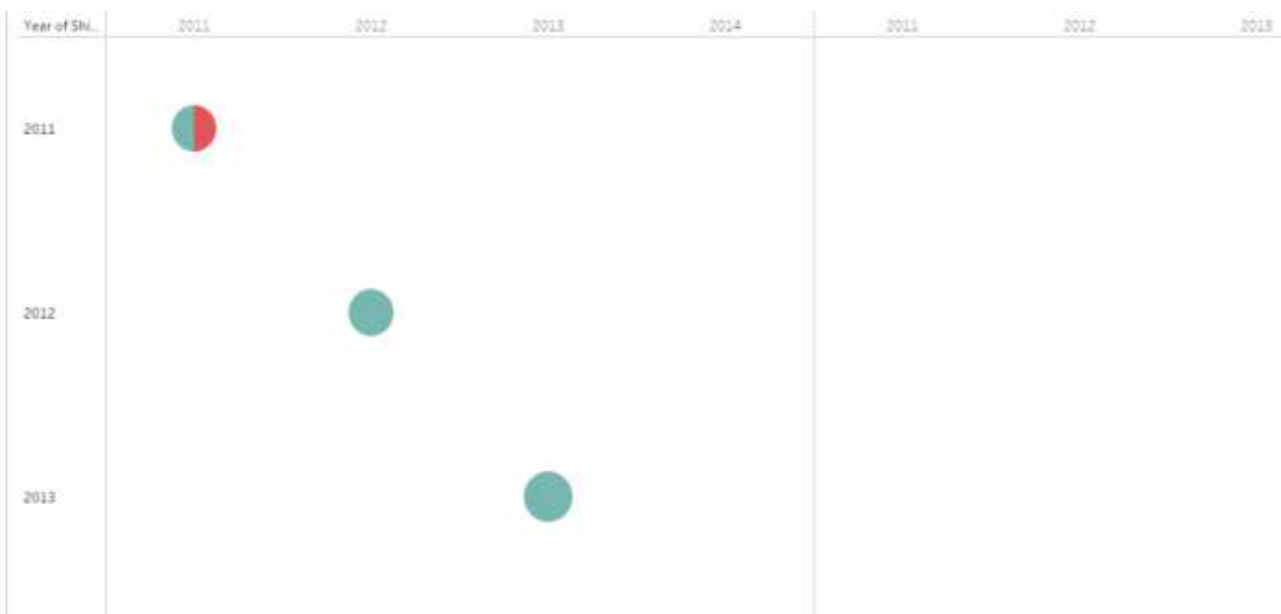
Literature Review

Hoyt and McGoldrick (2019) examine the five decades starting in the 1970s and identify the fall of economics majors in the 1990s as a turning point in the literature on economic education. Prior to the 1990s, textbook readability was a concern for economic educators. The expressions "learning by doing" and "training to think like an economist" first appeared in foundational pieces by Siegfried (1991) and Hansen (2001) after the 1990s and have since taken on a life of their own in the writings of economists (Hoyt and McGoldrick 2019).

Data literacy tools include data visualisation. The graphical display of information and data is known as data visualisation. Data visualisation tools offer an easy approach to observe and analyse trends, outliers, and patterns in data by utilising visual elements like charts, graphs, and maps. 2019 (Tableau.com). Data visualisation enriches a presentation in the same way as a thousand words while using less space and assisting the researcher in finding relationships in the data (Hennessey 2014). It takes time to create data visualisation activities that are well developed (Archibonga et al., 2017).

Components of Tableau Visualization

In Tableau the user begins by producing a single chart/graph in a worksheet. Dashboards are created by combining one or more worksheets, and each dashboard is connected to the others using tabs. The dashboard, which is the last stage of data visualisation, tells the story of the patterns found in the data, as the name implies.



Worksheets

The first step in creating a dashboard is a worksheet. Customers' data is used. Figure 2 shows the first worksheet for the activity. Icons to activate instructions that apply operations to the worksheet's chart are located in the horizontal bar at the top (above the red letter "A"). Mouse over the icons to see their functions. The "undo and redo," "sort data," and "Show Me" commands are all quite helpful. The Data pallet, which contains the variable labels (Dimensions) and values, is denoted by the re

d letter "B." (Measures). Drag variable labels from Dimensions in the Data Pallet to the Columns shelf and data from Measures to the Rows shelf to begin creating a chart (see red letter "C").

Pressing the suitable chart types for the data are highlighted with a red border when the Show Me icon is clicked; picking one, in this example a bar chart, causes the chart to display with a red letter "D."

Dashboards

One or more worksheets that display worksheets are collected in a dashboard. The dashboard's red letter A caption box contains the building instructions. Worksheets are added to the dashboard by dragging them from the Dashboard pane to its centre.

Summary

It is feasible to gather pertinent data, clean data, analyse data, and present their findings in these papers. A popular tool for data analysis is regression. Data visualisation is a newly emerging and complementary tool for data analysis. Although Tableau is a frequently used data visualisation tool, there aren't many example research projects using it in the literature on economics or education. Along the route, the student is given opportunities to annotate their charts with their interpretations of the data patterns they have noticed and their ideas regarding the causes of the patterns. They are also encouraged to think about the topic, explanations for the gap, and background readings.

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Novel Models of Machine Learning, Deep Learning, and Learning Theory

Dengue Malaria Prediction using CNN

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Abstract— The health care terrain is set up to be rich in information, but poor in rooting knowledge from the information. This is because we do not having effective and effective tools and styles. By applying the rearmost technology like machine literacy algorithms and ways and styles precious knowledge can be uprooted from the health care system can be veritably useful for farther improvement. Malaria and Dengue have a lot of bad runs which can harm mortal body veritably poorly. We are using Deep Learning algorithms to increase the delicacy of Malaria and Dengue Disease vaticination System. It's enforced as desktop operation in which stoner submits the miscellaneous data like textbook and image of blood cells symptoms. It retrieves retired data from stored database and deep literacy model and compares the stoner values with trained data set.

Keywords—Machine Learning, Disease prediction, Malaria, Dengue.

I. INTRODUCTION

Conditions are caused due to colorful reasons. They can be transmitted through colorful contagions or due to some chemical responses in our body. Among colorful life- changing conditions, conditions which have analogous symptoms have gathered a great deal of attention in medical exploration. The opinion of conditions with analogous symptoms is a grueling task, which can offer automated vaticination about the complaint of case so that farther treatment can be made effective. The opinion of similar conditions is generally grounded on signs, symptoms and cell image of the patient. A major challenge faced by healthcare associations, similar as hospitals and medical centers, is the lack of coffers at affordable costs and delicacy with lower time. 1) In healthcare, quality service depends on diagnosing cases duly and administering effective treatments with affordable cost. The available complaint database consists of both numerical and cell image data. Before applying any algorithm or any operation on available dataset we first need to check its authentication and thickness. We need to first perform data preprocessing operation on dataset to make it clean and proper. 2) By applying the algorithm, proposed system can identify and prize the retired knowledge from dataset, i.e.

patterns and connections associated with complaint from a database. The Healthcare vaticination system is an end stoner and an online discussion design which can help in dwindling the total time period needed for penetrating each case by croakers on time. Then we propose a system that allows druggies to get instant guidance on their health issues having analogous symptoms through a prophetic health care system online.

This system is also responsible for classifying conditions having analogous symptoms. compass

1. insure presto complaint vaticination.
2. insure accurate complaint vaticination.
3. Bear lower force
4. Ensures low cost
5. fluently accessible

II. LITERATURE SURVEY

Name:- Automatic Diagnosis With Efficient Medical Case Searching Based on Evolving Graphs. (Xiaoli Wang 1, Yuan Wang2, Chuchu Gao1, Kunhui lin1, and yadi li3), IEEE, 2018

Description:- The knowledge graph- grounded system to make the relation between colorful types of multimodal data builds a semantic rich knowledge base using both medical wordbooks and practical clinical data collected from hospitals and proposes a graph modeling system to bridge the gap between different types of data, and the multimodal clinical data of each case are fused and modeled as one unified profile graph and also develop a lazy literacy algorithm for automatic opinion grounded on graph similarity hunt.

Name:- Using Electronic Health Records and Machine Learning to Make Medical Related Predictions from Non-Medical Data (Stavros Pitoglou, Yiannis Koumpourous and Athanasios Anastasiou), International Conference on Machine Learning and Data Engineering, 2018

Description:- The thesis that the operation of machine literacy ways on data of this nature can be used to address vaticination/ soothsaying problems in the Health IT sphere.

Limitation:- The novelty of this approach consists in that medical data (test results, judgments, croakers ' notes etc.) aren't included in the predictors ' dataset.

Name:- Monitoring Mobile Patients Using Predictive Analysis

By Data From Wearable Sensors, International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) 2018.

Description- In this paper system uses detectors, the data accession unit, microcontroller and software. This system is suitable to shoot alarm dispatches about the case's critical health data by textbook dispatches or by dispatch reports. By using this information, the healthcare professional can give necessary medical advising.

Limitation- Sensors and controller, camera is costly.

Name:-Data Mining for Wearable Sensors in Health Monitoring Systems: A Review of Recent Trends and Challenges, Center for Applied Autonomous Sensor Systems, Orebro University, SE-70182, Orebro, Sweden;2017.

Description-: This paper provides a recent review of the rearmost styles and algorithms used to dissect data from wearable detectors used for physiological monitoring of vital signs in healthcare services. In particular, the paper outlines the more common data mining tasks that have been applied similar as anomaly discovery, vaticination and decision timber when considering in particular nonstop time series measures.

Limitation-: The named data mining fashion is largely dependent on the data mining task to be performed. According to the considered data mining tasks in Section 3, for anomaly discovery task, SVM, HMM, statistical tools and frequency analysis are more generally applied.

Name:-An Artificial Neural Network approach for classification of Vector-Borne diseases. (Prajwal Shimpi, Sanskruti Shah, Maitri Shroff , Anand Godbole),(ICEEOT) 2018.

Description-: Three conditions current in India malaria, dengue and chikungunya. The proposed system uses an Artificial Neural Network(ANN) rested backpropagation algorithm for training and testing. Several grade optimization ways are used like Adaptive Moment Estimation, RMS Prop, Adara, Classical instigation and Nesterov accelerated grade grade. Limitation- incremental from the 3 possible conditions that were taken in consideration in this paper, different set of conditions, that is, outside of vector- borne conditions are not detected.

Name:-Analytical study of heart disease diagnosis using classification Techniques. (C.Sowmiya; P.Sumitra), International Conference on Intelligent Techniques in Control, Optimization and Signal Processing,2017

Description-: In this paper the eventuality of nine bracket ways was estimated of vaticination of heartdisease.Using medical biographies similar as a age, coitus, blood pressure, casket pain type, dieting blood sugar. It can prognosticate like of cases getting heart complaint Grounded on this, medical society takes part interest in detecting and precluding the heart complaint.

Limitation-: It can only experiment a priori algorithm. Classification of diseases is not accurate.

Name:-An ensemble based on distances for a kNN method for heart disease diagnosis. (Alberto Palacios Pawlovsky), IEEE, 2018

Description-: In this paper the eventuality of nine bracket ways was estimated of vaticination of heartdisease.Using medical biographies similar as a age, coitus, blood pressure, casket pain type, dieting blood sugar. It can prognosticate like of cases getting heart complaint Grounded on this, medical society takes part interest in detecting and precluding the heart complaint.

Limitation -: In this paper the eventuality of nine bracket ways was estimated of vaticination of heartdisease.Using

medical biographies similar as a age, coitus, blood pressure, casket pain type, dieting blood sugar. It can prognosticate like of cases getting heart complaint Grounded on this, medical society takes part interest in detecting and precluding the heart complaint.

Name-: Prophetic Analytics in Health Care Using Machine Learning Tools and ways.

(B. Nithya, Dr.V.Ilango), ICICCS, 2017

Description-: It offers a variety of waking and threat operation decision support tools, targeted at perfecting case's safety and healthcare quality and complaint prognostications.

Limitation Massive quantities of miscellaneous, distributed, different, largely dynamic data sets and decreasingly large quantities of unshaped and non-standardized information with respect to varied types of cancers.

Name-: Non-invasive system for bronchopulmonary conditions opinion in cases of all periods grounded on the microwave oven technologies.(IvanV. Semernik, AlexanderV.Dem'yanenko, OlgaE. Semernik, AlexanderA. Lebedenko), IEEE, 2017

Description-: In this paper the system of bronchial asthma diagnostics grounded on analysis of microwave oven band electromagnetic radiation propagation through the case casket is described. The suggested system allows realizing inoffensivenon-invasive diagnostics of respirator system conditions among cases of all periods. It also allows covering the case's condition and the complaint progression during the whole period of treatment.

Limitation- The disadvantages of the suggested system are absence of necessity of doing breathing manoeuvres by the case, absence ofnon-influence on the caseetc.

Name- The Ethical Challenges of Applying Machine literacy and Artificial Intelligence in Cancer Care.(Rima Hajjo), IEEE, 2018

Description- This composition examines the ethical issues of applying ML and AI in cancer care and classifies them into three major orders bias, the societal perpetration of the technology, and the goods of big data analytics on cancer cases. Limitation- Algorithms trained on data sets with these characteristics are espoused in healthcare; they've the eventuality to complicate health difference.

III. PROPOSED METHODOLOGY

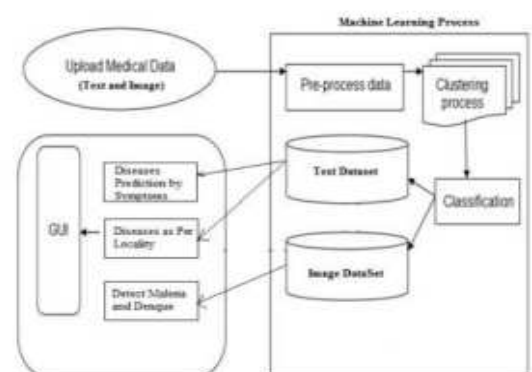


Fig 1. System architecture

The people are suffering from the numerous viral conditions like Dengue, Malaria. This information is collected from the colorful hospitals and the analysis of data is done and vaticination of some conditions can be made. This system gives the vaticination as per position of the area.

Description:

Module 1:

In this system we detect the dengue or malaria virus based blood cell image and apply image processing with the use of machine learning algorithm

Module 2:

detecting diseases based on symptoms.

A. Algorithm:

CNN is the basic algorithm used in the project which is as follows,

1. Classify dataset under labeled folders with blood samples images as CNN is supervised algorithm
2. Read dataset and prepare dataset in one file as pickle and NumPy.
3. Read features of all images and label (here name of dataset folder) of it using following functions,
 - a. Conv2D
 - b. Maxpool2D
 - c. REL activation for layers
 - d. Sigmoid activation for dense layer
 - e. Binary Cross entropy for loss calculation
4. Store it in model file
5. Get input image
6. Read features of input image
7. Compare features of stored features
8. Show label as prediction of nearly matched features.

Now days, to analyzation of the imaginary data in deep literacy, most important and constantly used algorithm is Convolutional neural network(CNN, or ConvNet). For the minimumpre-processing of a data CNN have different types of the variations. Along with the restatement invariance characteristics and the armature related with the participated- weight, CNN also known as shift steady or space steady artificial neural networks(SIANN). Along with the beast visual cortex, the connectivity between the neurons resembles the association; networks were inspired by natural processes. Only in defined visual fields, Respond to stimulants of Individual cortical neurons is known as the open field. The open fields of colorful neurons part lap specified they cowl the whole field of regard. CNN's use comparatively veritably little preprocessing compared to indispensable image bracket algorithms. This implies that the network learns the pollutants that in ancient algorithms were hand- finagled. This independence from former information and mortal trouble in a point style may be a major advantage. They need operations in image and videotape recognition, recommended systems, image bracket, medical image analysis, and verbal communication process. A CNN consists of associate input associated an affair subcaste, likewise as multiple retired layers. The retired layers of a CNN generally encompass convolutional layers, pooling layers, completely connected layers, and social control layers.

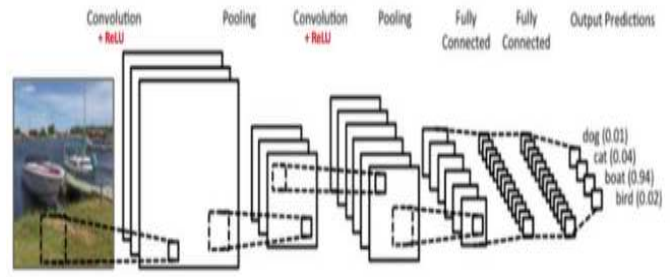


Fig 2. Simple ConvNet

The Convolutional Neural Network in Fig. is analogous in armature to the original LeNet and classifies an input image into four orders canine, cat, boat or raspberry. There are four main operations in the ConvNet shown in fig. above:

1. Convolution
2. Non Linearity
3. Pooling or Sub Sampling
4. Classification

An Image could be a matrix of picture element values. principally, each image will be diagrammatic as a matrix of picture element worth Channel could be a typical term wo n't to talk to a precise element of a picture.

B. Mathematical Model:

Let 'S' be the system

- Where,
 - $S = \{I, O, P, Fs, Ss\}$
 - Where,
 - I = Set of input Set of output
 - P = Set of technical processes
 - Fs = Set of Failure state
 - Ss = Set of Success state

- Identify the input data I_1, I_2, \dots, I_n

$I = \{(Input\ Data\ (Text, Image), Dataset\ (Dengue, Malaria))\}$

- Identify the output applications as O_1, O_2, \dots, O_n

$\{(Malaria\ Detection, Dengue\ Detection)\}$

- Identify the Process as P

$P = \{(Image\ pre-processing, Image\ Processing, Grey-scale, smoothing, Edging, segmentation, feature\ extraction, classification, show\ result)\}$

- Identify the Failure state as Fs

$Fs = \{(If\ data\ set\ not\ loaded, If\ not\ predicted, if\ more\ time\ required\ to\ predict)\}$

- Identify the Success state as Ss

$P = \{(Correct\ prediction\ within\ time)\}$

IV. RESULT AND DISCUSSION

In the proposed system, we will be using supervised CNN approach is used to prognosticate the results from images as well as textbook dataset is used for symptoms bracket. CNN gives delicacy than other algorithms. Also textbook dataset and symptoms bracket works in compliment to the CNN to get more precise results.

Comparative results of existing and proposed system is as follow,

36.

Parameters	Existing System	Proposed System
Image Dataset	Somewhat	Yes
Text Dataset	Somewhat	Yes
Symptoms Classification	Many Diseases	Focused on Dengue and Malaria
CNN	Somewhat	Yes
Execution	Mostly Heavy with Matlab	Lightweight with Python, OpenCV and Tensorflow
Time	More	Less

Table 1: Comparative Results

With reference to Table 1 it is clear that we overcome various problems in existing system and our approach works efficiently.

V. CONCLUSION

A robust and new system by using machine knowledge for judgments malaria and dengue has been executed in this paper. By using this system we gain the lower than 60 seconds time to give a opinion as compared to other clinical laboratories. The prophecy algorithm is design to predict the area in pitfall zone of particular complaint by considering the position from the database to calculatetheresults.The results have to be the same as the Python affair, as well as keeping to an respectable processing speed and duration. The disquisition will concentrate on the benefits it can give for the successful opinion of malaria, dengue and theprobativetreatment.The system prophecy is truly important in the awareness about the viral diseasespreading in the position as people get advised by the system about any particular complaint so they take precautions about that.

VI. REFERENCES

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Online Personal Health Care

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Abstract— Considering the day-by-day rapid increase in population of the world, providing appropriate healthcare to elderly or unwell people becomes a crucial issue and needs high attention from mainly medical, also industrial and academic fields of the society. Patient healthcare provision in the home environment presents many challenges. Patient Healthcare is a term used for the practice of medicine and public health supported by mobile devices. It is most commonly used in the reference to using mobile communication devices such as mobile phones, tablet & computer PDAs. This project addresses Patient Healthcare System at home. The purpose of this project is to on emergency case doctor can handle the situation using this device. After analysing these patient records from device then doctor send the all details via SMS to the patient like prescription, tablets etc., and patient take action on this update and take relax.

Keywords—*Personal Health, full Stack, Health Care*

I. INTRODUCTION

Since the population of the world is ageing rapidly, how to provide appropriate healthcare to the elderly and unwell people becomes an important issue and draws high attention from medical, academic and industrial fields of the society. Economic growth in a country largely depends on the standards of its social infrastructure. Healthcare is important areas of social infrastructure. It also covers care of the other healthcare organization objective of which can be met through healthcare infrastructure needs, management model that identifies problems, develops a framework for implementation and helps to evaluate dynamically healthcare infrastructure service performance and social security measures. Hospitals always need better management. The database of all patients should be handy enough. But also, there should be data prevention. Also, the patient data should be kept private in case. Healthcare is the most important concern of many countries in the world. Improving the lives of patients especially in the weaker parts of the society which include the elderly, physically and mentally disabled as well as the chronically ill patients is the major factor to be improved. In existing system, the data is recorded in the form of paperwork or on general storage server. But generally, that data is accessible to all the staff and doctors. Hence, we are proposing a new way where patient and doctors able to communicate through mobile application and web application.

The proposed system uses website for real time monitoring and analysis of the patient's health parameters and in return provide medication. It is easy for doctors and the caregivers to immediately act in emergency cases, and also to provide medication depending on the health parameters without the physical presence of the doctors. The system is such that, remote monitoring of patients can be done by diagnosis of the patients with the help of the website. In this patient can book appointment and also can get prescriptions. Patient also can share reports and data to the Doctor through this website. This data is received by the doctors and caregivers through server which is analyzed by the doctors. The server helps to store the data, medical history of the patient for future use. The system architecture is such that the patients can be monitored and treated privately at home. This system also helps in handling multiple patients at a time in the hospitals as well as the public health care units. Online Medicine Shop Project in JSP Mysql. online Pharmacy shop project in JSP Mysql Netbeans. This project is a web application which is developed in Java JSP Mysql. Work on the Sales Reporting and Management System-Pharma project to enhance the growth of pharma employees/ companies. this project is to develop an online web portal that can handle product information, can booking from distributors very fast from all over the world and online payment for orders and customer support for distributors. This type of application will atomize the procedure of drug supply through the Pharmaceuticals Company and improve business standards and customer relationships. This application is use distributors can view detailed information of transactions and get drugs information and see future orders from his account. Customers can easily visit this site and register themselves, by filling a registration form. Once a customer is registered, he/she can login using their email and password and can buy products available. Users can also view doctors with their descriptions, clinics, and timings.

II. Scope of the Project

Effective and timely communication between patients, physicians, nurses, pharmacists, and other healthcare professionals is vital to good healthcare. Current communication mechanisms, based largely on paper records and prescriptions, are old-fashioned, inefficient, and unreliable.

When multiple healthcare professionals and facilities are involved in providing healthcare for a patient, the healthcare services provided aren't often coordinated. Typically, a physician writes a prescription on paper and gives it to the patient

The patient carries the prescription to the pharmacy, waits in line to hand the prescription to the pharmacist, and waits for the pharmacist to fill the prescription. The pharmacist might be unable to read the physician's handwriting; the patient could modify or forge the prescription; or the physician might be unaware of medications prescribed by other physicians. These and other problems indicate the need to improve the quality of healthcare

III. LITERATURE SURVEY

Author Name - Mi Jung, Rho

Title - Different Perception and Attitude toward Medical Data that including Protected Health Information in Clinical Research

Publication Year- 2018

Technology Used - The interest for clinical research, using medical data stored in the EMR, is increasing. However, perception and attitude medical data, including protected health information, could differ depending on the person. Different perception and attitude could interfere with the activation of medical information utilizing. Therefore, we attempted to find different perception and attitude toward protected health information preserving medical data in clinical research.

Author Name - Fayeza Anjum, Abu Saleh Mohammed Shoaib

Title - Online Health Care

Publication Year- 2018

Technology Used - The importance of health care is immense in a society and over the past years, this sector has been evolving to produce a more efficient and computerized system. Bangladesh has also made a significant improvement in the health care system over the years. This paper presents the development of a web application for the general public of Bangladesh where they can store their own medical data and access it anytime, from anywhere. In the Online Health Care (OHC) system, users can register as patients to store their medical data in the database.

Author Name - Pin-Chieh Huang

Title - Development of Health Care System Based on Wearable Devices

Publication Year- 2019

Technology Used - the system has been set in a long-term care institution in Taiwan since October, 1st, 2018. There are two groups of residents in the institution. One of the groups are the elders who have chronic such as high pressure and high blood sugar. This type of group adopts the care notification system to help them manage their health. The other group is dementia residents. There are 10 dementias about 59 to 89 years old attend the experiment.

Author Name - Yung-Tien Huang

Title - A Study on the Mobile Personal Health Management System

Publication Year- 2019

Technology Used - Based on the demand characteristics of remote care, this paper establishes a system structure of mobile personal health management, which is divided into three parts: blood pressure blood glucose pulse machine, radio frequency identification (RFID) system and network health information management system. The completed mobile personal health management system allows users to use the wireless network environment to complete physiological measurements and numerical upload records anytime, anywhere, and to easily obtain a list of personal health measurement records using a tablet or smart phone. And the analysis chart, the measurement data of this system is measured and transmitted, combined with the record and analysis of network health information management, can improve the immediacy and accessibility of long-term and long-distance care, and also simplify the operation of medical services process.

Author Name - Sarmad Monadel Sabree ALGayar

Title - Medical Social Media Systems – Implementation of the Android Application

Publication Year- 2019

Technology Used - This article presents the implementation of an integrated architecture for a mobile healthcare system, which is called Medical social media system. This system integrates wearable sensors, smartphones, and oriented social media, so as to enhance the healthcare services in the Iraqi environment. The system can be used by smartphones, running on the Android system and smart-watches. In addition, the website can be utilized by devices like desktops, notebooks, tablets, and smartphones which can be utilized maximally for data collection and analysis via user-system interactivity, utilizes wearable sensors, smartphones that automatically collect life activities information, such as exercises information like heart rate, the breathing rate, and body temperature.

Author Name - Mark L. Braunstein

Title - Health Care in the Age of Interoperability Part 5: The Personal Health Record

Publication Year- 2019

Technology Used - we focused on clinical decision support (CDS) for physicians and other health care providers. In this one, we will look at how interoperability through Fast Healthcare Interoperability Resources (FHIR) could empower patients to become more involved in their own care and in maintaining their health.

Author Name - Yan Li

Title - User Privacy Protection Technology of Tennis Match Live Broadcast from Media Cloud Platform Based on AES Encryption Algorithm

Publication Year- 2020

Technology Used - With the improvement of the current Internet software and hardware performance, cloud storage has become one of the most widely used applications. This paper proposes a user privacy protection algorithm suitable for tennis match live broadcast from media cloud platform. Through theoretical and experimental verification, this

algorithm can better protect the privacy of users in the live cloud platform. This algorithm is a ciphertext calculation algorithm based on data blocking. Firstly, plaintext data are grouped, then AES ciphertext calculation is performed on each group of plaintext data simultaneously and respectively, and finally ciphertext data after grouping encryption is spliced to obtain final ciphertext data.

Author Name - Adam Imansyah Pandesenda

Title - Sentiment Analysis of Service Quality of Online Healthcare Platform Using Fast Large-Margin

Publication Year- 2020

Technology Used -. Mobile technology is a tool by which healthcare users are assisted. Health information technology has the ability to enhance individual health outcomes and increase healthcare quality, allowing better independent health management. The implementation of information technology in healthcare, particularly the development of healthcare services based on mobile technology (m-health), has already changed healthcare delivery by making it more available and affordable across developing world. Alodokter is Indonesia's number one digital health firm, that has significantly changed the axis of Indonesian health services in providing easily understood, reliable, and available medical information to everyone

Author Name - Informatique de santé

Title - Health informatics — Personal health device communication

Publication Year- 2022

Technology Used - ISO/IEEE 11073 standards enable communication between medical devices and external computer systems. This standard uses the optimized framework created in IEEE Std 11073-20601™-2008a and describes a specific, interoperable communication approach for pulse oximeters. These standards align with, and draw upon, the existing clinically focused standards to provide support for communication of data from clinical or personal health devices.

IV. PROPOSED METHODOLOGY

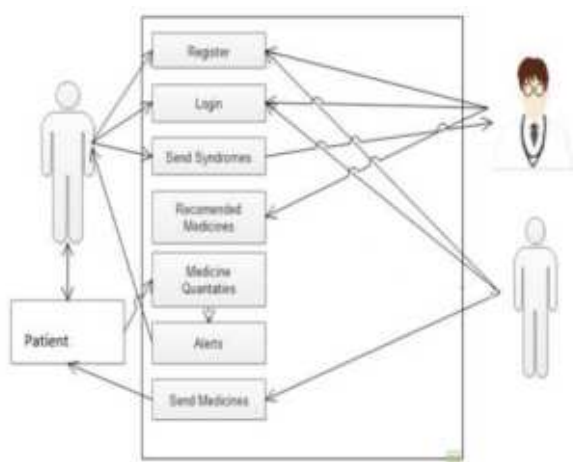


Fig. 1. System Architecture

Patient also can upload reports on website. Patient should view a prescription suggested by doctor on website. Patient Above figure showing system architecture for proposed system. In this there are 3 modules included which are admin, medical & patient. Patient can book appointment online of particular doctor. can order medicines from website e-commerce site directly. Doctor can give time to the patients according to their time convenience.

First, User and Admin and Medical shop owner should have to register to the system. After registering to the system user, doctor and shop owner should have to login to the system. After login patient should book appointment, can view prescription given by the doctor and also can order the medicines from same website.

Doctor can view all the data of the users and also can send prescription to the patients and medical shop owner. Medical shop owner can view all information of patients and their reports. Medical store owner can book medicines online from medicine ecommerce. Medical store owner can view all the medical related information.

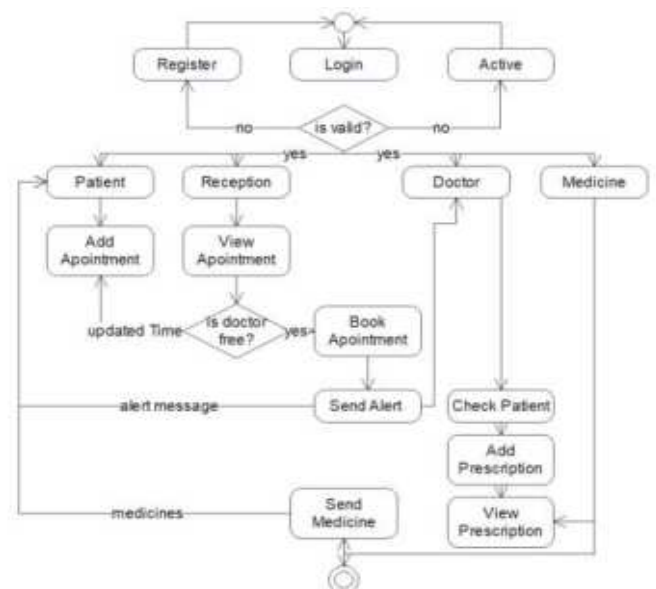


Fig. 2. Flow Chart

A flowchart visually displays the sequence of activities in a process and who is responsible for those activities. The purpose of any flowchart is to help visualize required steps – especially important for a project management process. Every flowchart consists of actions, the roles responsible for executing those actions and the inputs and outputs for each step. Project flow describes a pre-set sequence of activities required to plan, produce, deliver and maintain project product, along with information, materials, and resources required by the project. Project flow is a convenient way to define and plan projects. Flowchart is a graphical diagram that represents the sequence of steps to solve a problem. A flowchart is a diagrammatic representation of an algorithm. In computer programming.

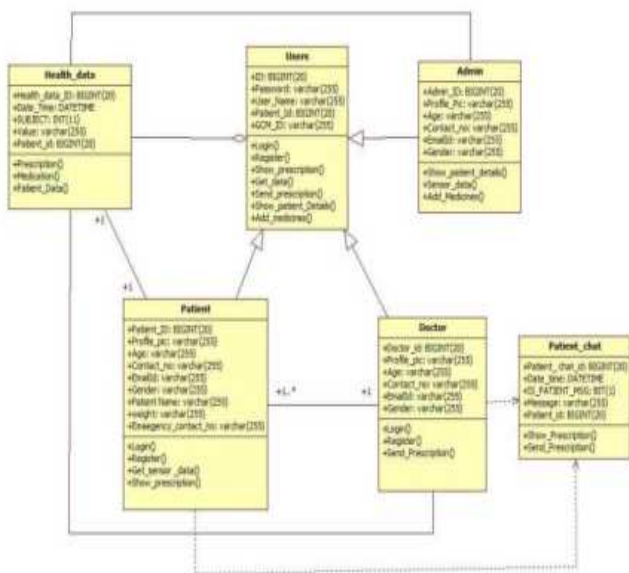


Fig. 3. Class Diagram

Class diagrams are the main building block of any object-oriented solution. It shows the classes in a system, attributes, and operations of each class and the relationship between each class.

In most modelling tools, a class has three parts. Name at the top, attributes in the middle and operations or methods at the bottom. In a large system with many related classes, classes are grouped together to create class diagrams. Different relationships between classes are shown by different types of arrows. Class diagram consists of classes, interfaces, associations, and collaboration. Class diagrams basically represent the object-oriented view of a system, which is static in nature.

V. RESULT AND DISCUSSION

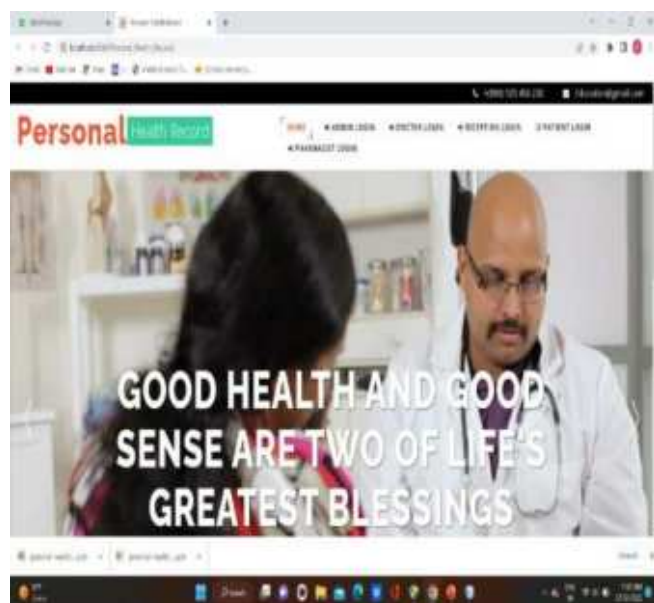


Fig. 4. Home Page

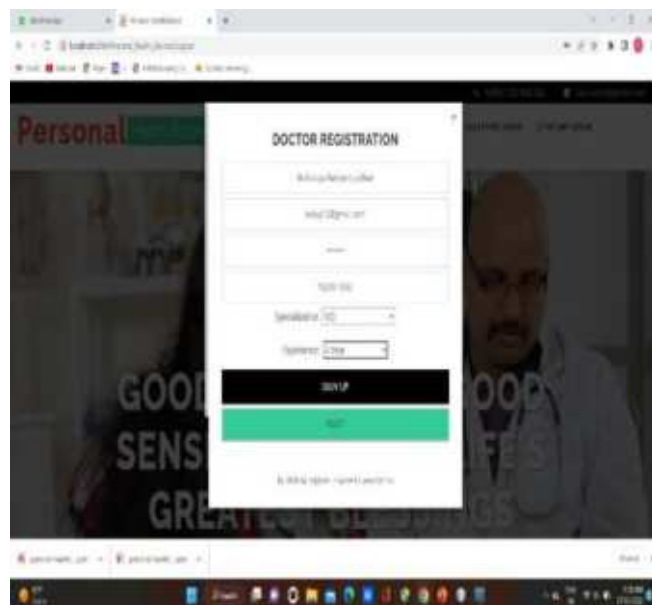


Fig. 5. Registration Page

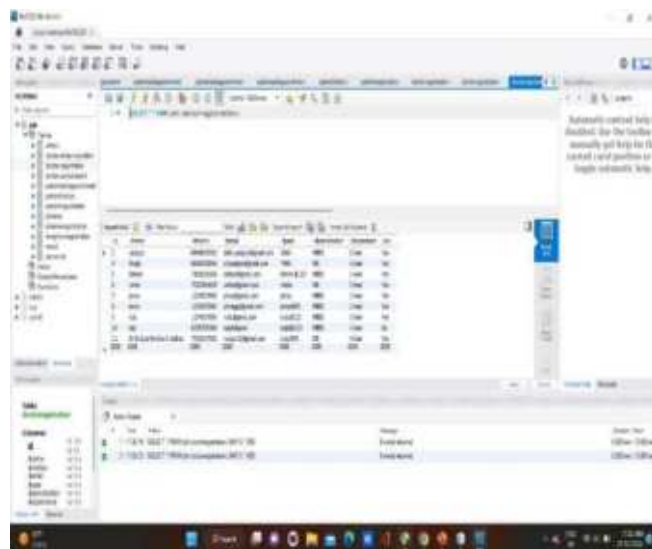


Fig. 6. Stored Dataset

VI. CONCLUSION

In The Present Healthcare Monitoring System, The Proposed System Is More Efficient And Beneficial. It Uses Low Cost; Proper Messages Are Provided In Emergency. Thus, It Saves Life Of Patient When Abnormal Conditions Take Place. A Dynamic Integration Related To Multimedia Medical Data Provides The Framework Which Is Low Overhead And Rich Multimedia Support. The System Is Able To Carry Out A Long-Term Monitoring On Patient's Condition And Is Equipped With An Emergency Rescue Mechanism Using SMS And E-Mail Alert.

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Real Estate Search Based on Data Mining

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Abstract— the real estate system Give the functionality for buyers, allowing them to search for houses by features or address. It provides functionality for the seller, authorize them to log into the system and add new advertisements or delete existing ones. For this each user is provided a login account with login ID and password. Along with this, when the user will search for the property, original property value and predicted property value will be displayed. People looking to buy a new home tend to be more conservative with budgets and market strategies. The existing system involves calculation of house prices without the necessary prediction about future market trends and price increase. Aim of this project was to develop a real estate web application using Notepad++ and Xampp. The functioning of this project involves a website which accepts customer's specifications and then uses the application of data mining. This application will help customers to invest in an estate without approaching an agent. It also decreases the risk involved in the transaction. By analyzing previous market trends and price ranges, and also upcoming developments future prices will be predicted. For the price predication we will be using classification algorithm.

Keywords- Xampp, Data Mining, price prediction, python.

I. Introduction

Real estate is one of the most fast-paced and emerging industries today. Nowadays everyone wants to be the owner of their house rather than live on rent. Therefore, people are very cautious in searching for the most suitable house. Different people have different budgets and so vary their desire. This system includes property details like Address, space measurement (sq. ft.), number of BHKs, Floor, Property Seller name and its contact number plus email-id. The system contains an algorithm that calculations loan that the user can take plus 20%-30% cash that the user has to pay. Thus, there is a need to predict the efficient house pricing for real estate customers with respect to their budgets and priorities. This topic brings together the latest research on prediction markets to further their utilization by economic forecasters. It provides a description of prediction markets, and also the current markets which are useful in understanding the market which helps in making useful predictions. Thus, there is need to predict the efficient house pricing for real estate customers with respect to their budgets and priorities. This uses data mining algorithm to predict prices by analyzing current house prices, thereby forecasting the future prices according to the users requirements.

II. LITERATURE REVIEW

Byeonghwa Park et al.[2] describes an innovative software that is used for real estate evaluation and mapping and analyzing of real estate advertisements published on the internet in the Czech Republic. The software systematically collects, analyzes and assesses data about the changes in the real estate market. For each half year, the software assembles over 650,000 price quotations concerning sale or rental of apartments, houses, business properties and building lots.

Wang, X. et al.[6] developed a real estate web application using Microsoft ASP .NET and SQL 2008. The real estate system Give the functionality for buyers, allowing them to search for houses by features or address. It provides functionality for the seller, authorize them to log into the system and add new advertisements or delete existing ones. For this each user is provided a login account with login ID and password. Along with this, when the user will search for the property, original property value and predicted property value will be displayed. By analyzing previous market trends and price ranges, and also upcoming developments future prices will be predicted.

Aaron Ng[5] focuses on determinants of real estate investment, on the capital market, one of important criteria for investment decision is the issue of selecting sources, possibilities and methods of raising the value of the investment object (Klecza, 2010). This paper focuses on perceiving real estate property as an investment asset that generates a certain amount of revenue to its owner, assuming expected risk and the expected level of liquidity (Kruclický, 2019).

An Overview on the Indian Real Estate Sector [11] researcher go through different article of newspaper, web-portal and report of several government organizations. We also go through various research articles of rating agencies like ICRA, JLL and E and Y concerning with reality sector of India. We also critically analyzed the government of India and MP regulation regarding the reality sector and affordable housing.

Vishal Raman[7] aims to study the actual utility of real estate pricing models based on data mining and machine learning. In order to achieve this goal, this paper introduces appropriate trend estimation methods, adjusts pricing models and processes, and realizes trend this paper aims to study the actual utility of real estate pricing models based on data mining and machine learning.

III. METHODOLOGY

A. Activity Digram

Activity diagram focuses on the execution and flow of the behavior of a system instead of implementation. Below fig represents the actual flow of and behavior of system. It consists of that are made up of action which applies to behavioral modeling technology.

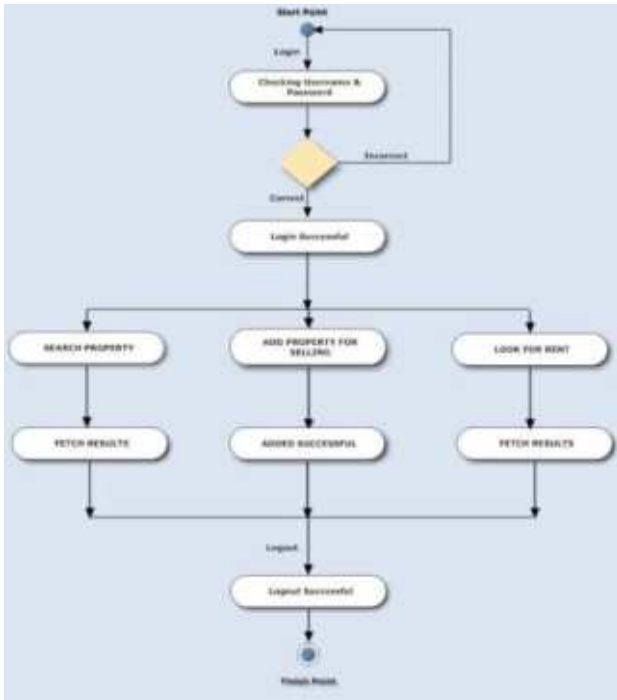


Fig. 3 Activity Diagram

B. Data Flow Digram:

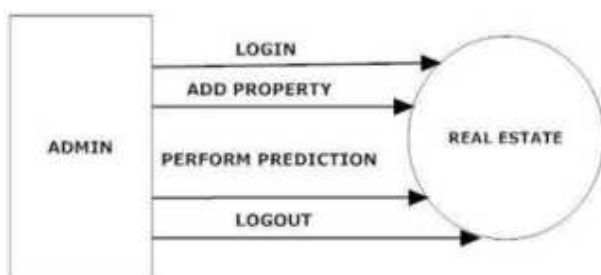


Fig 2. DFD Level 0.

DFD level 0:- After user is successfully logged in, he can search properties according to his preferences. He can add his/her shortlisted properties. He can also search for respective rent for any provided property.

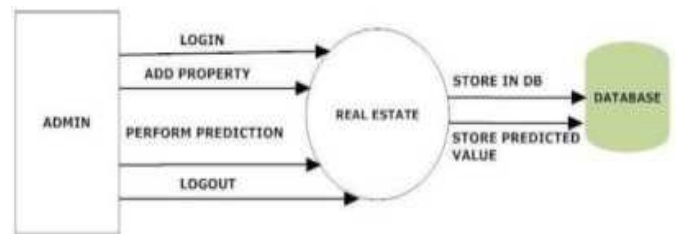


Fig. DFD Level 1.

DFD level 1:- Admin have to first log in into the website. When he enters new property then that info will be stored into the database so that it will be easy to retrieve. when the predictions are made, that data also stored into the database.

IV. RESULTS AND OTHER POSSIBLE APPLICATIONS

This project helps the users to make good decisions regarding buying or selling of valuable property. Prior to this online system this process involved a lot of travelling costs and searching time. Due to this system the user now does not have to travel much and can look for the property it is searching for, online according to its requirements. This system includes property details like Address, space measurement(sq ft), number of BHKs, Floor, Property Seller name and its contact number plus email-id. The user can search property depending on the area that it wants in, number of wash rooms, bedrooms, halls and kitchen. The system contains an algorithm that calculates loan that the user can take plus 20%-30% cash that the user has to pay. This system allows the admin to enter details about any property that it is wishing for. The admin can even delete the property details. Thus this system eliminates cost to a great extent and also reduces searching time. With the help of this system the user can get the property details depending on its preferences. Thus this system also helps to maintain good relationship between the buyers and the sellers of the property.

V.CONCLUSION

- In today's real estate world, it has become tough to store such huge data and extract them for one's own requirement.
- The system makes use of such data in the most efficient way.
- The data mining algorithm helps to fulfill customers by increasing the accuracy of estate choice and reducing the risk of investing in an estate.
- Lots of features that could be added to make the system more widely acceptable.
- One of the major future scopes is adding estate database of more cities which will provide the user to explore more estates and reach an accurate decision.

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- [9] Real Estate Price Prediction with Regression and Classification, CS 229 Autumn 2016 Project Final Report In this project, house prices will be predicted given explanatory variables that cover many aspects of residential houses. As continuous house prices, they will be predicted with various regression techniques including Lasso, Ridge, SVM regression, and Random Forest regression; as individual price ranges, they will be predicted with classification methods including Naive Bayes, logistic regression, SVM classification, and Random Forest classification. They also perform PCA to improve the prediction accuracy. The goal of this project is to create a regression model and a classification model that are able to accurately estimate the price of the house given the features.
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- [12] Using machine learning algorithms for housing price prediction, Byeonghwa Park , Jae Kwon Bae, 2015 It is a well-known fact that housing price valuation is one of most important trading decisions affecting a national real estate policy. In this study, they create models using machine learning algorithms such as C4.5, RIPPER (Repeated Incremental Pruning to Produce Error Reduction), Nave Bayesian, and AdaBoost (Adaptive Boosting) to predict housing price.

Intelligent Quality Control System for Product Manufacturers through ML

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Abstract— One of the most important components in ensuring product quality before it reaches the market is industrial inspection. The visual system, including human vision, machine vision, or a mix of both, can be used to carry out the inspection tasks. In this research, we present a method that can regulate the product quality of press parts. Visual inspection systems are used to accomplish quality control by identifying acceptable parts from rejected goods. Complete quality control of the raw materials is a requirement for large-scale production enterprises. The primary goals are to create an image processing system that can assess a part's dimension and determine whether it should be accepted or rejected. Calculating the pixel value will yield the part's dimensions. The result shows its possibility to be used as automated visual inspection system.

Keywords— Convolutional Neural Network(CNN), Deep Learning(DL), Deep Neural Network(DNN), quality, image processing

Introduction: During manufacturing of industrial object, it is very difficult to designed accurate objects that fits properly in machines. Any small dimensional error would result in lead the fitting of object to not be proper and can lead to problems. It is important to analyze where and how the error takes place during manufacturing the objects. If this inspection of objects is done manually then it is time consuming and not very accurate. Hence this is an idea to provide a vision based test jig in order to analyze the object. Further we can also provide the analysis to the manufacturing that in which exact place the error is occurring maximum so that they can take measures to avoid or reduce it. Also total number of objects that are accurate and inaccurate in a batch can be calculated which will save the time of the manufacturer and will make the work simple, more accurate and independent of humans.

Model Overview: There are plenty of opportunities in automating the Quality Inspection in manufacturing industries who are manufacturing the identical components in a mass production basis. Assuring the quality of dispatch lot is the key performance of a company who are providing each lot with non-defective components. In a short survey in we got to know that there are still Quality inspection is going on manual basis & Sampling methodology is adopted. This sampling inspection method can not assures 100% quality inspection. It is impossible to inspect each & every component & their parameter by manually as this method is time consuming & as there are manual interventions in the process so it reduces accuracy.

Algorithm:

1. **CNN Algorithm:** A rejected product loses resources in the factory upstream, and in manufacturing companies, quality inspectors often check the product's quality after it has been produced to meet industry standards. Cost, manpower, consumables, and capacity. With the current artificial intelligence trend, industrial companies are looking to automate material quality inspection within the manufacturing cycle itself using deep learning-based computer vision technologies. The objective is to obtain human level accuracy or higher while minimizing human intervention, while also maximizing industrial capacity, labor costs, etc. Deep learning is used in many different applications; from disease identification with medical imaging to object detection in self-driving cars, deep learning has demonstrated to achieve human level accuracy & better.

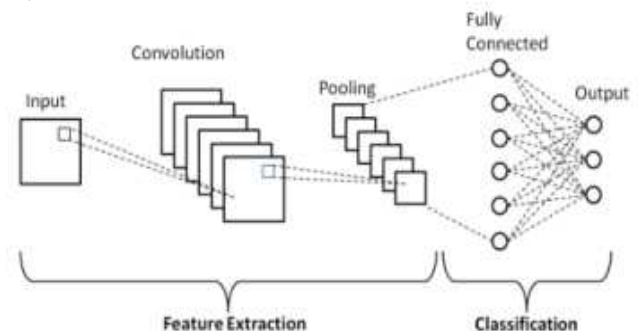


Fig1. Convolutional Neural Network

2. **SVM Algorithm:** One of the most well-liked supervised learning algorithms, Support Vector Machine, or SVM, is used to solve Classification and Regression problems. However, it is largely employed in Machine Learning Classification issues. The SVM algorithm's objective is to establish the best line or decision boundary that can divide n-dimensional space into classes, allowing us to quickly classify fresh data points in the future.

3. **KNN algorithm:** One of the easiest machine learning algorithms, based on the supervised learning method, is K-Nearest Neighbor. The K-NN algorithm makes the assumption that the new case and the existing cases are comparable, and it places the new instance in the category which is most like the existing categories.

4. **Random forest algorithm:** Supervised machine learning algorithms like random forest are frequently employed in classification and regression issues. On various samples, it constructs decision trees and uses their average for classification and majority vote for regression.

5. AdaBoost Algorithm: AdaBoost, also known as Adaptive Boosting, is a machine learning method used in an ensemble setting. Decision trees with one level, or Decision trees with only one split, are the most popular algorithm used with AdaBoost. Another name for these trees is Decision Stumps. It creates a model and equally weights each piece of data. Then, it gives points that were incorrectly categorised larger weights. The next model now gives more weight to all the points with higher weights. If a small error is not reported, it will continue to train models.

Methodology:



Fig 2. Block diagram of Methodology

Capture Image from the Camera. Those images are given as an input for the system. Segmentation means separation of background & Object. System will identify the object out of the image by developed model. After identifying the object, system will detect the features of the object like length, diameter etc. System will run set of program for this. After identifying the features, system will measure the dimensions of respective feature or parameter. System will run set of program for this.

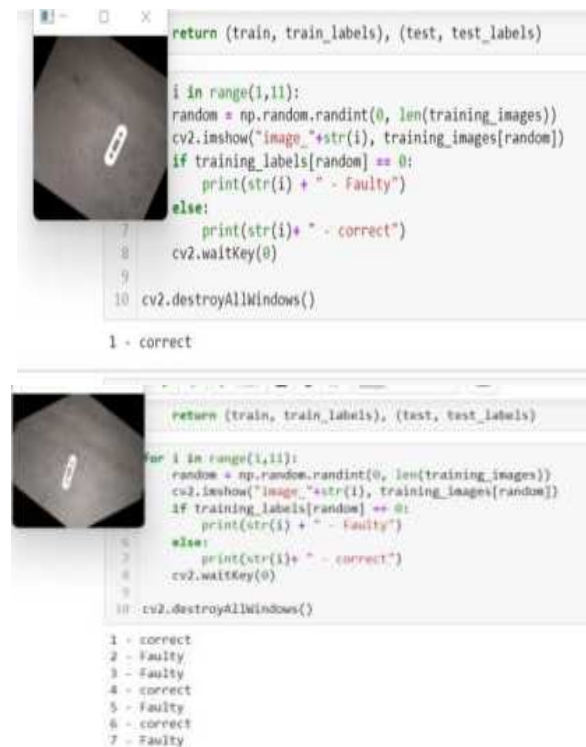
Program flow:



This is the program flow of our project:

1. First we have to load the dataset by using importing the libraries. Dataset includes the images of faulty and correct images.
2. Next segmentation and extraction is very important part for training and testing dataset. Data splits into two parts first is training set and second is testing set.
3. Load the datasets of train and testing set as an input.
4. Train the model with train data set. We use the CNN algorithm. Neural network fed the large amount of images.
5. Test that model has trained and capturing accurate datasets. It checks the built model works correctly or not.
6. Build Deep learning convolution neural network layers.
7. We have to plot the accuracy versus loss for understanding the whole model is better or how accurate it is.
8. Final step is to printing the results of correct and faulty images.

Result:



Future Scope: Dedicated web application can be developed with user-friendly UI and automated conveyor based system to check the quality parameters of components.

Initially this system is proposed for inspection of objects in a single dimension so we can extend to inspect objects in three dimension which increase the accuracy and save the time. Development of vision based test jig and mechanism for inspection and sorting of industrial objects will fulfil the high requirements of inspection accuracy and process effectiveness.

Conclusion: This system is proposed to be used in industries which manufactures parts and needs to have accurate quality inspection of those objects. This also increase quality of products and reduces cost of manufacturing. By providing a vision based solution for inspection of industrial objects, we can overcome disadvantages of traditional manual inspection and errors will also reduce. The synchronization and simultaneous execution of task were used to achieve high inspection speed. The developed system can be applied in various industrial inspection system where high accuracy of object is needed so that it fits properly in machines.

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Plant Leaf Disease Detection using CNN

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Abstract— when plants and crops are suffering from pests it affects the agricultural production of the country. Usually, farmers or experts observe the plants with eye for detection and identification of disease. But this method is often time processing, expensive and inaccurate. Automatic detection using image processing techniques provide fast and accurate results. All essential steps required for implementing this disease recognition model are fully described throughout the paper, starting from gathering images to make a database, assessed by agricultural experts, a deep learning framework to perform the deep CNN training. The advance and novelty of the developed model dwell its simplicity; healthy leaves and background images are in line with other classes, enabling the model to distinguish between diseased leaves and healthy ones or from the environment by using CNN. Deep learning techniques are very successful in image classification problems. We can make use of Mobilenet V2 and Machine Learning to process data of different plant image samples to get fast analysis of the various diseases.

Keywords—Plant Image, Plant Disease Detection, Machine Learning, Image Processing, DeepLearning, Convolutional Neural Network.

I. INTRODUCTION

Our task will be to make an app which will detect the disease of the plant from its leaves. To achieve this, we will use convolutional neural network (CNN) models like MobileNet V2 to identify the images with greater accuracy. We will be using the „Plant Village“ Dataset from Tensor Flow datasets which has 38 categories. The total images are 54,303. The original dataset named as „Plant Village“ had 61,486 images. The images will be resized to 224 x 224 pixels for MobileNet V2.

This paper uses TensorFlow datasets module to download the plant village datasets. Then we extract the labels of each category from the images and split them accordingly to train, valid and test sets. The image size has been changed to be used in MobileNet V2. We use sequential model from keras for our model. After compiling we then fit the model with images.

II. LITERATURE REVIEW

These papers present an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It covers survey on

Sr.No	Author Name	Paper Name	Publication Year	Technology Used
1.	Vijai Singh, & A.K Misra	Detection of plant leaf diseases using image segmentation and soft computing techniques,” Information Processing in Agriculture,	2016	This paper presents an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It covers survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm
2.	Mohanty S.P., Hughes, D. P., & SalathéM.,	Using Detection,” Frontiers in Plant Science, vol. 7.	2016	This paper demonstrates the technical feasibility using a deep learning approach utilizing 54,306 images of 14 crop species with 26 diseases (or healthy) made openly available through the project Plant Village (Hughes and Salathé, 2015). Neural networks provide a mapping between image of a

				diseased plant(input) to crop disease pair(output)
3.	Serawork A. Walleign, Mihai Polceanu & Cedric Buche	Soybean Convolutional	2018	This paper describes the feasibility of CNN for plant disease classification for leaf images taken under the natural environment. The model is designed based on the LeNet architecture to perform the soybean plant disease classification.
4.	Konstantinos P. Ferentinos,	Deep learning models for plant disease detection and diagnosis, "Computers and Electronics in Agriculture", vol. 145, pp. 311-318,	2018	Deep learning model was developed for detection and diagnosis of plant diseases. In this system open database of 87,848 images was used for training and testing. Proposed paper includes various phases of implementation namely dataset creation, feature extraction, training the classifier and classification.

different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm

This paper demonstrates the technical feasibility using a deep learning approach utilizing 54,306 images of 14 crop species with 26 diseases (or healthy) made openly available through the project plant village (Hughes and Salathé, 2015). Neural networks provide a mapping between image of a diseased plant (input) to crop disease pair(output).

The primary goal of convolution in this case is to extract features from the input image. This paper consists of an abstract and core of it is plant disease classification using convolutions. The created datasets of diseased and healthy leaves are collectively trained under Random Forest to classify the diseased and healthy images. For extracting features of an image, we use Histogram of an Oriented Gradient (HOG) using machine learning to train the large data sets available publicly gives us a clear way to detect the disease present in plants in a colossal scale.

III. METHODOLOGY

During the period of gathering the pictures for the dataset, pictures with a more modest goal and measurement not exactly 500 pixels were not considered as substantial pictures for the dataset. In expansion, just the pictures where the locale of intrigue was in higher the goal was set apart as a qualified possibility for the dataset.

It is significant to utilize precisely characterized pictures for the preparation and approval dataset. Just in that manner may a fitting and solid identifying model be created. In this stage, copied pictures that were left after the underlying the emphasis of get-together and gathering pictures into classes were eliminated from the dataset..

A. Image preprocessing and labeling

Pre-processing pictures generally includes eliminating low-recurrence foundation commotion, normalizing the power of the individual particles' pictures, eliminating reflections, and veiling segments of pictures. Picture pre-processing is the strategy of improving information. Furthermore, the strategy of picture pre-processing included editing of the apparent multitude of pictures physically, making the square around the leaves, to feature the district of intrigue (plant leaves). During the period of gathering the pictures for the dataset, pictures with a more modest goal and measurement not exactly 500 pixels were not considered as substantial pictures for the dataset. In expansion, just the pictures where the locale of intrigue was in higher the goal was set apart as a qualified possibility for the dataset. In that manner, it was guaranteed that pictures contain all the required data for highlight learning. Numerous assets can be found via looking over the Internet, in any case, their significance is frequently problematic. Considering a legitimate concern for affirming the exactness of classes in the dataset, at first assembled by a catchphrases search, horticultural specialists inspected leaf pictures and marked all the pictures with fitting infection abbreviations. As it is known, it is significant to utilize precisely characterized pictures for the preparation and approval dataset. Just in that manner may a fitting and solid identifying model be created.

In this stage, copied pictures that were left after the underlying the emphasis of get-together and gathering pictures into classes were eliminated from the dataset.

B. System design

To diagnose the reason for the symptom by using an automatic tool, therefore the image processing system is proposed to develop to automate the identification and classification of the leaf batches into specific disorders. As shown within the figure above the system consists of three main blocks: Image Analyzer, Feature Database and Classifier resp. [9]. The processing proposed to try to by these blocks is split into two phases as follows offline Phase: an outsized set of defected images are processed by a picture analyzer for extracting abnormal features.

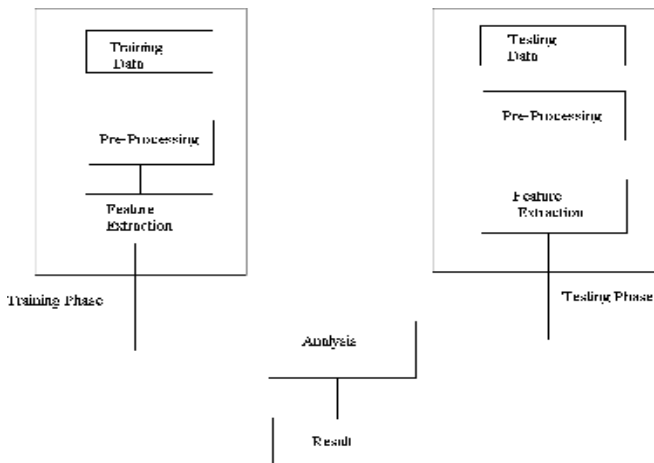


Fig. 1. System Architecture.

C. Convolutional Neural Network

The input test image is developed and pre-processed in the following phase and then it is transformed into array form for difference. The chosen database is appropriately separated and pre-processed and then retiled into suitable folders. The model is well trained using CNN and then classification takes position. The evaluation of the test image and the trained model take position tracked by the display of the result. If there is a flaw or infection in the plant the package displays the disease along with the remedy.

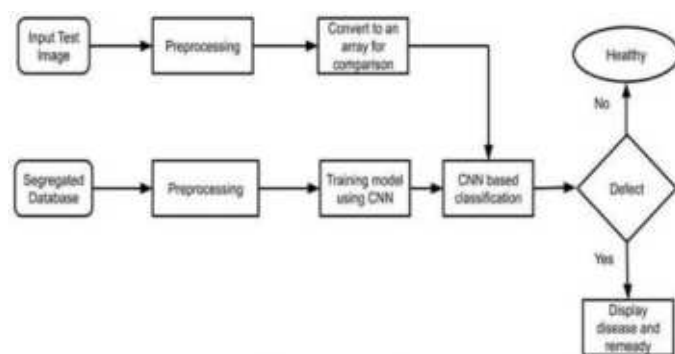


Fig. 2. Data Flow Diagram

IV. DATASET TRAINING

The dataset is preprocessed like Image reshaping, resizing and conversion to an array form. Similar processing is additionally done on the test image. A dataset consisting of about 38 different plant leaf diseases is obtained, out of which any image is often used as a test image for the software.

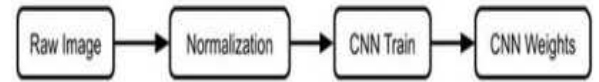


Fig. 3. Training Model

The train dataset is employed to coach the model (CNN) so that it can identify the test image and therefore the disease it is CNN has different layers that are Dense, Dropout, Activation, Flatten, Convolution2D, and maxpooling2d. After the model is trained successfully, the software can identify the disease if the plant species is contained within the dataset. After successful training and preprocessing, comparison of the test image and trained model takes place to predict the disease.

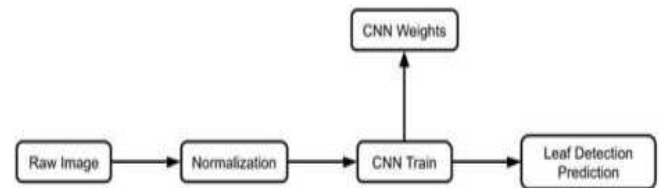


Fig. 4. Testing Model

V. IMPLEMENTATION

The CNN Model Steps

Conv2D: It is a 2D Convolution Layer, this layer creates a convolution kernel that's wind with layers input which helps produce a tensor of outputs.

`keras.layers.Conv2D(filters, kernel_size, strides=(1,1), padding='valid', data_format=None, dilation_rate=(1,1), activation=None, use_bias=True, kernel_initializer='glorot_uniform', bias_initializer='zeros', kernel_regularizer=None, bias_regularizer=None, activity_regularizer=None, kernel_constraint=None, bias_constraint=None`

A. Maxpooling:

Max pooling may be a pooling process that choose the very best element from the region of the feature map covered by the filter. Thus, the output after max-pooling level would be a feature map comprising the foremost important features of the previous feature map.

B. Flatten:

In between the convolutional layer and therefore the fully connected layer, there is a „Flatten“ layer. Flattening transforms a two-dimensional matrix of features into a vector which will be fed into a totally connected neural network classifier.

C. Image Data Generator:

Image Data Generator quickly found out Python generators which will automatically turn image files on disk into batches of preprocessed tensors.

D. Training Process:

Effective training begins well before a trainer delivers a private training session and continues then training session is complete. Training are often viewed as a process comprised of 5 related stages or activities: assessment, motivation, design, delivery, and evaluation.

E. Epochs:

An epoch may be a term utilized in machine learning and indicates the amount of passes of the whole training dataset the machine learning algorithm has completed. Datasets are usually grouped into batches (especially when the quantity of knowledge is extremely large).

F. Validation Process:

Validation is mentioned because the process where a trained model is evaluated with a testing data set. The testing data set may be a separate portion of an equivalent data set from which the training set springs . the most purpose of using the testing data set is to check the generalization ability of a trained model.

The normalization class comprises raw images and it is fed to the CNN model which comprises dense and weight. The CNN model categorizes and identifies by using the training model. The training model class contains the image dataset. Leaf recognition becomes utilized of the features.

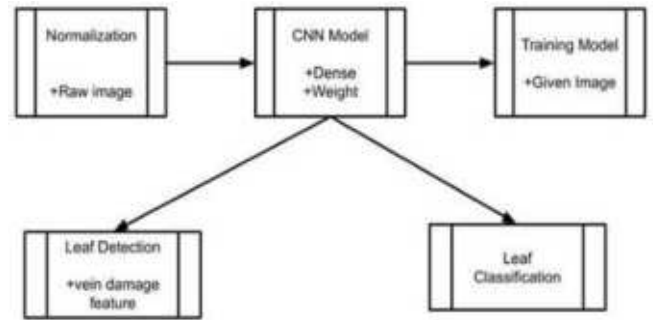


Fig. 5. Class Diagram

VI. RESULTS AND OTHER POSSIBLE APPLICATIONS

The Result Analysis

Our project gives the output of different Convolutional Neural Network modules (VGG 19 & MobileNet V2 as of now) being implemented successfully, there is also the uploading of plant village dataset which is uploaded successfully.

A. VGG 19:

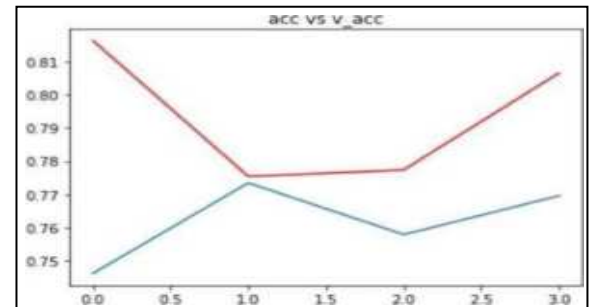


Fig. 6.1 Accuracy Vs Valid Accuracy (VGG19)

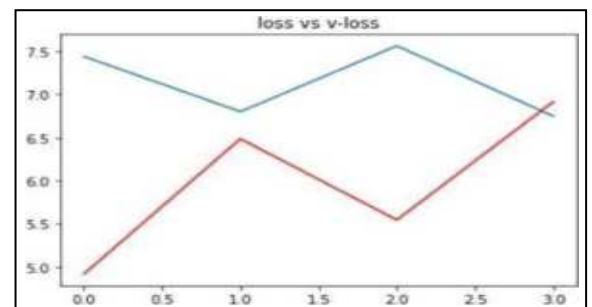


Fig 6.2 Loss Vs Valid Loss (VGG19)

VGG model gives you accuracy of 79,62130904197693%.

B. Mobilenet V2:

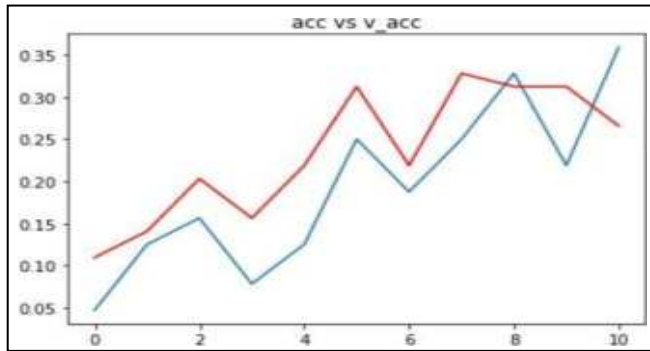


FIGURE 6.3: ACCURACY VS VALID ACCURACY (MN V2)

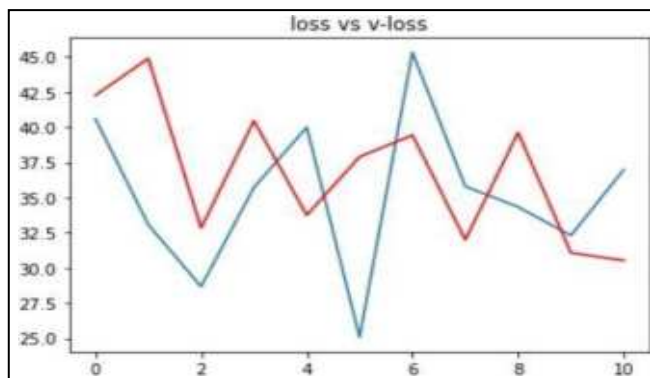


Figure 6.4: Loss Vs Valid Loss (MN V2)

Mobilnet V2 only accuracy of 29.21014428138733%.

Applications:

Plant diseases and pests detection is a very important research content in the field of machine vision. It is a technology that uses machine vision equipment to acquire

images to judge whether there are diseases and pests in the collected plant images.

VII. CONCLUSION

- This project will help gardeners and people in agriculture with identification of diseases of the plants.
- Identify as many varieties of diseases of plants as possible through their photograph, and there by share a piece of knowledge to the user of this application.
- The application is also supposed to be adaptable to download in a variety of research and forensic devices.
- Identify infected and healthy leaves as well as to detect illness in affected plants.

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Statistics of machine learning Algorithms with the consideration of Accuracy

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Abstract

Heart plays significant role in living organisms, Diagnosis and prediction of heart related diseases requires more correctness. Due to this it has become crucial task to detect that disease at early stage to prevent future loss. Because a little mistake can cause problem. Heart disease is a major cause of death worldwide today and predicting cardiovascular disease is an important challenge in the field of clinical data analysis. lack of mobility (having difficulty walking and moving) causes thousands of problems in human health.

So, Machine learning is very useful technique for predicting such disease.

In this study, we propose a Analysis of Different method for finding meaningful characteristics by applying the ML techniques, which gives higher accuracy of cardiovascular disease predication and here we are using the data on cardiovascular patients collected from UCI laboratory, Kaggle and using the different algorithms that are KNN, Decision tree, Logistic Regression, SVM, Random Forest, Naïve Bayes” . to analyze performance on different data base.

Keywords

Machine learning, heart disease prediction, CVD, classification algorithms, Django, Decision tree, Logistic regression, Random Forest, Support Vector Machine (SVM), k-nearest neighbor (KNN)

INTRODUCTION

It is difficult to identify heart disease because of several contributory risk factors such as diabetes, high blood pressure, high cholesterol abnormal pulse rate and many other factors [1]. In the today's world due to the mechanical life, it has been seen that multiple health issues have been created in human life [3] heart disease is one of the most significant causes of mortality in the world today heart disease is a critical disease that affects the functionality of the heart, and gives rise to complications such as the infection of the coronary artery and decreased blood vessel function. Artificial Intelligence has occupied each and every part of life due to its usage. AI plays key role in the decision-making process and in prediction. Machine Learning is the science of teaching machines to teach them how to learn by themselves. Machine learning is superset of Deep learning. Machine Learning (ML) has been shown to be effective in assisting in making decisions and

predictions from the large quantity of data produced by the healthcare Industry [1] [2]. The objective of such a system to quickly predict the disease from the parameters like blood pressure, body temperature and heart beat rate of patient [1][2][3] Number of machine learning algorithms shows their superior performance in predicting the disease. There are three variety of machine learning algorithms namely supervised learning, unsupervised learning, reinforcement learning. Logistic regression SVM, KNN, Decision tree, Naive Bayes becomes supervised machine learning algorithms. K-means clustering is unsupervised machine learning algorithm. However, due to some of the conflicts in terms of feature extraction and selection, they often fail to prove their performance with respect to accuracy. Hence, there is a need of strongest and enhanced version of classifiers or predictors to make the early detection of disease precisely Most of the research has been made on prediction of heart disease where few parameters out of 76 where consider but all these are for normal patient. Where these parameter values are different if we consider for diabetes patient. Also, the data available on various Repositories is limited. So, to collect data in real life and make a prediction model for early.

In this,” Heart Disease Prediction based Web Application”, we are using different algorithms to give better accuracy to the end user. The application enables the user to predict chances of heart disease by entering the few details of his/her health. Machine Learning can play an important role in predicting the heart diseases. The goal of our heart disease prediction is to predict if a patient should have heart disease or not.

II. SYSTEM ARCHITECTURE

A. Architecture Overview

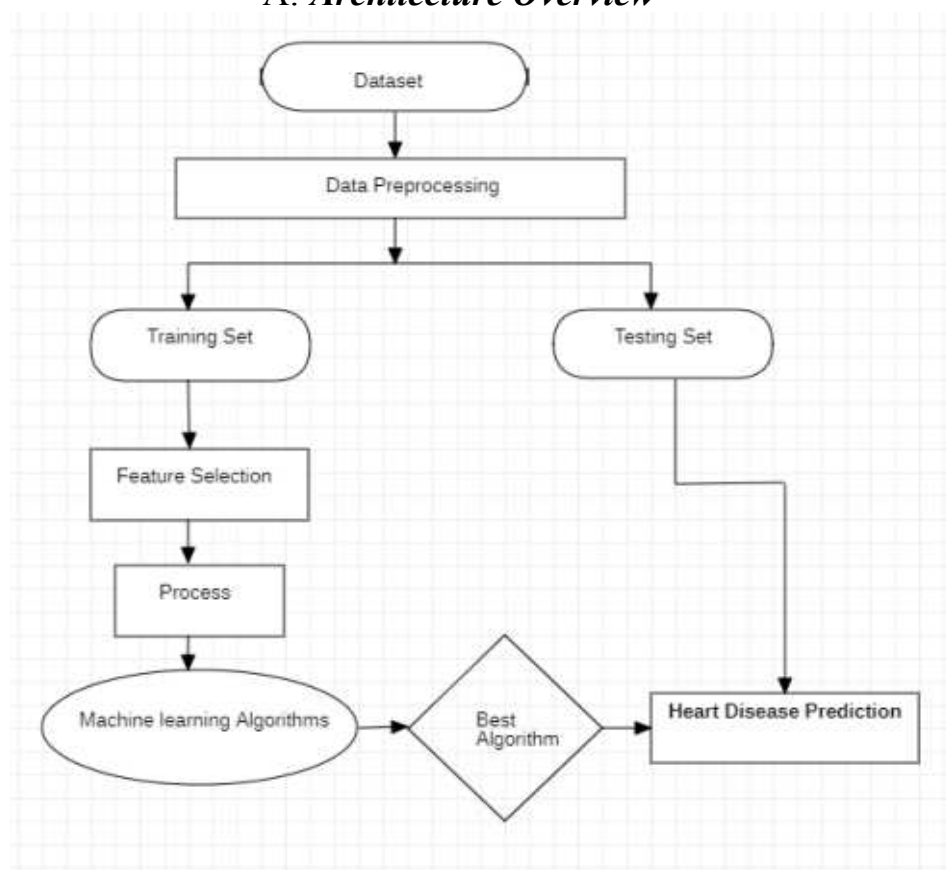


Fig: - System Architecture

Initially we take dataset from Kaggle and UCI Website for prediction of cardiovascular disease. Dataset includes so many independent columns which represents symptoms and one dependent column which represents results.

Initially data is not in well format so it need to be processed by handling missing values, handling outliers, etc. After advance processing data is divided into training and test set. Training data is used to select features. Unwanted and underused features are removed and all the remaining features are provided with machine learning algorithms such as KNN, Decision tree, Logistic Regression, SVM, Random Forest, Naïve Bayes. The best out of all those results is chosen and testing data is passed to check whether training is done appropriately or not.

Algorithms used:

Logistic Regression

Naïve Bayes

K- Nearest Neighbors

Decision Tree

Random Forest

Support Vector Machine

Dataset Used:

UCI Machine Learning Repository

Kaggle Dataset

I. RESULT AND DISCUSSIONS

A. Experimental Setup

All the experimental cases are implemented in python programming using variety of libraries like NumPy, pandas, sklearn, etc. With django for website and in environment with System having configuration of Intel Core i3 windows 10(64 bit) machine with 8 GB RAM.

B. Dataset

Patient Datasets data was downloaded from the UCI repository dataset.

C. Results

This section represents a comparison between the performances of each model. Demonstrates accuracy, memory of f1 points and accuracy of each machine learning model in relation to the disease [2].

Confusion matrix:

		Predicted Class		
		Positive	Negative	
Actual Class	Positive	True Positive (TP)	False Negative (FN) Type II Error	Sensitivity $\frac{TP}{(TP + FN)}$
	Negative	False Positive (FP) Type I Error	True Negative (TN)	Specificity $\frac{TN}{(TN + FP)}$
		Precision $\frac{TP}{(TP + FP)}$	Negative Predictive Value $\frac{TN}{(TN + FN)}$	Accuracy $\frac{TP + TN}{(TP + TN + FP + FN)}$

Fig j. Confusion matrix

Precision:

It is defined as the ratio of correctly identified cases in all predicted cases. Therefore, it is useful when the costs of False Positives are high [2].

$$\text{Precision} = TP / (TP + FP)$$

Recall:

It is a measure of properly identified cases in all actual cases. It is important when the cost of False Negatives is high [2]

$$\text{Recall} = TP / (TP + FN)$$

F1-score:

This is a consistent method of Precision and Recall and offers a better rate of incorrectly classified cases than Accuracy Metric [2].\

$$F1\text{-score} = (TP) / (TP + 1/2(FP + FN))$$

Accuracy:

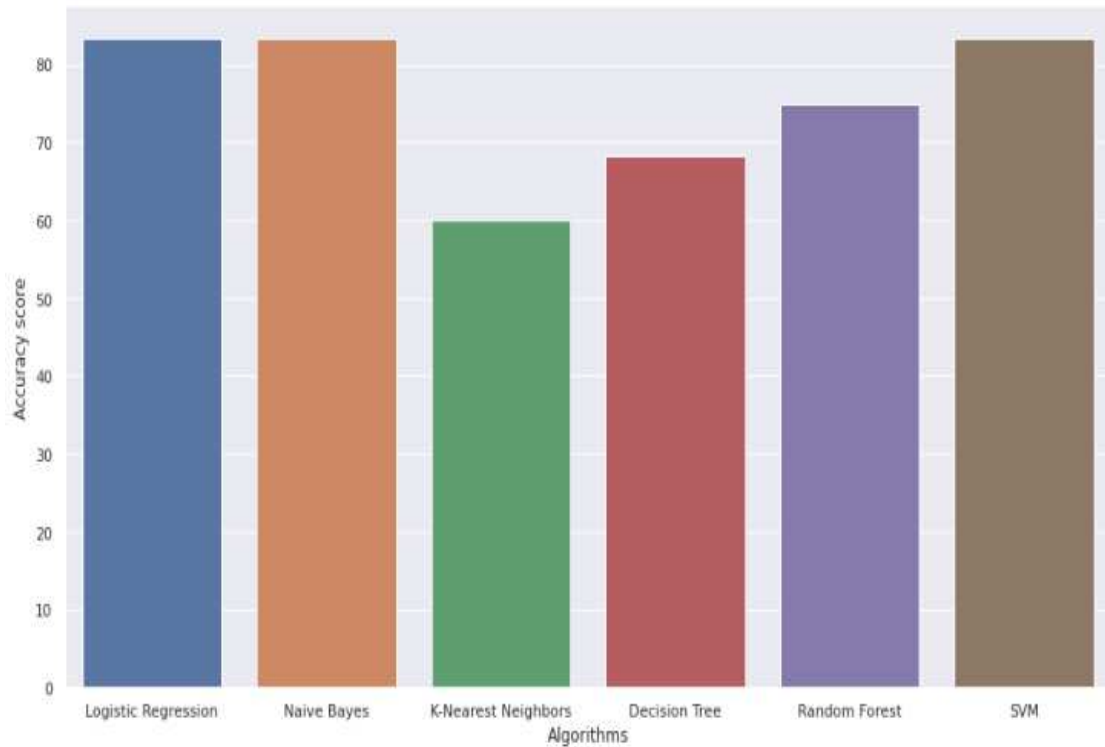
One of the most obvious metrics, the proportion of all cases is correctly identified. It is widely used when all classes are equally important.

$$Accuracy = (TP + TN) / (TP + TN + FN + FP)$$

Now a comparison of the learning algorithm for each machine for each disease is given in the following table:

1. On UCI Machine Learning Repository Dataset

Algorithms/Performance measures	Precision	Recall	F-Score	Accuracy
1. Logistic Regression	96.66	76.31	85.29	83.33
2. Naïve Bayes	96.66	76.31	85.29	83.33
3. K- Nearest Neighbors	81.81	47.36	60.0	60.0
4. Decision Tree	88.0	57.89	69.84	68.33
5. Random Forest	92.59	65.70	76.92	75.0
6. Support Vector Machine	96.66	76.31	85.29	83.33



III.CONCLUSION

The heart is one of the essential and vital organs of the human body and the prediction about heart diseases is also an important concern for the human beings so that the accuracy for algorithms is one of parameters for analysis of performance of algorithms. Accuracy of the algorithms in machine learning depends upon the data set that is used for training and testing purposes. The proposed ML model is used for predicting heart disease.

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Embedded Systems

Greeting Voice Controlled Robot Using Arduino Board

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Abstract:- This robot is a virtual agent, usually an electro-machine that is guided by a computer program or electrical circuitry robots replace humans in assistance of performing those repetitive and dangerous tasks which humans prefer not to do-, or are unable to do due to size is not limited or humans could not survive in extreme environments. Modern robots are classified into different categories such as mobile robots, Commercial or industrial robots, robots, or service robots based on their performance features. This is a service robot that performs the repetitive task of welcoming people both by recorded voice message. Usually when we invite people to home, office, marriage functions or parties, etc., we need to assign a person to receive them and greet them at the entrance.

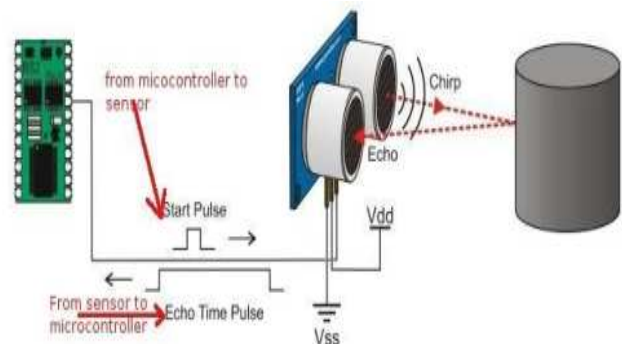
Keywords:- Cobots, Greeting ping sensor.

1. Introduction

In this project, we are trying to solve the problems which occurs mainly in entrance of parties, malls or an receptive task. In the present day there are different types of robots. In . The transmitter of ultrasonic sensor generates radio waves. If anyone comes in the range of radio waves it reflect to the receiver of ultrasonic sensor, then robot wishes that person Welcome ! have a good day.

2. Working of greeting voice controlled robot system:-

Firstly, we need to give 5V power supply to Arduino and voice playback module. The ultrasonic sensor hc-so4 have transmitter and receiver. The transmitter emits the high frequency sound waves to detect the object or person. If anyone present in front of ultrasonic sensor it reflects the waves to receiver. The ultrasonic sensor is connected to Arduino UNO, We can notice maximum accuracy at minimum angle 15 °C and at maximum 30 °C when object enter in this measurement angle it pass message to Arduino UNO. Arduino UNO is connected to both voice playback IC and ultrasonic sensor. So Arduino UNO shares the message to the voice playback module. In between speaker and voice playback module, we use an audio amplifier to amplify the speaker's voice, so it can be easily heard.



Working of robot

3. Microcontroller Based On Arduino :-

Arduino :- Arduino is a tool for making computers that can sense and control more of the physical world than desktop computer. It is an open-source physical computing platform based on a simple microcontroller board. There are many other microcontroller platforms available for physical computing.

Two Vital Features of the Arduino are :-

i. Inexpensive– Arduino boards are relatively inexpensive compared to other microcontroller platforms.

ii. Extensible software and Open source – The Arduino software is published as open source tools. The language can be expanded through C++ libraries, and technical details wanting to understand the people and can make the leap from Arduino to the AVR C programming language on which it's based.

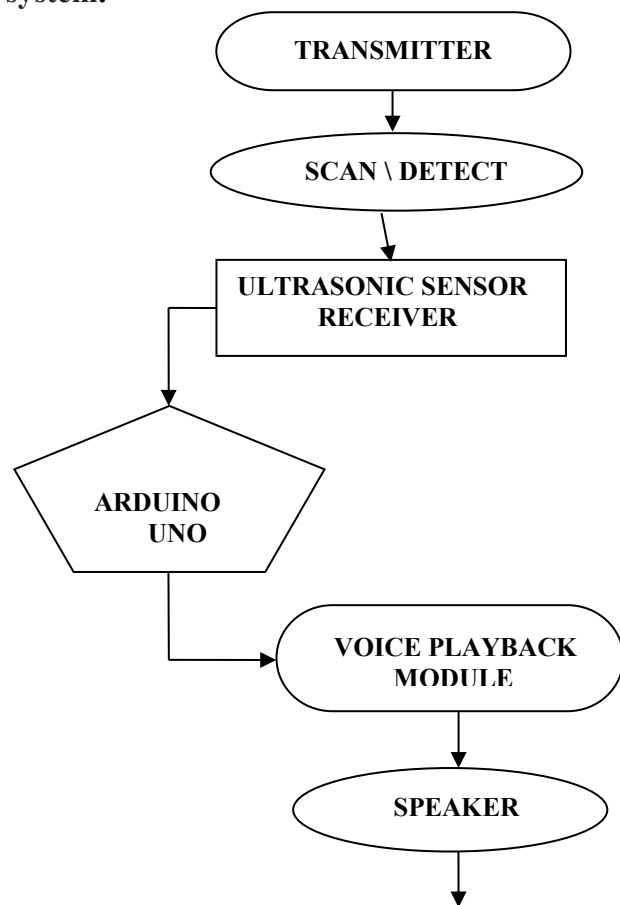


ARDUINO UNO

Arduino board Technical Specifications :-

- Microcontroller - ATmega328.
- Operating voltage - 5V
- Maximum input voltage - 7-12V
- Digital I/O Pins 14
- Analog Input Pins 6
- DC Current per I/O Pin - 40 mA
- DC Current for 3.3V Pin - 50 mA.
- Flash Memory - 32 KB

4. Flowchart of greeting voice controlled robot system:-



5. Applications of greeting voice controlled robot system:-

1. Hospitality :- This is a robot that performs the repetitive task of welcoming people by recording voice communication, "welcome, have a good day," in its range. This is a low maintenance robot which can be created and used in public places, functions, parties, etc. which attracts more attention from children as well as grown-ups.

2. Education:- Greeting voice controlled robot system can be used at the entrance of schools, colleges, universities to greet the peoples.

3. Medical Managements :- Greeting voice controlled robot system can be used in medical management, such as hospitals, clinics, medicals, etc. This robot is placed in the entrance of place. We also change the command when we want to use inside the hospitals.

4. Private Facility :- Greeting voice controlled robot system can be also used me airplane, or on the platform.

6. Block Diagram Of Robot :-

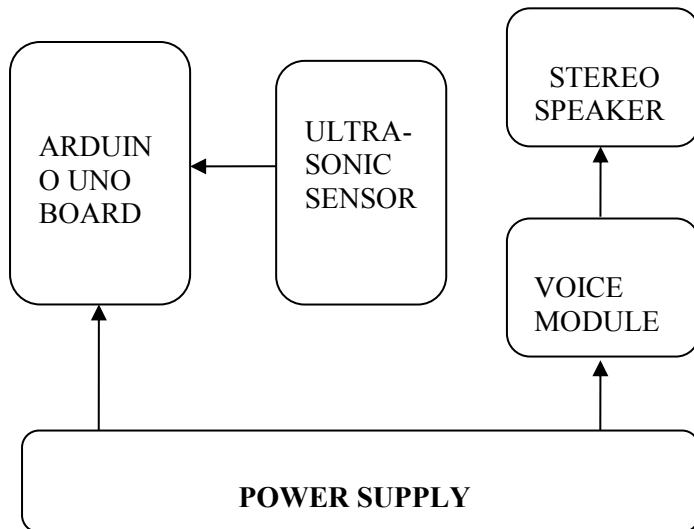


Fig.:- Schematic Block Diagram Of Greeting Voice Controlled Robot Using Arduino Board.

7. Advantages of greeting voice controlled robot system:-

1. Cost effective -

Greeting voice-controlled robot using Arduino UNO system is cost-effective over the long term and low-cost service robot that is used in public places and functions.

2. Convenient-

A greeting voice-controlled robot system is convenient to use since it is a good welcoming host and eliminates the need for one person, which saves time and effort.

8. Disadvantages of greeting voice controlled robot system:-

1. Liable to damage :

A greeting voice-controlled robot is vulnerable to damage from environmental factors such as water, dirt, or dust, which can affect their performance and accuracy.

2. Wrong Detection:

Greeting voice-controlled robot systems may experience false detection, which means that the ultrasonic sensor should only recognise the person, but it detects both objects and people.

9. Future scope :-

Useful for speech recognition security system.

- Useful for functions, parties, bank purpose.
- If we use other technologies like Zigbee or GPS, we can improve the range of the robot.
- The robot is useful for surveillance.
- It is also useful in covid-19 as reception.

In health care, Greeting voice-controlled robot system can be used as a instructor in hospitals to provide instructions to people (for example, use sanitizer and wear a mask).

10. Conclusion

The main aim of this project was to construct a “Namaste robot” which provides the service of welcoming people graciously. We have constructed a model robot which can sense people walking before it within its vicinity and welcome them courteously. Different messages can be saved according to the requirement of the customer. This is a low cost service robot which can be designed and used in public places, functions, parties ETC which attracts a lot of attention from peoples. The voice controlled robot is an easy programmable (software) project. This project operated on human voice command with android application. The implementation of this project is easy, so this robot is beneficial for human life. The robot can be used offices, centers, parks, shopping malls etc., and also on other places.

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Fingerprint Door Lock System

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Abstract—

The system typically includes a fingerprint scanner, a database of authorized users, and a mechanism for controlling the lock. This abstract provides a brief overview of the key features and benefits of fingerprint door lock systems, including their ability to enhance security, improve access control, and reduce the risk of unauthorized entry. This technology offers a high level of security as fingerprints are unique to each individual, and cannot be easily replicated or faked. It eliminates the need for traditional keys or codes, which can be lost, stolen, or shared, compromising the security of the building.

I Introduction

In this project we are trying to solve the problems which occurs related to the security in homes, shops and offices. These issues can be fixed by using traditional locks but here a possibility is may occurred of some unknown person will open the lock without breaking it by using duplicate keys. Using these locks also make problems if we lost keys of lock and we have to carry those keys with us. Security is of primary concern and in this busy, competitive world, human cannot find ways to provide security to his confidential belongings manually. Instead, he finds an alternative which can provide a full fledged security as well as atomized.

II Working of finger print door lock system

1. Enrollment: The first step in using a fingerprint door lock system is to enroll authorized users into the system. This is done by capturing the user's fingerprint using a fingerprint scanner and storing it in the system's database.

2. Verification: When a user wants to access the secured area, they place their finger on the fingerprint scanner. The scanner then captures an image of the fingerprint and compares it with the stored fingerprint templates in the database to see if there is a match.

3. Authentication: If the captured fingerprint matches one of the templates in the database, the system authenticates the user identity and grants them access to the secured area.

4. Logging: A fingerprint door lock system typically logs all

Access attempts, whether successful or not. This creates an audit trail that can be used for security purpose or to track user activity.

5. Maintenance: Finger print door lock system require regular maintenance to ensure that they continue to function properly.

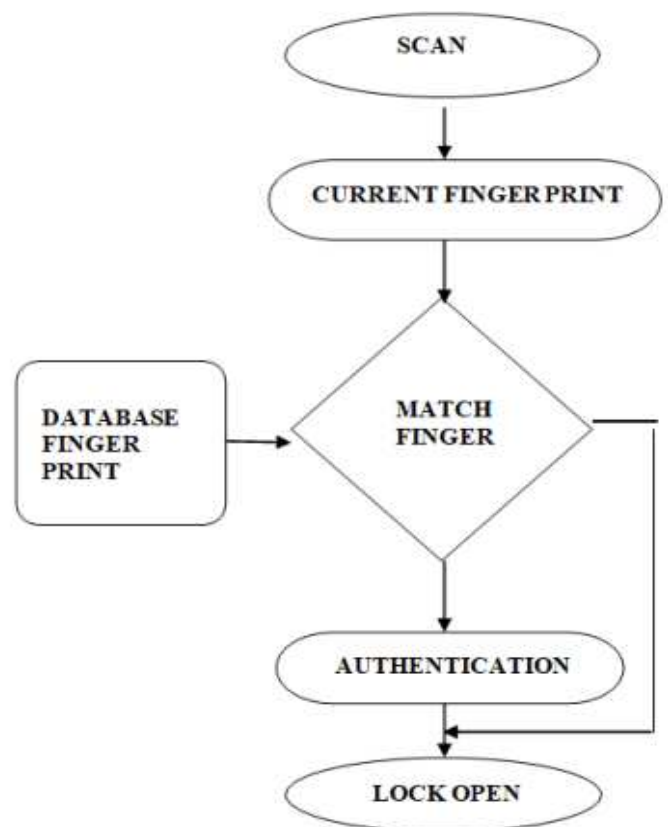


Fig.1 Working Of Finger Print Door Lock System

III. Advantages of Fingerprint Door Lock System:

1. High Security: Fingerprint door lock system provides high-security access control by using biometric technology. It is difficult to replicate or fake fingerprints, making it an ideal option for high-security areas.
2. Convenient: Fingerprint door lock systems are convenient to use since they eliminate the need for keys, access cards, or remembering passwords. You can simply place your finger on the scanner to gain access, which saves time and effort.
3. User Management: Fingerprint door lock systems allow administrators to manage user access more efficiently. They can easily add or remove users from the system's database, and monitor access logs to track user activity.
4. Cost-effective: Fingerprint door lock systems are cost-effective in the long run since they eliminate the need for physical keys or access cards, which can be costly to replace or manage.

IV Disadvantages of Fingerprint Door Lock System:

1. False Rejection: Fingerprint door lock systems may experience false rejection rates, which means that the system may not recognize an authorized user due to variations in finger placement or quality of the fingerprint image.
2. Limited Scalability: Fingerprint door lock systems may have limited scalability since they require a physical fingerprint scanner for each user, which can be costly to install and manage in larger organizations.
3. Vulnerability to Damage: Fingerprint scanners are vulnerable to damage from environmental factors such as water, dirt, or dust, which can affect their performance and accuracy.

Overall, fingerprint door lock systems provide a high level of security and convenience, but they also have some potential drawbacks that should be considered before implementation.

V. Applications of finger print door lock system

1. Healthcare: Fingerprint door lock systems can be used in healthcare settings, such as hospitals or clinics, to control access to restricted areas, such as medication storage rooms or medical records.
2. Education: Fingerprint door lock systems can be used in educational institutions, such as schools or universities, to control access to classrooms, laboratories, or other sensitive areas.
3. Government: Fingerprint door lock systems can be used in government facilities, such as military bases or embassies, to provide secure access control for authorized personnel.
4. Hospitality: Fingerprint door lock systems can be used in hospitality settings, such as hotels or resorts, to provide secure access control for guest rooms.

5. Retail: Fingerprint door lock systems can be used in retail settings, such as jewelry stores or high-end boutiques, to provide secure access control for storage areas or display cases

VI .Block Diagram Of Finger Print Door Lock System

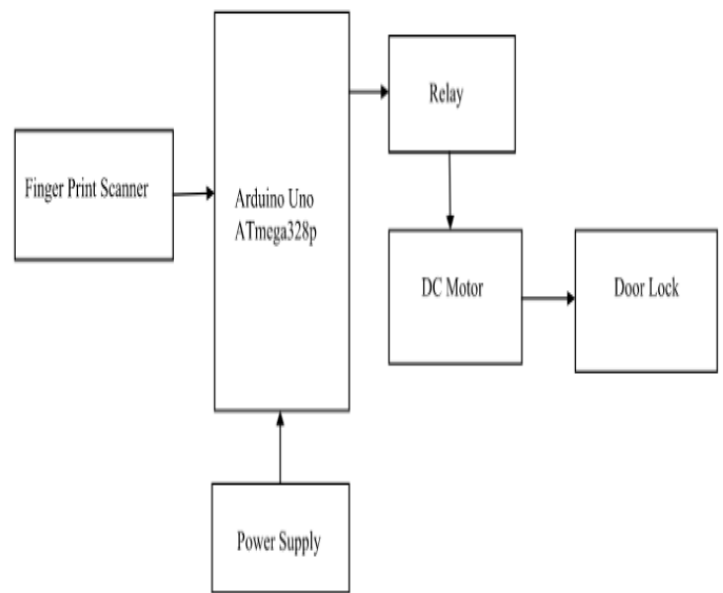


Fig.2 Block Diagram Of Finger Print Door Lock System

VII. Future scope

Fingerprint based locks are revolutionary locking systems that open with just the touch of authorised user's finger; their increased use in various locking applications can actuate what would be known as 'Keyless World'.

A fingerprint mismatch can be conveniently regarded as an attempt of illegal access. In the wake of such unratified event, an adjunct siren alarm may be initiated to reveal possible theft.

For systems demanding more security, such as expensive jewellery items or museum articles, scanning of multiple fingerprints may be employed. In future, alarm will be introduced.

When intruder tries to break the door, the vibration is sensed by sensor which makes an alarm. This will inform the neighbors about intruders and this will help to take further action to prevent

VIII Conclusion

Fingerprint door lock systems are a secure and convenient way of managing access control. They use biometric technology to authenticate users based on their fingerprints, eliminating the need for physical keys or access cards.

Fingerprint door lock systems provide several advantages, such as high security, user management, and cost-effectiveness, which make them ideal for various industries and settings. However, they also have some potential drawbacks, such as false rejection rates and privacy concerns, which should be considered before implementation.

IX Acknowledgement

Fingerprint door lock systems are a significant advancement in the field of access control systems. They provide a high level of security and convenience, which is why they are being increasingly adopted in various industries and settings.

The development of biometric technology has made it possible to use fingerprints as a means of authentication. Fingerprint door lock systems eliminate the need for physical keys or access cards, which can be lost or stolen, and they offer a more secure and convenient way of managing access control.

Fingerprint door lock systems have several advantages, such as high security, user management, and cost-effectiveness. However, they also have some potential drawbacks, such as false rejection rates and privacy concerns, which need to be considered before implementation.

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Accelerometer Based Hand Gesture Controlled Robo-Car

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ABSTRACT - Gesture Controlled Car is a robot which can be controlled by simple human gestures. The user just needs to wear a gesture device in which a sensor is included. The sensor will record the movement of hand in a specific direction which will result in the motion of the robot in the respective directions. The robot and the Gesture instrument are connected wirelessly through radio waves. User can interact with the robot in a more friendly way due to the wireless communication. We can control the car using accelerometer sensors connected to a hand glove. The sensors are intended to replace the remote control that is generally used to run the car. It will allow user to control the forward, backward, leftward and rightward movements, while using the same accelerometer sensor to control the throttle of the car. Movement of car is controlled by the differential mechanism. The mechanism involves the rotation of both forth & rear wheels of left or right side to move in the anticlockwise direction and the other pair to rotate in the clockwise direction which makes the car to rotate about its own axis without any kind of forward or backward motion. The main advantage of this mechanism is the car with this mechanism can take sharp turn without any difficulty.

KEYWORDS – ADXL345, ATMEGA328P, Motor Driver L293D, RF Module.

1] INTRODUCTION - Nowadays, robotics are becoming one of the most advanced in the field of technology. A Robot is an electro-mechanical system that is operated by a computer program. Robots can be autonomous or semi-autonomous. An autonomous robot is not controlled by human and acts on its own decision by sensing its environment. Majority of the industrial robots are autonomous as they are required to operate at high speed and with great accuracy. But some applications require semi-autonomous or human controlled robots. Some of the most commonly used control systems are voice recognition, tactile or touch controlled and motion controlled. A Gesture Controlled robot is a kind of robot which can be controlled by your hand gestures not by old buttons. You just need to wear a small transmitting device in your hand which included an acceleration meter. This will transmit an appropriate command to the robot so that it can do whatever

we want. The transmitting device included a ADC for analog to digital conversion and an encoder IC(HT12E) which is use to encode the four bit data and then it will transmit by an RF Transmitter module. At the receiving end an RF Receiver module receive's the encoded data and decode it by and decoder IC(HT12D). This data is then processed by a microcontroller and finally our motor driver to control the motor's. Now its time to break the task in different module's to make the task easy and simple any project become easy or error free if it is done in different modules. As our project is already divided into two different part transmitter and receiver. The applications of robotics mainly involve in automobiles, medical, construction, defense and also used as a fire fighting robot to help the people from the fire accident. But, controlling the robot with a remote or a switch is quite complicated. So, a new project is developed that is, an accelerometer based gesture control robot. The main goal of this project is to control the movement of the robot with hand gesture using accelerometer. The robot is usually an electro-mechanical machine that can perform tasks automatically. Some robots require some degree of guidance, which may be done using a remote control or with a computer interface. Robots can be autonomous, semi-autonomous or remotely controlled. Robots have evolved so much and are capable of mimicking humans that they seem to have a mind of their own.

2] LITERATURE SURVEY -

2.1 Gesture Controlled Robot using Accelerometer [Aishwarya Mohan, Rashmi Priyadarshini]

Innovations in the field of science is currently being developed aggressively in the field of Robotics. It is a rapidly emerging field that is here for the long haul because of its incredible use in rearranging work and day-by-day errands in the standard existence of people. To improve the compatibility of robots with humans for our day-to-day activities, we have to develop an efficacious method for interacting with robots. The modus operandi of this project involves beginning with splitting the model into two modules, resulting in two circuits: (a) a transmitter circuit, and (b) a receiver circuit. The methodology behind this is that we will connect the ADXL345 with the Atmega328p IC

which will process the values fed to its analog pins from the accelerometer.

2.2 Hand Gesture Control Car

[Rutwik Shah, Vinay Deshmukh, Viraj Kulkarni, Shatakshi Mulay, Madhuri Pote]

This project includes a transmitter section and a receiver section. The required components to build this project are Ht12e, Ht12d, L293D, AT89S52, 7805, capacitor, crystal, PBT connector, single pole antenna, resistor, LED, accelerometer, and battery. The accelerometer is an essential device in this project. accelerometer or transmitter device depends upon the hand gesture. Through the transmitter device, a command is received and it is processed with the help of the At89S51 microcontroller

2.3 Hand Gesture controlled Robot

Kathiravan Sekar, Ramarajan Thileeban, Vishnuram Rajkumar, Sri Sudharshan Bedhu Sembian

A microcontroller processes this data, and the motor driver is used to control the motors. As the user moves his hand, it senses and sends the signal for decision. The output from the accelerometer is gathered for the process by a microcontroller. According to the sensor output, the controller is made to work, and it sends the respective signal to the motors. It uses two DC motors to move, to drive them, and one motor driver is IC used which provides sufficient current to motors. All this material is mounted on metal chassis. As we move our hand to the right robot will move to the right side.

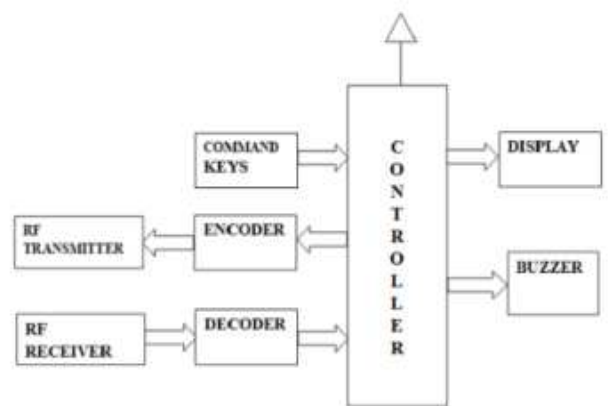
2.4 An Approach to Accelerometer-Based Controlled Robot [Rasika Gadage1, Shweta Mirje2, Prajakta Yadav3, Zakiya Makandar4]

The technique of establishing a process of interaction between humans and computers is evolving since the invention of computer technology. The mouse is an excellent invention in HCI (Human-Computer Interaction) technology. Though wireless or Bluetooth mouse technology is invented still, that technology is not completely device free. A Bluetooth mouse has the requirement of battery power and connecting dongle. The presence of extra devices in a mouse increases the difficulty to use it. The proposed mouse system is beyond this limitation. This paper proposes a virtual mouse system based on HCI using computer vision and hand gestures. Gestures are captured with a built-in camera or webcam and processed with color segmentation & detection technique.

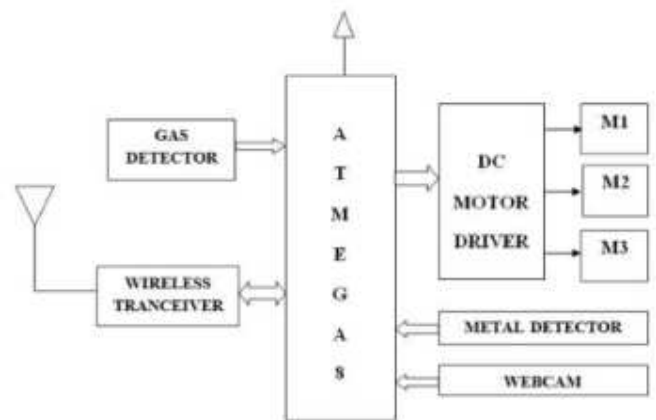
2.5 Accelerometer and Arduino Based Gesture Controlled Robocar Arkaprabha Lodh, Debopama Ghosh, Debosama Ghosh

Robotics is one of the emerging fields nowadays. It can be defined as a design gadget that can assist humans in their day-to-day activities and help them by amalgamating electronics and mechanical engineering. Robots are assuming a significant number of jobs in sectors like construction, military, medicine, etc. Various attempts have been implemented to make interfaces among users and PCs put together frameworks based on human gestures. These gesture-based interfaces can substitute regular interface gadgets. In the wake of making some essential robots like line follower robots or computer-controlled robots, human gestures can operate these types of robots and therefore an accelerometer-based Hand Gesture Robot is on the rise. This technique will reduce the dichotomy between the digital and physical worlds. In this paper, we will see how a robot can move by using Hand Gestures.

3] ARCHITECTURE -



A) Transmitter section



B) Receiver section

3.1] MICROCONTROLLER

The P8951RD2 is an 80C51 microcontroller with 64 kB Flash and 1024 bytes of data RAM. A key feature of the P8951RD2 is its X2 mode option. The design engineer can choose to run the application with the conventional 80C51 clock rate (12 clocks per machine cycle) or select the X2 mode (6 clocks per machine cycle) to achieve twice the throughput at the same clock frequency. Another way to benefit from this feature is to keep the same performance by reducing the clock frequency by half, thus dramatically reducing the EMI. The Flash program memory supports both parallel programming and in serial In-System Programming (ISP). Parallel programming mode offers gang-programming at high speed, reducing programming costs and time to market. ISP allows a device to be reprogrammed in the end product under software control. The capability to field/update the application firmware makes a wide range of applications possible. The P8951RD2 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running. connectivity (SPI/SDIO or I2C/UART interface) can be enhanced with wireless internet access by acting as a Wi-Fi adaptor. The ESP8266EX is one of the industry's most fully integrated Wi-Fi chips; it includes antenna switches, an RF balloon, a power amplifier, a low noise reception amplifier, filters, power management modules, and only a small amount of extra hardware.

3.2] Accelerometer (ADXL335):

An accelerometer is a one type of sensor and it gives an analog data while moving in the direction of X, Y and Z. These directions depend on the type of sensor. This sensor consists of arrow directions, if we tilt the sensor in one direction, then the data at the particular pin will change in the form of analog.

3.3] HT12E Encoder :

The HT12E encoder are 12 bit encoders that is they have 8 address bits and 4 data bits. It encodes the 12-bit parallel data into serial for transmission through an RF transmitter.

3.4] HT12D Decoder :

HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by RF receiver into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously and is only decoded when no error or unmatched codes are found. A valid transmission is indicated by a high signal at VT pin.

3.5] RF Module:

An RF Transmitter and Receiver pair is used for wireless communication. The wireless data transmission is done

using 434 MHz Radio Frequency signals that are modulated using Amplitude Shift Keying (ASK) Modulation technique.

3.6] L298 Driver:

L 298 is a dual full bridge driver that has a capability to bear high voltage as well as high current.

3.7] 150 RPM Motors:

These are attached to the wheels of the car to give them power to move.

4] FUTURE SCOPE -

In the future we can design a wireless robot that can sense hand gestures by using wireless technologies. It can be used in military applications as a robotic vehicle that can be handled by a soldier to avoid casualties. Our system has shown the possibility that interaction with machines through gestures is a feasible task and the set of detected gestures could be enhanced to more commands by implementing a more complex model of an advanced vehicle not only in limited space but also in the broader area as in the roads too. In the future, service robots execute many different tasks from private movement to full-fledged advanced automotive that can make disabled to able in all sense.

5] CONCLUSION –

We accomplished our goal with no obstacles i.e., controlling a robot with gestures rather than remote-controlled devices. Our robot is indicating legitimate reactions at whatever point we move our hand. The output from the four pre-defined hand motions to make the robot move in desired directions are: flexion for forward motion, extension for backward motion, tilt right for a right turn, and tilt left for a left turn. It can be reduced by implementing mechatronics rescue tools for planned rescue operations. Soldiers die upon reactive, spontaneous rescue or encounter operations due to a lack of adequate pieces of equipment. We hope that our robot can enhance commando operation. This robot can also be used in disaster situations. It is used for surveillance by providing live footage by webcam.

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GESTURE RECOGNIZATION BASED VIRTUAL MOUSE AND KEYBOARD

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Abstract:-This project uses hand gestures and computer vision to construct an optical mouse and keyboard. The computer's camera will detect a user's image of various hand gestures, and the mouse or pointer on the computer will move in sync with those movements. Even right and left clicks can be made by users utilising a variety of motions. Similar to this, a variety of gestures, including the one-finger gesture for choosing an alphabet and the fourfigure motion for swiping left and right, can be used to operate the keyboard. It will work as a virtual mouse and keyboard in the absence of a cable or other accessories. Python is used to code on the Anaconda platform, and the project's only piece of hardware is a webcam. Here, the Convex hull defects are first built, and then, using the defect computations, an algorithm is devised that maps the mouse and keyboard functions to the defects. The computer will recognise the user's gesture and reply properly by mapping a few of them with the mouse and keyboard.

Keywords:-Face Recognition, Virtual Mouse and Keyboard, Anaconda Platform, Optical Mouse

Introduction: - The webcam on the computer will begin to record video of the person using it while they are seated in front of it. A small green box will appear in the middle of the screen throughout this process. The code will be applied to the items presented there, and they will be compared to them in the green box. If they do, a red border will go up to show that the computer has discovered the object. The object can then be dragged to move the mouse pointer. In addition to helping to create a virtual computing environment, this will increase the security of the machine. The pointer will be positioned here at various items' places using hand motions. For a right click, a different gesture will be performed, and for a left click, a different gesture will be utilised. Similar to this, keyboard operations that are traditionally carried out on a physical keyboard can be mimicked with a single gesture. If the gesture does not match the box, a red border will appear when the recognisable gesture is detected; otherwise, simply a green box will be shown.

Motivation:-The motivation is to create a virtual human computer interface and an object tracking programme for computer interaction.Create such an AI-related application.

Problem Definition:-We frequently utilise physical mice or touchpads in PCs and laptops for personal use. The usage of HCI technology, which recognises hand and eye gestures as well as mouse movements and events, fully eliminates the need for additional hardware in this project.

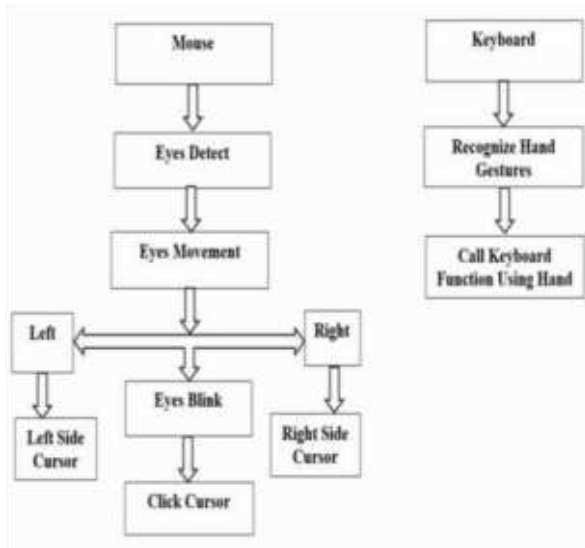
Objective of The Proposed Work:-

- We'll design and build a system for this project that can recognise particular human motions and utilise them to control.
- Using gesture recognition technology, a camera reads human body movements and transmits the information to a computer, which then uses the gestures as input to operate application-specific devices.

Existing Technology:-

- Hardware keyboards and mice are required by current technologies.
- We need a keyboard and mouse to text and move the cursor on a screen in today's technology. Therefore, a keyboard and mouse are required.
- Cost is high.

Architecture :-



The mouse system was created in Python, and in order for it to work, the following Python modules had to be loaded. Numpy is a Python extension module. Actions on groups of relevant data can be taken quickly and effectively. In technical and scientific computing, Scipy is a Python library that is open-source. OpenCV is a collection of software development tools with a main emphasis on real-time computer vision. The name PyautoGUI refers to a cross-platform, Python-based GUI automation module. Through keyboard and mouse control as well as basic image recognition, this enables you to automate computer tasks. A person's pupil is recognised by the gadget using the webcam. The mouse cursor can now be moved by a person moving his eyes, according to the students.

The pointer movement can be seen on the computer's home screen. To type using our fingertip on the virtual keyboard, we took the following actions:

- Step 1: Capturing live video with computer's camera.
- Step 2: Editing each frame of the video that was recorded.
- Step 3: Converting the image frame.
- Step 4: Virtual keyboard.
- Step 5: To identify hand movements, use hand landmarks.
- Step 6: Flip the input device while locating the object's location over the virtual keyboard.

Then the machine locates the face. Advantages of gesture recognition: Once the system recognises and records the eyes then the system locates the students. The last module provides details on the system used to advance a number of fields, including the ability to move the mouse pointer by monitoring pupil movements.

Module 1 GUI:- Our GUI was created in Tkinter. The Python binding for the Tk GUI toolkit is called Tkinter. It serves as the de facto default GUI for Python and is the official Python interface to the Tk GUI toolkit.

Module 2 :- Login/Registration Process: Before utilising the application, users must first register. Data from users will be stored in the database and fetched when they log in to the system. Only registered users are able to log into the system.

Module 3 :- Database Module: User data is stored in databases. The DBsqllitedatabase was employed.

Module 4 :- The device uses an eye-based interface that functions like a mouse and transforms eye movements like blinking, staring, and squinting into mouse cursor actions. Software needed for this method includes Python, OpenCV, NumPy, and a few more facial recognition algorithms using the Harr Cascade algorithm, as well as a simple camera.

Module 5:- Keyboard Usability: Gesture-based controls will be used to control keyboard usability. In order to make motions, we need the forefinger and middle finger. The top, middle, and base are our location coordinates. We will use a keyboard to control movement like a finger.

Related work:- Paper 1: Gesture Recognition-Based Virtual Mouse and Keyboard

Author:- Sugnik Roy Chowdhury, Sumit Pathak, M.D. Anto Praveena

Description:- In this project, computer vision is used in creating an Optical mouse and keyboard using hand gestures. The camera of the computer will read the image of different gestures performed by a person's hand and according to the movement of the gestures the Mouse or the cursor of the computer will move, even perform right and left clicks using different gestures.

Paper 2: Finger Recognition and Gesture-based Virtual Keyboard

Author:- ChinnamDatta Sai Nikhil, Chukka Uma Someswara Rao, E. Brumancia, K. Indira, T. Anandhi, P. Ajitha

Description:- Hand motion acknowledgment is critical for human PC connection. Right now, present a novel constant strategy for hand motion recognition. The proposed framework is vision based, which uses AI methods and contributions from a PC webcam. Vision-based signal acknowledgment following and motion acknowledgment In our structure, the hand area is separated from the foundation with the foundation subtraction technique. At that point, fingers are portioned to identify and perceive the fingers.

Paper 3 : An Arduino-based Gesture Control System for Human-Computer Interface

Author:- Shravani Belgamwaha Sahil Agrawal . Description:- Learning the gestures and handling them will require certain time for different users thus it will be tough initially. It can be fun to use the interface in later stages. The interface provides altogether a new and easy way to use the computer. Although the interface can perform computer handling

functions, using the mouse and the keyboard becomes imminent. This system can prove to be a major help to all the physically challenged and illiterate people

Paper 4 :Virtual Mouse Control Using Colored Finger Tips and Hand Gesture Recognition

Author:-VantukalaVishnuTeja Reddy , Thumma

Dhyanchand, GallaVamsi Krishna, Satish Maheshwaram

Description:- In human-computer interaction, a virtual mouse implemented with fingertip recognition and hand gesture tracking based on the image in a live video is one of the studies. In this paper, virtual mouse control using fingertip identification and hand gesture recognition is proposed. This study consists of two methods for tracking the fingers, one is by using colored caps, and the other is by hand gesture detection. This includes three main steps that are finger detection using color identification, hand gesture tracking, and implementation of on-screen cursor.

Paper 5:I-Keyboard: Fully Imaginary Keyboard on Touch Devices Empowered by Deep Neural Decoder

Author:-Ue-Hwan Kim , Sahng-Min Yoo , and Jong-Hwan Kim , Fellow

Description:-Text entry aims to provide an effective and efficient pathway for humans to deliver their messages to computers. With the advent of mobile computing, the recent focus of text-entry research has moved from physical keyboards to soft keyboards. Current soft keyboards, however, increase the typo rate due to a lack of tactile feedback and degrade the usability of mobile devices due to their large portion of screens.

Future Scope:- Future basic pointing and pinching movements will be successful using the method. Even so, there are still a lot of areas where improvement is possible. Currently Although the background of the system remains static, using this hand tracking gadget would be both incredibly beneficial and necessary. setting up the augmented reality environment to allow a person to engage with virtual 3D surroundings while sporting real-world things. Multiple multidimensional camera angles are required to catch the hand gestures since a layer of capturing capacity is required in this scenario.

Conclusion:-This suggestion describes a system that would substitute for the keyboard and mouse and recognise hand movements. This covers keyboard drag-and-click operations, mouse cursor movement, and additional keyboard features like printing alphabets. The skin segmentation technique is used to separate the colour and image of the hand from the surrounding area. The remove arm approach can be used to resolve the whole body being captured by the camera. The proposed approach typically recognises and comprehends hand gestures, enabling it to control keyboard and mouse operations and generate a realistic user interface. architectural visualisations, 3D printing, and even remote medical intervention.

This project is easy to build and has many potential uses in the medical profession, where computers is essential but has not yet been fully fulfilled due to a lack of human-computer interaction.

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Military Spying Robot

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ABSTRACT - The goal of this device is to reduce human casualties in terrorist attacks like the one on September 11th. So this problem can be solved by building an spy robot with a camera, which will make it easier to study competitors as needed. This robot can enter enemy territory discreetly and provide data to us via wireless camera. For more than half a century, robotics has been a mainstay of advanced production. Robots and their associated equipment are increasingly being used for military and law enforcement reasons as they grow more sophisticated, reliable, and smaller. "With proper sensors and cameras to execute varied duties, mobile robots are operated remotely for reconnaissance patrol and feedback video footage to an operator," says a military spokesperson. Android smart phones are the most common gadget nowadays. On the internet, there are numerous programmes that use inherent hardware in these phones, such as Bluetooth, technology, to control other devices. Bluetooth technology strives to communicate data wirelessly at a short distance through radio wave transmission, with features to produce ease, perception, and controllability, thanks to the advancement of current technology and the Android Smartphone. We've created a robot that can be controlled using an Android phone application. It connects to the controller through Bluetooth and sends control commands. The Bluetooth module can be connected to the controller. The robot's mobility may be controlled using commands received through Android. As a result, the necessary actions can be taken.

Object tracking, on the other hand, is one of the most difficult problems in computer vision. Tracking objects can be difficult due to intrinsic and extrinsic issues such as deformation, camera motion, motion blur, and occlusion. This project shows a useful application using a real-time object detection system that can collect user-defined .

INTRODUCTION - In this system disposal technicians and mission controllers with a number of challenges including high risks in it. A typical disposal mission will initially involve investigating the site using a remote controlled robot and disposing the mine. The system also includes night vision camera which will not only allow viewing whatever will be recorded in day time but also during night. The whole system is controlled via android application. An Android smart phone will act as remote controlled device for movement of the

robot. An Android application will be developed for the same. The Bluetooth module will act as an interface between Smartphone and Raspberry pi. We will be using Bluetooth module for the system, which can be used as either master or slave. Generally our master will be smart phone and slave will be Bluetooth module. Bluetooth module will give the commands given by smart phone to the controller. Controller will act as the brain of the robot. The robot movement will be decided by the controller. The Controller will be programmed with the help of the Embedded C programming. In addition to this we also have a ultrasonic sensor and also a metal detector to detect bombs.

LITERATURE SURVEY -A literature survey on military spying robots reveals a significant body of research and development in the field of unmanned surveillance systems. These studies explore various aspects such as design, functionality, applications, and challenges associated with military spying robots. Here is a brief overview of key findings from the literature:

1.Design and Development: Researchers have focused on designing compact and stealthy robots capable of operating in diverse environments. Studies propose innovative approaches such as biomimetic designs, inspired by animals like insects or birds, to enhance agility, maneuverability, and camouflage capabilities.

2.Sensor Technologies: Several studies emphasize the integration of advanced sensor technologies in military spying robots. These include high-resolution cameras, thermal imaging, LIDAR, RADAR, and acoustic sensors. Sensor fusion techniques are also explored to enhance perception and data collection capabilities.

3.Communication and Networking: Literature highlights the importance of secure and robust communication systems for military spying robots. Studies propose the use of encrypted communication channels, mesh networking, and satellite communication to ensure reliable data transmission and remote control.

4.Autonomy and Navigation: Researchers have explored autonomous navigation algorithms and techniques for military spying robots. This includes path planning, obstacle detection and avoidance, simultaneous localization and mapping (SLAM), and swarm intelligence approaches to improve coordination and adaptability.

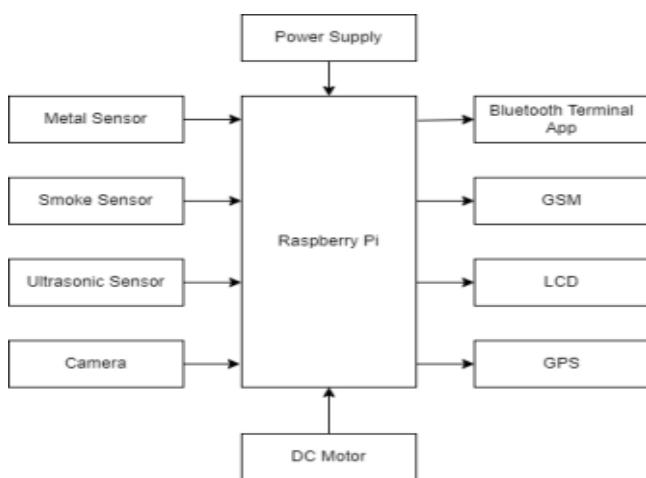
5.Data Processing and Analysis: Studies emphasize the integration of artificial intelligence and machine learning techniques for data processing and analysis. This includes

object recognition, behavior analysis, anomaly detection, and predictive analytics to extract actionable intelligence from collected data.

6.Ethical and Legal Considerations: Literature acknowledges the ethical and legal implications associated with military spying robots. Discussions revolve around issues such as privacy concerns, rules of engagement, adherence to international laws, and the potential impact on civilian populations.

7.Operational Challenges: Researchers identify operational challenges such as power management, endurance, robustness, and reliability as key areas of focus. Studies propose innovative solutions including energy harvesting, efficient battery systems, and redundant components to address these challenges.

SYSTEM ARCHITECTURE



METHODOLOGY

Military spying robot utilizes advanced surveillance technology to gather intelligence covertly. It employs a compact design and state-of-the-art sensors to remain inconspicuous in various environments. Equipped with high-resolution cameras, audio recorders, and motion detectors, Military infiltrates target areas undetected. It employs machine learning algorithms to analyze collected data and identify valuable information. Military's communication module enables it to transmit findings securely to a remote command center. Its autonomous capabilities, including navigation and obstacle avoidance, ensure efficient operation. Military's methodology emphasizes stealth, data collection, analysis, and secure transmission, making it an effective tool for intelligence gathering and reconnaissance missions.

Proposed System

The proposed system for a military spying robot aims to enhance intelligence gathering capabilities for military operations. The robot incorporates cutting-edge technologies and features designed specifically for covert surveillance and reconnaissance missions. Here are some key components and functionalities of the proposed system

1.Stealth Design: The robot is built with a compact and low-profile design, allowing it to blend seamlessly into various environments and avoid detection by adversaries.

2.Sensor Suite: The robot is equipped with a comprehensive sensor suite, including high-resolution cameras, infrared sensors, microphones, and motion detectors. These sensors enable the robot to capture visual and audio data discreetly and detect any movement or suspicious activity in its surroundings.

3.Autonomous Navigation: The robot utilizes advanced autonomous navigation algorithms and obstacle avoidance mechanisms to move silently and effectively in complex terrains, both indoors and outdoors

4.Secure Communication: The robot is equipped with a secure communication module that utilizes encryption protocols to transmit collected data and real-time updates to a remote command center or designated military personnel.

5.Data Analysis and Intelligence Processing: The robot incorporates powerful onboard processors and machine learning algorithms to analyze collected data and extract relevant intelligence. This includes facial recognition, object identification, anomaly detection, and other pattern recognition techniques.

6.Long-duration Operation: The proposed system ensures extended battery life and efficient power management, allowing the robot to operate for extended periods without requiring frequent recharging or maintenance.

7.Command and Control Integration: The robot can be seamlessly integrated into existing military command and control systems, enabling real-time monitoring, mission planning, and remote control capabilities.

8.Adaptability and Upgradability: The proposed system is designed to accommodate future technological advancements and can be easily upgraded with new sensors, software enhancements, and operational capabilities to meet evolving military requirements.

Raspberry Pi - Raspberry Pi is a small single board computer. it is heart of our project. By connecting peripherals like Keyboard, mouse, display to the Raspberry Pi, it will act as a mini personal computer. Raspberry Pi is popularly used for real time Image/Video Processing, IoT based applications and Robotics applications. Raspberry Pi is slower than laptop or desktop but is still a computer which can provide all the expected features or abilities, at a low power consumption.

Smoke Sensor:-Height: 47mm(mounted in B401 base)
Diameter: 102mm Weight: 105gm

Ultrasonic Sensor - Most often, proximity sensors are combined with ultrasonic sensors. They are present in anticollision safety systems and self-parking automotive technologies. Robotic obstacle detection systems and manufacturing technology both use ultrasonic sensors.

Bluetooth Module - The bluetooth module HC-05 consists of six pins. The six pins Key, 5V, GND, Tx, Rx, Status. The bluetooth module has two devices i) master device ii) slave device One device connects to the master while the other device connects to the slave. The connection between the devices takes place as follows: One of the pin Tx is connected to pin Rx of the Rpi board while the pin Rx of bluetooth module is connected to the Tx pin of Rpi. Thus, in a way cross-connection is required for the operation of bluetooth module. The GND pin is given to the GND pin of Rpi and power supply pin of Rpi is given to the pin of power. In order to have proper communication, the master device must be connected to the slave. Once the pairing is done between two devices, the device will ask to enter the password. The password will be either 0000 or 1234. Enter the password and both the devices will be connected to each other.

Camera - A Night Vision Camera: Apart from what a basic camera consists of, it consists of a transmitter unit. It captures images and transmits these images through the transmitter in form of digital signals, which are received by the receiver unit connected to the TV or computer. A night vision camera can receive illumination either by amplifying the visible light using image intensifiers or using infrared light directly by objects – thermal imaging or infrared light reflected by objects-near infrared illumination

DC motors : The speed of step execution controls the rate of motor rotation. A 1.8° step motor executing steps at a speed of 200 steps per second will rotate at exactly 1 revolution per second. Stepper motors can be very accurately controlled in terms of how far and how fast they will rotate. The number of steps the motor executes is equal to the number of pulse commands it is given. A step motor will rotate a distance and at a rate that is proportional to the number and frequency of its pulse commands.

4.RESULT

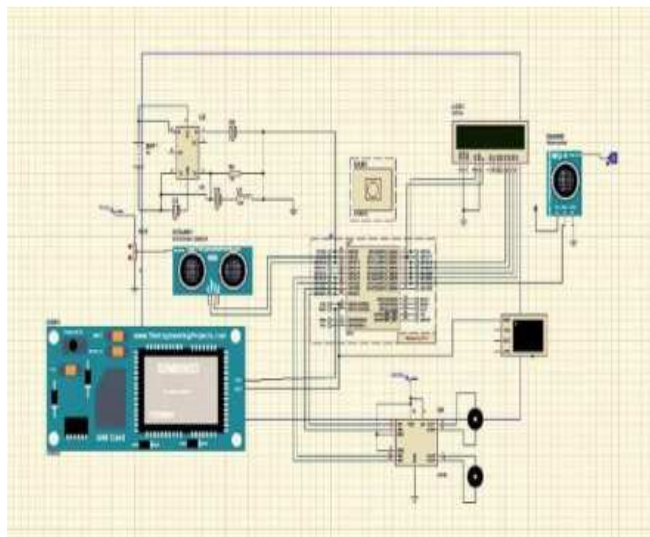


Fig-Circuit diagram Military Robo.

5. CONCLUSIONS

Smart phone are which can develop effective remote control program. At the same time, this program uses Bluetooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot The Multi-Purpose Military Service Robot will be designing in such a way that it can fulfill the needs of the military, the police and armed forces. It has countless applications and can be used in different environments and scenarios. For instance, at one place it can be used by the armed forces, military purposes, while at another instance it can be used for spy purposes. It will also be able to diffuse the mines after detecting it.

FUTURE SCOPE

Smaller and more advanced drones: Spying robots will become smaller and more capable, allowing them to fly into confined spaces and gather intelligence.

Improved sensors: Future robots will have better cameras, thermal imaging, and other sensors to gather more accurate and comprehensive information.

Better communication and coordination: Spying robots will be able to share real-time data with other military assets, improving situational awareness and coordination.

Cyber and electronic warfare capabilities: Robots may have the ability to disrupt or disable enemy communication systems and networks.

Swarming and collaborative operations: Robots will work together in coordinated swarms, covering larger areas and overwhelming enemy defenses.

Stealthy infiltration and reconnaissance: Robots will be designed to quietly enter hostile areas, gather intelligence, and avoid detection.

Longer flight times and extended range: Advances in propulsion and energy efficiency will allow robots to conduct prolonged surveillance missions over larger areas.

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Digital door lock system using Arduino UNO

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Abstract- As technology advances and expands on a day-to-day base, safety becomes suddenly essential in all disciplines. Everyone desires a private place where no one can enter without their authorization, therefore we need to secure our room, office, locker, etc. that save our precious accessories, documents, data and for that purpose, the proposed work has developed a "word grounded door cinch system by using Arduino.". This device is a digital door cinch with a word or leg law. Which prevents the stoner from opening the door unless they input the correct word or leg law. Word grounded door cinch system allows only approved persons to pierce confined areas. This system is completely controlled by Arduino. The word can be entered via a keypad. If the word is matched with the stored word in Arduino the door gets open.

Keywords: Arduino Uno, Keypad Lock, Security, Servomotor.

I. Introduction

The term "door cinch" refers to a device that prohibits a door from being opened and that can only be opened with a key, point, retina scanner, smartcard, or other analogous device. Door cinches have played a vital part in mortal life for a long time. As the rate of theft rises, security has come a top precedence in recent times. Door cinches are intended to keep us and our things safe and secure from stealers. People used to lock home doors with physical keys, and they needed the key to unlock doors. If they lost the key, it was doubtful to repair, and it was

precious. Now, those door cinch systems may be replaced with new locking technologies.

The Arduino Uno, Servo motor, 4 * 4 keypad module, and muumuu cables comprise the word- grounded door cinch system. In this design, we will use the keypad to enter a word and also use the servo motor to open the door cinch. The Arduino is the program's brain, controlling the entire system. The word or leg law is entered using the 4 * 4 keypad module. The servo motor pushes (cinches) or pulls (unlocks) the door's latch. The automated door cinch system is extensively located in several spheres of life similar as in the banks as well as home and office surroundings. It could be employed as a business controller for controlling the flux and exodus of individualities to and from an atmosphere (as seen in banks) or could be used to limit unwanted access to an Atmosphere (access control)

Advantages of Arduino Grounded Door Lock System

- This design is veritably simple.
- The factors are veritably common.
- Lower power consumption.
- It's a veritably simple but good security system.

This circuit can be used as a door cinch like key locks. It can be used at largely secure places to secure important documents. With some variations, this design can be used as a word- grounded home appliances system.

II. Literature Survey

Akshaya Krishnadas Bhat et al. [1] This article illustrates how a password-protected door lock can be used in a variety of settings, including the home, office, and desk. The system will check the user's entered password for validity before unlocking it for the authorized user. This method could be a less expensive alternative to expensive door lock systems that use retina scans, iris scans, or fingerprints, among several other technologies.

Prof.A.Y. Prabhakar et al. [2] - This article shows how an ARDUINO UNO-based password based door lock system is created, where the door is unlocked and the user who input the right code is authorized to enter the zone. And the common individual can bid on such a locking system for a low price in order to ensure the protection of their valuables.

Shruti Jalpur et al. [3]– This paper depicts a secure and protected door lock system, with network security supplied by the use of cryptographic algorithms such as SHA-128 and SHA-512. The technology also allows the authorized user to access the information remotely. The user input is encrypted and hashed using the algorithms AES-128 and SHA-512. If the sensor detects unauthorized access, it will send a notification to the smart phone application placed on the authorized user's smartphone

Shuhad Natashab Bint Mohd Zainot [4]– "The door entry system utilizing Arduino is created to overcome cannot be replaced," according to this research. It also saves time and provides a high level of security.

III. Proposed Work

The system is composed of three major modules. The microcontroller module

consists substantially of the Arduino Uno R3 microcontroller. The keypad module serves as the input to the microcontroller, as the word demanded to open the door must be entered into the system via the module. The keypad module was designed from scrape for this system, using 16 drive button switches and 4 resistors, since a ready-made module was not available in the request at the moment of design. Since the Arduino is limited to a maximum affair current of 500mA on each of its affair legs, driving the DC motor directly from these legs would damage them. Hence, the motor driver IC is employed to act as an interface between the Arduino and the DC motor.

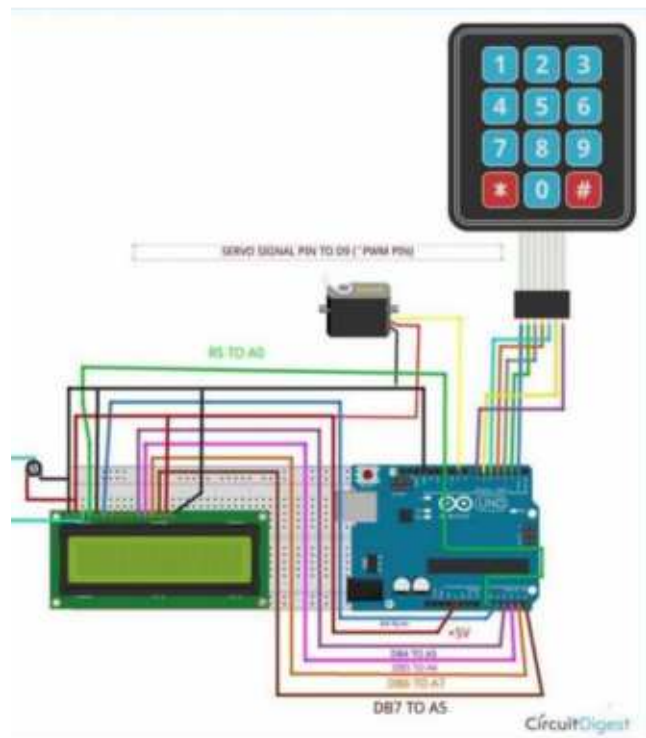


Figure 1 : Circuit Diagram [8].

Circuit diagram of proposed system is shown in fig 1. The main functional unit of the system is discussed hereafter.

motors as an output and can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards [6].

Table 1: Component Details

Sr. No	Component Name	Specification
1.	Arduino Uno	Microcontroller: ATmega328 Operating Voltage: 5V Input Voltage (recommended): 7-12V Input Voltage (limit): 6-20V Clock Speed: 16 MHz I/P O/P pins 14
2.	4*4 matrix Membrane keypad	Maximum rating: 23 VDC, 30mA Operating Temperature: 32 to 122 F Interface: 8 pins access to 4*4 matrix
3.	LCD 16*2	Operating current: 1mA Custom characters support Work in both 8-bit and 4-bit module
4.	Servo Motor SG-90	Operating voltage: 5V Torque: 2.5kg/cm Gear type: plastic Weight of motor: 9gm Package includes gear horns and screws

IV. Description of Components

Arduino UNO:

The Arduino Uno is a low cost, flexible, and simple-to-use programmable open-source microcontroller board that may be used in a wide range of electronic applications. This board can operate relays, LEDs, Servos, and



4*4 Keypad Module:

The polymer material used in these Keypad Modules is thin and flexible. The 16 keys in the 4*4 Keypad module are grouped in a matrix of rows and columns. An electrical wire connects all of these switches together. In most cases, there is no link between rows and columns. When we push the key, a row and a column fall into touch. [7]

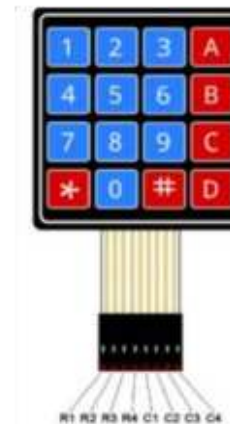


Figure 3. 4*4 keypad

Servo motor:

A servo motor is a simple electric motor which is controlled by servomechanism. When a DC motor is used as a controlled

device in conjunction with a servo mechanism, it is referred to as a DC Servo Motor. AC Servo-Motor refers to a controlled motor that is powered by AC [7].

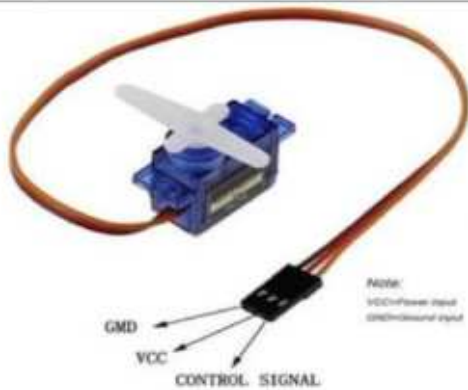


Figure 4. Servo Motor

Jumper Wires:

Simple terms, jumper wires are wires with connection pins on both ends. A jumper wire is sometimes referred to as a jumper, a jumper cable, a DuPont, or a cable. Without soldering, jumper wires are used to connect electronic components or a test circuit. Jumper wires come in a variety of colors, and the fact that they all work the same colors doesn't mean anything.



V. Result



Fig.5 (a) inside view of the connection

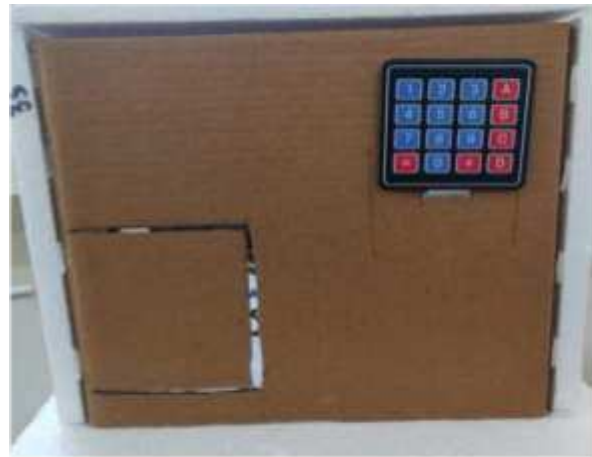


Fig 5(b): locked status of the door



Fig 5(c): Unlocked status of the door

VI. Limitations

The good limitation of this system is its incapability to automatically descry the presence of scholars outside the lecture hall when the door is

closed. As an enhancement, stir detectors could be employed to implement this functionality. Based on the encouragement behind this design, this system could be applied as an access control medium in tertiary institutions like universities, polytechnics and the likes.

VII. Future Scope

As long as the word isn't participated with anyone, this operation can give perfect security. Druggies can introduce constraints to the word entry process to make it safer. Also add a point scanner and a display model to show dispatches similar as whether the door is locked or not. Rather of using a keypad module, can employ smart cards to open doors with the same model. In the future, the proposed system can employ a power force appendage rather of a battery for power transfer.

VIII. Conclusion

Since there are multiple other security systems available, similar as point, retina scanner, RFID card, pattern, and so on. still, the" word grounded door cinch system using Arduino" is veritably affordable. It's cost effective because we're using affordable element costs. Also, with the help of the library, it's extremely simple to develop law, and anyone may use this model for security purposes. Because the being door lock system has an issue with precious and irreplaceable factors, one may use an Arduino-grounded door lock system to break this problem because it's simple to install and remove. thus, the" word- grounded door cinch system using Arduino" is a time- saving programmable module that will help us in furnishing excellent security.

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Booking On-Demand Home Services in Local Area Using MEAN Stack and Machine Learning

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Abstract - In today's world, On-Demand services are crucial because the need for handyman services is increasing quickly all around the world. Everyone in this fast-paced environment prefers demand services to complete tasks swiftly and efficiently. In the current situation, everyone is occupied with busy schedules and demanding responsibilities, and there is a strong work culture, so if any issues occur at home, they do not have enough time or sometimes that issue maybe not be resolved by them. The ideal option is to engage a handyman or an on-demand service if you don't want your professional life to conflict with household issues that you can't handle on your own and require a skilled individual to handle. Those who need home services including plumbing, electronic repair, laundry, cleaning, carpentry, painting, pet care, pest control, and gardening can benefit from the on-demand services system. Using this website makes it simpler to schedule your employee at the ideal moment and price.

Keywords: *On-demand home services, MEAN, Machine Learning, E-learning, job-portal*

I. INTRODUCTION

In recent days, the amount of work we have to do has increased rapidly, taking up a lot of our working hours [4]. As a result, some problems that sadly arise related to electric appliances, plumbing, and many more at home cannot be fixed by ourselves.

Doing work online saves a lot of time in comparison to offline activity. It's difficult to maintain and repair homes because people have busy schedules and demanding jobs. If any trouble arises in a household, it might create a problem and it's hectic to resolve the problem [4]. Professional workers are required for resolving tasks like plumbing, carpentry, electrician, etc if someone is not able to do their own [2][6]. To get those expert people offline take a lot of time for them and those can charge high money and delay work. To overcome these issues the system is providing a way of listing a professional worker on site for maintenance and repair [9]. An interactive and flexible website to book workers for respective work like plumbing, electrician, carpentry, etc is proposed [3].

Users go to the website and with a single click can choose a desired service for their home to fix issues. Users will able to find the workers based on their current locations with the help of a GPS [1].

For workers interested to be listed on the system, workers first have to register with their required data like worker id, and their work, and charge for their work [16]. After that admin has to verify all those details and assure the worker to get the list on the website. Our website provides authorized and authenticated login for users by creating an account. It's easy for users to get a

worker to fix the problem and to get stress free. In minimal steps user can book workers.

II. RELATED WORKS

In Web Application Based On-Demand Home Service System [2] PHP and SQL technology is used for the client side and back end side respectively. The login page is available for the user admin and service provider. Every user and service provider has to register with basic details on the web application. System is developed in such a way that admin can delete service providers' details from the system if found violating the rules. The nearest service provider can be located by entering the user's location. Confirmation of the requested service is sent through the mail to the user. A tracking system of requests is also included to keep a track of requested services.

In A Web Application-Based Administration Panel For Handyman Services System [10] the technology performance is improved using javascript technology like react.js for frontend because react.js render complex UI in very little time and also contains virtual DOM so that performance is improved. Node.js is used as middleware between react and mongodb, to securely transfer data between client and server.

In An Online System for Household Services System [5], for the system to integrate external payment gateways, the consumer must pay for the services they selected, which guarantees a secure and safe transaction.

In Web application Services For Booking Handyman Using MERN [4] taskers are listed based on location and cost. There is a flow of requests from the user to the admin, then admin to the professional. Professionals can declare the pay they want. Workers used the mongodb database to store large data in JSON format in key-value pairs. hence the system becomes flexible. System also developed AXIOS, which allows node.js and react.js to send HTTP requests to one another. Security and authentication are handled through JWT. react-redux to transfer data to all UI components.

III. BACKGROUND TOOLS

A. Angular:

Angular is JavaScript framework for making frontend. Javascript's angular framework is declarative, effective, and versatile and can be applied to create user interfaces. Routing and presentation of

data on the client side in angular. Angular creates a Single Page Application (SPA).

B. Node.js and Express.js:

It is utilised to create input-output, event-driven, server-side applications. An asynchronous, event-driven runtime environment for javascript called nodejs. It is used to create scalable network applications. Non-blocking, I/O is present in node for faster response. To process requests, node.js uses an event loop design, so that it gives high performance and low latency.

C. MongoDB:

It is a document-oriented, non-relational database. It has dynamic schema. It centers around the CAP theorem (Consistency, Availability, and Partition tolerance). It performs significantly better than RDBMS in terms of speed.

D. Machine Learning:

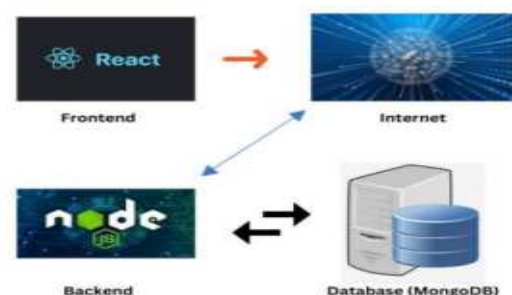
Machine Learning is generally used for training our model for specific purposes and required features. Services provided by Machine Learning are analysis, classification, and recommendation.

E. Socket Programming:

With socket programming, two or more nodes on a computer network can connect and communicate with one another. The other socket (node) reaches out to the first socket to establish a connection while the first socket listens on a certain port at an IP. While the client reaches out to the server, the server creates the listener socket.

F. Web Services Provider:

One of the main use case of AWS is hosting the website on AWS EC2 instance such that it is scalable and accessible to the user easily and by using load balancer services system will able to reply for



every request so there is no down time in the system.

Fig1: Flow of web application

IV. PROPOSED SYSTEM

In the proposed system user has to first register in the system to access features of web applications and services provided by handyman workers. when the user starts registering, the system validates the mail id entered by the user and then provides access to all features and services. The default language for this system is english but for user convenience 'local language availability feature' is added to the system. Users can change web applications into many languages. When users search for a particular service, the system provides the names of handyman workers based on feedback and rating [2][16]. These ratings are generated by doing sentiment analysis and a recommendation system. If the user provides their location with the system, it can provide the best result for service providers near them. The overall performance of this system is enhanced with sentiment analysis, a recommendation system, and a GPS [11]. If the user gets any problem with web application features, the user can connect with a chatbot to resolve their query.

Sentiment analysis has a crucial role to uplift the workers based on their reviews which contain specific words that will take our features for our machine learning model and used to find the right handyman.

The following features are added to the proposed system for better user experience and they can use these services and take benefit of it.

Local Language Availability: In a rural area, not every person is well educated also not every handyman is educated, so they have a language barrier while communicating and interacting with the English language, so language translator is added to the system so that all can translate language into their native language and use this web application. more than 100+ language translators are added to the system so it supports as much as a local language.

Chatbot for user help: Sometimes people who live in rural areas are not much familiar with how to use e-commerce websites as well as different websites, so they lose interest in that website and go to another website. Chatbots are added to the system so users can ask questions about where to see all

services, how to book service, or if they need any help Chatbots will solve their problems [22].

Payment Gateway: Razorpay is used as a payment gateway for making payments to the handyman [12]. It also removes the drawback of Paypal payment gateways as it does not support all types of payment methods. Using Razorpay users can use any payment method like UPI, debit card, credit card, net banking, etc. With its product suite, Razorpay is the payment solution in India that enables businesses to receive, handle, and disperse payments, so using it secure payment will be done between the client and the handyman [5][7].

GPS integration: You can find the best handyman around the corner, See how far the location of the handyman is from your home, and how much time will take to come to your doorstep if you book that particular handyman [1]. So Google maps play an important role to check the location of a handyman [11][15].

Authentication: at the time of registration valid emails are taken to check the right user, also they can be authenticated using OTP. Bcrypt js is used for storing the hash value of the password in the database, so no one can attack that password. Your application will be able to use the Bcrypt algorithm to convert the user-inputted password into a hash, also referred to as a “digital fingerprint.”

Advance Search: The user can use multiple parameters to select the right handyman on his budget and near to him [13]. For example, the user can select a plumber who takes costs less than or up to X rupees, up to Y kilometers from his home, and has a rating of 4 out of 5.

Sort workers by Rating: The rating of particular workers is stored in a database using different ratings given to that worker. Average ratings are calculated and workers are sorted in descending order of rating.

Sort workers by Review: The worker review is stored and used to calculate sentiment scores using the reviews given to that worker. If workers have positive reviews displayed first then workers have negative reviews.

Sort workers by Nearest Distance: The current location of the user is accessed using GPS, The worker's address is converted into latitude and longitude using a node-geocoder and calculating the difference of current latitude and longitude with all workers and sorted all workers with the nearest location [16].

Sort workers by Complaints: The worker's complaints are categorized into work-related complaints and behavioral complaints. The score of complaints is calculated and who have maximum negative score are displayed last. For finding the score for complaints sentiment functionality is used.

Sort workers by Price: It's crucial to give clients pricing information that is clear, simple to understand, and suited to their needs when arranging employees by price. Every worker has a booking price, the worker is sorted from lowest to highest price.

Machine Learning: Machine Learning is used to get learn our model and predict the output based on the fed data to the model by finding the relation between the features [14]. ML is used for basically classification, recommendation, and prediction purposes. In here our model we used classification and recommendation-type algorithms to predict which worker is best at their work in all.

Sentiment Analysis: Analyzes the data and determines the opinion about the worker and service. In our system sentiment analysis is used on the feedback dataset and finds how many good, bad, and neutral reviews and lists them, workers, accordingly the best, neutral, and bad. This is a way to learn the expressions, opinions, emotions, and attitudes toward the subject and classified as positive, negative, or neutral [14][16].

Online Consult: The Online Consult Platform allows communicating between workers and users. This platform provides a feature where workers can interact with users in real time. This online consult is user-friendly and very easy to use for workers even if they are not tech-savvy. This online consult can provide real-time video and audio chatting between workers and users [20]. It helps to build trust between users and handymen by enabling a user to communicate in real time, share information, and clear doubts. It also allowed sharing screen and document sharing. Overall, it is a valuable platform for workers to provide effective and fast support to its users. The worker can create a meeting using the meeting code, user can also go to the same meeting code and join that meeting. Socket programming is used for achieving this. Also Web Real-Time Communication (WebRTC) API is used to communicate video and audio on websites for peer-to-peer communication.

E-Learning: In the present world, learning is a crucial part of anyone's life. So, learning can be achieved either the traditional way or

electronically. The estimated value of the present global e-learning industry was roughly USD 235.5 billion in 2022, and it is expected to reach USD 648.8 billion by 2030. By keeping in mind, the current market scenario [8], we have developed an e-learning platform for our on-demand home services website to train and develop skills in new students who want to learn and

implement those skills and earn money in life. This website contains two logins: one for the user and another for the admin [18]. When the user registers, the admin will approve the user with basic details and give the user the possibility to access the website.

E-learning is an effective way to provide learning to users. It is a web-based platform designed to provide learners, in our case, with resources, video demonstrations, etc. One main feature is that admin can upload a course on the website. This platform typically offers a range of features and resources that enable the worker to develop skills and be ready for the work. This e-learning platform can be accessed by any worker or learner who is registered on the platform and can access it from anywhere using an internet connection. This allows the learner to work at their own pace. The biggest advantage of delivering online learning has been the minimal cost of the internet relative to the person-to-person method [17].

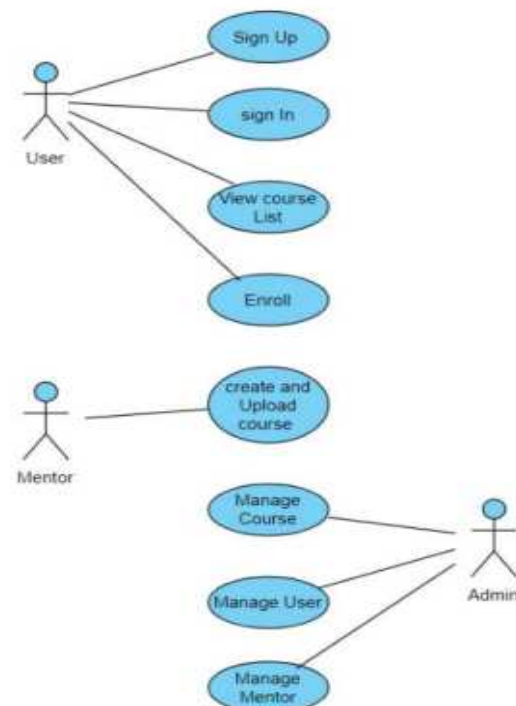


Fig2: Use case diagram for E-Learning Platform

Job Portal: A job portal for handymen is used to provide a platform for business owners and workers to connect [19]. In this Job portal system, we have created three sections posted jobs, view jobs, and post jobs which makes it easy for workers and job posters to easily manage job postings and applications. Suppose Two-Wheeler shop owner has a vacancy for a mechanic person, the shop owner can post their job openings on this Job portal. While, posting the Job openings shop owner has to provide information such as a shop name, job role, salary, location, deadline for Job application, email, and job description. On the other side, needy workers can browse jobs on the job portal based on their skills and experience. If a worker wants to apply for a particular job then the worker has to fill in information like Name, Email, and general behavior. Once applied for the job, the Job poster can see the workers who applied for the Job [21]. After considering each application owner can accept or reject the application. The job portal provides options that are approved application, and reject application on each job application. These job applications can see in the navigation bar under the view job section [19].

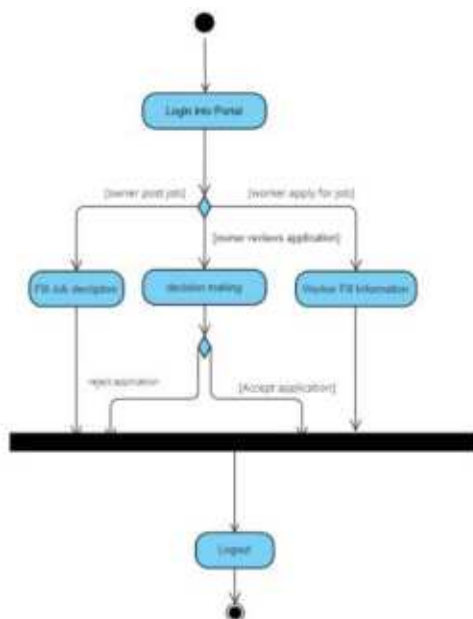


Fig3: Activity Diagram for Job Portal

A. Use case illustration for suggested model

There are three actors in the proposed system, an administrator, a worker, and a client. For accessing and making changes to the website, the administrator only has to log in [4][5][10]. The customer should first complete the registration and login processes before using the services. A

user may submit an attachment that details the offerings if necessary. Again, when the demand has been fulfilled, he can send it for purchase, and once the operation was already completed and confirmed, the client can rate the experience [13].

In the worst-case scenario, the consumer can proceed with the return policy process if they are dissatisfied with the service.

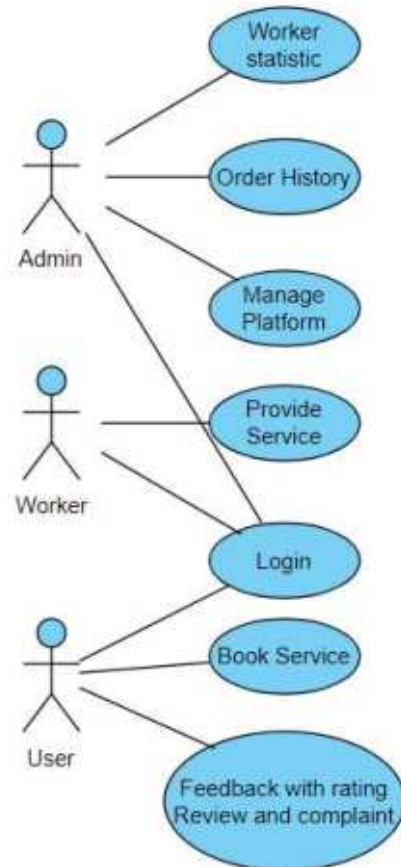


Fig4: Use case diagram for Proposed Model

B. Work flow of proposed model

First users have to register in the system for using different services, after registration users are authenticated, they have to login into the system using valid credentials, then they can see different services. According to their need, they can choose the required service. For the best of its sake, the user can sort all workers using different criteria like sort by review which uses sentiment analysis, sort by nearest location, sort by price, sort by complaints and sort by rating. Using this feature users can sort workers and choose the worker with their budget [6]. To avail, a service user needs to do a payment and have to choose an available time

slot finally user gets confirmation from the handyman for booked service. Once service is booked user gets notified by SMS [4]. There is another login which is an admin login. Admin can see all the users, workers, statistics of workers, and all the history of orders. The Worker login contains the pending requests for services and completed services.



Fig5: Workflow of Proposed Model

V. RESULT

The proposed system helps the user to book their on-demand home service in a very efficient way. Users also have different features for their simplicity like local language availability, a chatbot for user help, GPS integration to see nearby handymen, and a secure payment gateway using Razorpay. Data of users and repairers is kept in a database, so anyone can access their account from anywhere at any time. Handyman reviews are stored and sentiment analysis is used to suggest the best worker according to their work performance.

If new users want to avail of services from the handyman services application. User can do registration on the User registration page as mentioned below where the user enters details and register as a customer.

User Registration

Name

Email

Phone Number

Password

Confirm Password

[Register](#) [Already have an account? Login here](#)

Fig6: User Registration Page

Worker registration same as a new user, if a new worker wants to join a platform. The worker has to register themselves on the platform. To register, the system provides a worker registration page where a worker has to fill in personal details as shown in fig7.

Worker Registration

Name Worker Id

Email Phone Number

Password Confirm Password

Address Price/hour

Services you offered

[Register](#) [Already have an account? Login here](#)

Fig7: Worker Registration Page

Chatbot helps users to resolve queries. Chatbot functionality is provided which is shown in fig8 where a user who has a query can ask questions to the chatbot for quick answers.

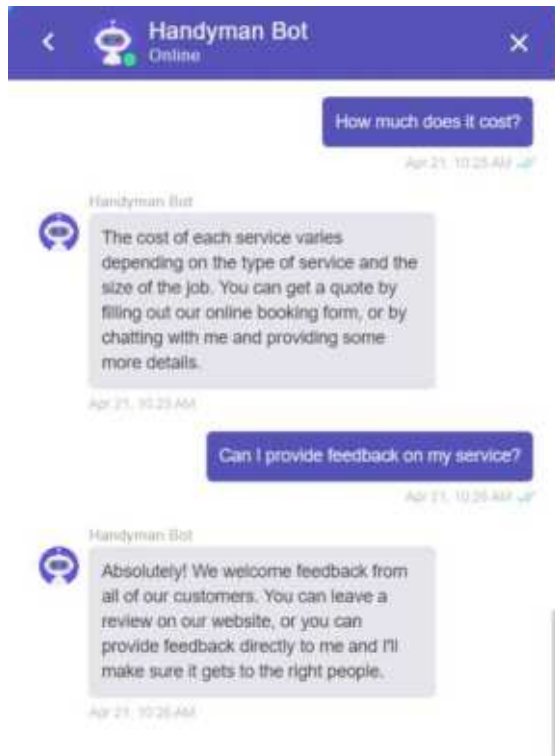


Fig8: Chatbot for user help module

When the user logs in to our system successfully, firstly page shown by the system to the user is the services page. This page will list all types of services that are offered by our website. This system contains various types of services like Car &

Bike services, Carpenter, Cleaning, Electrician, Painting, and Plumbers. Based on user demand he will select the service and do the next further process for booking the handyman.

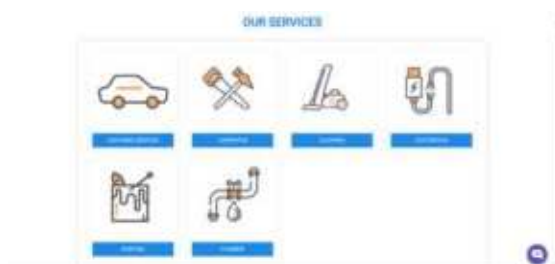


Fig9: All services List Page

By selecting the specific service from our services page ex; Plumber. This page will list all the plumber from our database that is registered with our website. This page contains the search bar from which we can search the specific plumber by name. Another option is sorting by containing four types of sorting functions sort by rating, sort by review using sentiment analysis, sort by complaints, and sort by price.

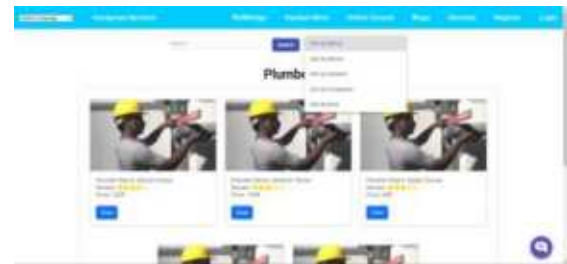


Fig10: Listing all Plumber:

After view of specific Handyman new page will render is the booking of the handyman process. Also, it contains the details about the handyman that is very important to know for the user like the price of the work, the address of the handyman, and the phone number. User can also place their review here after the completion of the work and can rate the worker on a scale of 1 to 5. If any complaint has to be sent about the handyman for behaviour or work user can submit a complaint by selecting complaint a worker button.



Fig11: Plumber information details page

Users can see all workers of the system on google maps using a marker. When the user hovers or click on that marker the worker name, rating, price, and address are displayed to the user. It helps users to see the number of workers nearest to them.



Fig12: Markers of all workers in Google Map

After the completion of the data form of the book now the next page user will obtain is the payment page for booking the handyman. Payment is equal to the payment shown on the Booking page i.e. basic price. For Completing payment our website gives many options like card, UPI/QR, Net-banking, Wallet, etc. The payment gateway

used here is Razorpay which is very accessible. After the click on Pay now final page shown is the payment successful page. So this is the final work to place a handyman for work.



Fig13: Payment gateway using Razorpay

After completion of the booking of the handyman service, the client will get the confirmation of the handyman on their registered mobile number. This will act as the deal between the client and workers as it gives trust in the genuineness of the client.

For on-demand home services, email confirmation is a crucial component of the customer experience because it gives customers peace of mind and assurance that their booking has been properly handled. A record of the transaction between the consumer and the service provider is provided by the email confirmation, which can also be used to settle disagreements or measure the effectiveness of marketing initiatives. The information in the email confirmation and its appearance can affect how the consumer feels about the service and if they will use it again in the future.

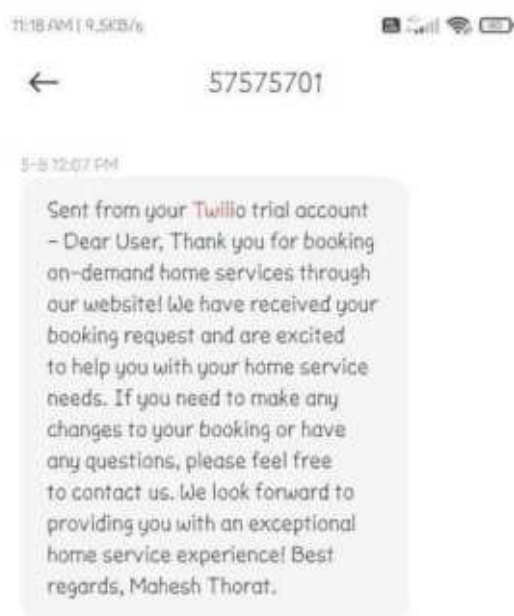


Fig14: Confirmation through SMS

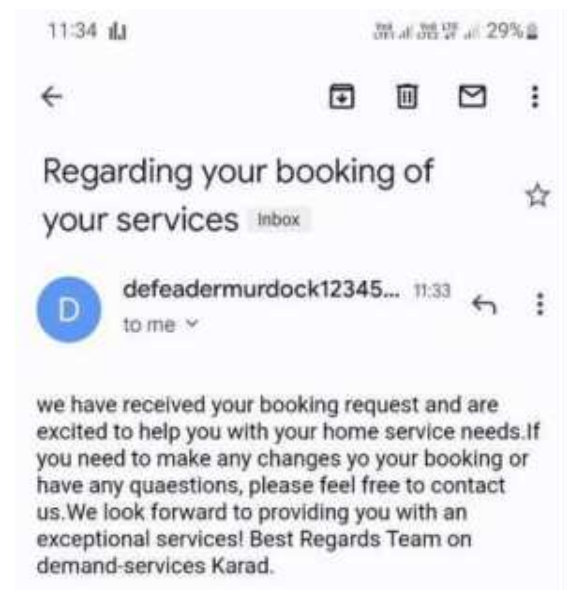


Fig15: Confirmation through email notification

A blog service is the best way to keep the website updated with fresh content. Admin will post about some regular defect activities and ways to recover this activity by taking some general steps. Users will get help solving problems. The main functionality is that users can read the blog in their local language by selecting it from the navbar. Another feature of a blog is that the system will read it loudly, so the user has only to listen. It is very important to share a view and message about a service, business, etc.



Fig16: List of All Blogs

Online consult is a video-based chatting platform that is used by workers and clients to solve problems that are very small in issue and that we can prevent at home with the guidance of the worker. For this worker, there will be a small charge. A worker will create a lobby for chat, and a link will be shared with customers so that they can join and ask their query.



Fig17: Online consult in worker and user

The following chart shows the graphical representation of the data in the system, and this occurs under the functionalities of the admin. Following the graphical representation are the pie chart for worker statistics.



Fig18: Pie Chart of worker statistics

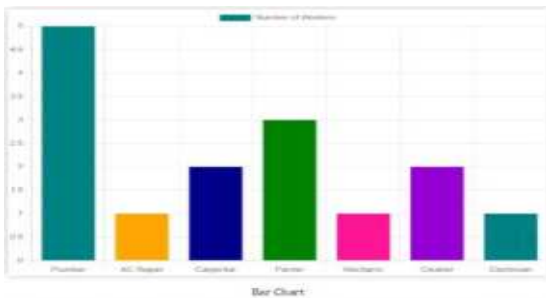


Fig19: Bar chart of numbers of worker

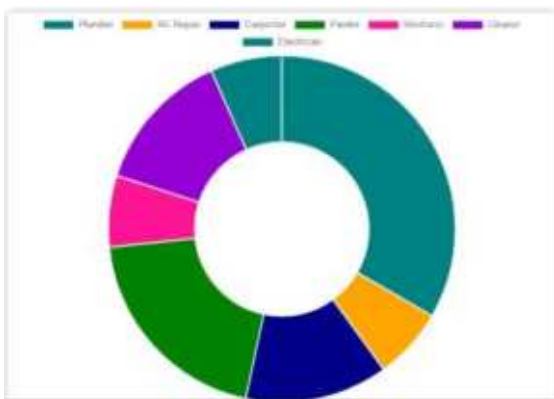


Fig20: Doughnut chart of workers

Local language availability is one of the main functionalities of our system, so that any user

can connect to our website in their own language. More than 100 languages are supported by our website. The below fig.20 shows the frequently asked questions and answers in the local language, i.e., Marathi. As the website is developed keeping locality in mind, we have implemented local language selection.



Fig21: Translate language into local language.

An e-learning platform is the best way to train workers in their profession or new ones who want to learn and earn. We have provided an e-learning platform for learners to learn and also provided courses to develop skills. The following shows the training uploaded for a specific profession, like plumbing training, which will get a plumbing lecture, etc. There is a search bar from which users will get their specific lecture if it is present in our system.

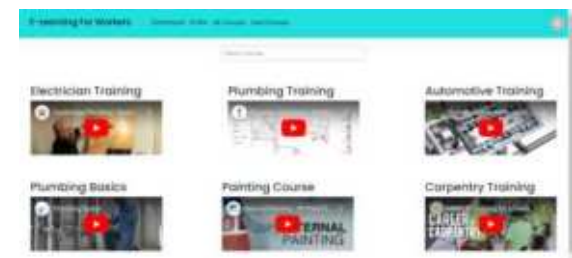


Fig22: List of all free courses

In Job Portal, workers can log in to the system and post a job, so others who are interested in applying for that job check the job details. At the time of posting a job worker can fill in the data like what is the salary for this job, is this job part-time or full-time, how much experience is needed for this job, and location of the job.

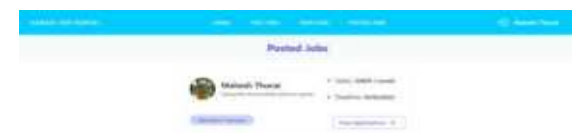


Fig23: List of posted job

Once if worker posts a job then they can see several applications for this job. They can see the details of the applying persons and decide to

approve or reject the application. Also, they can search applicant data using their name.



Fig24: List of applicants for particular job

VI. CONCLUSION

Thus, by using an on-demand service website users able to book a worker at their place i.e doorstep. A website can be easily accessed and a simple frontend makes a user feel comfortable to use. All the best and most experienced worker able to get at one click and fair price. The site provides almost all types of necessary services like cleaning, carpentry, home maintenance, electrical works, appliance repair, house painting, plumbing, etc. All of this information is stored in the database and can be accessed only by the admin which acts as intermediate between the customer and the service provider.

VII. FUTURE SCOPE

At further this on-demand website will provide training to workers who are willing to meet the next level of expertise in their work. Blockchain is used for the blocks which record and track all the data shared within or in between the business entities. By using blockchain we can decentralize our database such it runs on various nodes and is accessed easily by customers. We can scale our website in all the regions connecting the villages and also cities and make it available to them in every language.

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Wireless mobile charger

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Abstract—Wireless charging is a technique of transmitting power through an air gap to an electrical device for the purpose of energy replenishment. Recently, wireless charging technology has significantly advanced in terms of efficiency and functionality. This article first presents an overview and fundamentals of wireless charging.

I.INTRODUCTION

Wireless charging has been around since the late 19th century, when electricity pioneer Nikola Tesla demonstrated magnetic resonant coupling – the ability to transmit electricity through the air by creating a magnetic field between two circuits, a transmitter and a receiver. But for about 100 years it was a technology without many practical applications, except, perhaps, for a few electric toothbrush models. Today, there are nearly a half dozen wireless charging technologies in use, all aimed at cutting cables to everything from smartphones and laptops to kitchen appliances and cars. Wireless charging is making inroads in the healthcare, automotive and manufacturing industries because it offers the promise of increased mobility and advances that could allow tiny internet of things (IoT) devices to get power many feet away from a charger.

II.Working of wireless mobile charger

Inductive charging works by utilizing something called "Oersted's law." This states that when an electric current flows through a wire, it generates a magnetic field. Even better, if you create a tight coil and run electricity through it, it creates an even stronger magnetic field. This little coil is what you'll find in a wireless charging pad—it's sitting there, converting an electrical current into an electromagnetic field, waiting for something to come along and "take" that energy. Of course, you can't just hold a battery in a magnetic field and expect it to charge up. You have to set up a receiver that can take this electromagnetic field and convert it back into an electric current. In this example, the best receiver happens to be yet another coil. To transfer electricity through the air, you can put an electric current through the induction coil and then place a receiver coil nearby. The induction coil turns the electric current into an electromagnetic field due to Oersted's law.

III. Figure. working of wireless mobile charger

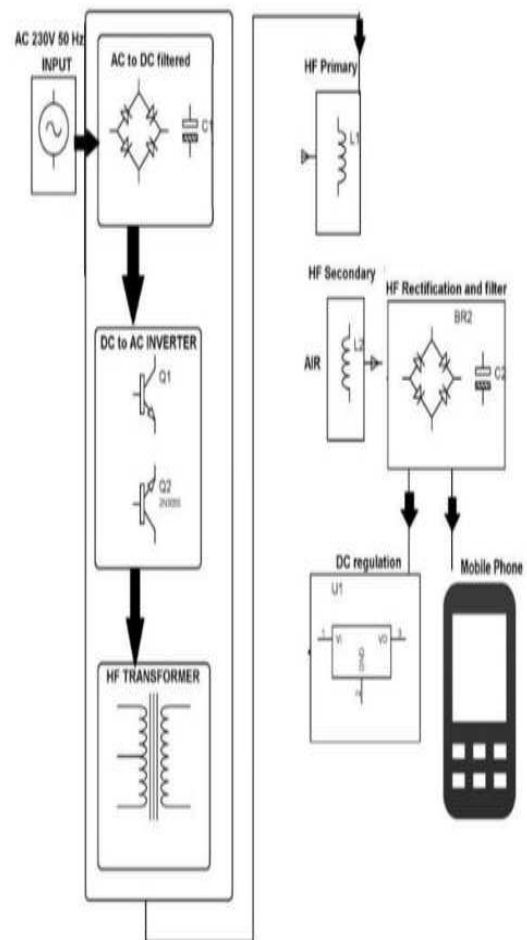


fig.1 working of wireless mobile charger

IV. Advantages of wireless mobile charger

1. Convenience: Wireless charging is a convenient way to charge your devices. You don't have to fumble with wires or worry about tangled cables.
2. Safety: Wireless charging is a safe way to charge your devices. There is no risk of electric shock, as the current is transferred through a magnetic field.
3. Efficiency: Wireless charging is an efficient way to charge your devices. Less energy is lost during the transfer process, so that you can get a longer charge from your battery. 🗨️📧🗨️

V. Disadvantages of wireless mobile charger

1. Cost: Wireless chargers are typically more expensive than wired chargers.
2. Speed: Wireless charging is slower than wired charging. It can take several hours to charge a device using wireless charging fully.
3. Compatibility: Not all devices support wireless charging. You will need to check to see if your device is compatible before you purchase a wireless charger.

VI. Applications of wireless mobile charger

Wireless charging is currently being used in many applications including:

1. Smartphones and wearable
2. Notebooks and tablets
3. Power tools and service robots, such as vacuum cleaners
4. Multicopters and electric toys
5. Medical devices
6. In-car charging

In addition to the fancy reasons why you should use wireless charging, like no need to plug in a device and no plug compatibility issues, wireless charging provides safety from hazards related to connecting directly to the mains. Furthermore, it's reliable in harsher environments, such as drilling and mining and allows for seamless on-the-go charging. Finally, wireless charging eliminates tangling and other mess created by wires. We have only just scratched the face of wireless charging with several novel applications, every product design being done with the future in mind should seek to incorporate wireless charging as its certainly one of the ways we will charge battery powered devices in the nearest future.

VII. Block diagram of wireless mobile charger

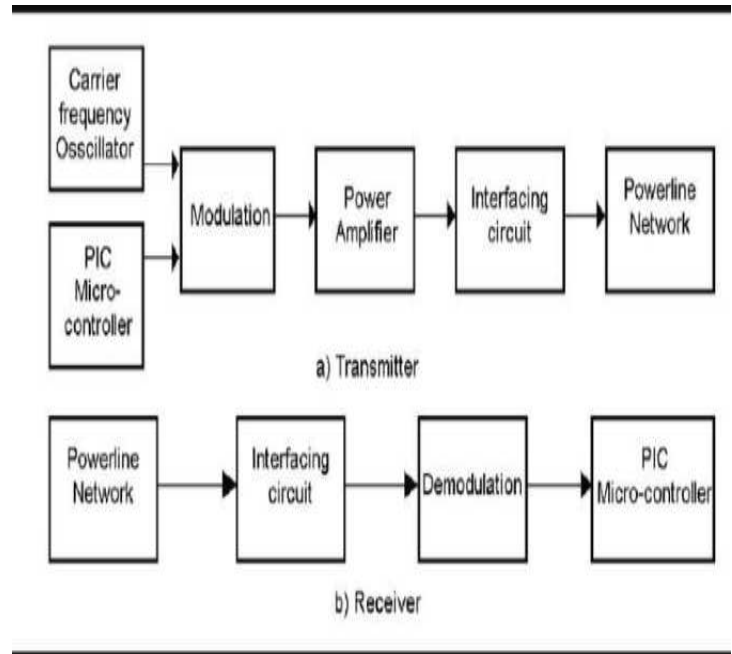


fig.2 Block diagram of wireless mobile charger

VIII. Future scope

Wireless charging is an emerging industry. As this technology advances, more and more gadgets will be able to be charged wirelessly. It's also likely that wireless charging will become both more practical and less expensive in the near future.

IX Conclusion of wireless mobile charger

Wireless charging is convenient and fairly efficient, but there has not been enough research done to increase efficiency and distance necessary between the device and charger. Currently, electric toothbrushes and cellular phones need to be in contact with the charger's surface

X Acknowledgement of wireless mobile charger

This type of charging technology uses a combination of tiny batteries and consumes very little electricity. This technology is commonly used with wireless keyboards, wireless mouse, medical equipment, hearing aids, watches, music players, and other devices. To send and receive wireless signals, these gadgets use radio frequency waves.

In this technique, the transmitter is linked to a socket to generate radio waves. You can charge the battery by setting the receiver to the same frequency as that of the transmitter at the beginning of a sentence.

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TRAFFIC LIGHT CONTROL SYSTEM

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ABSTRACT - Traffic congestion on the highways is one of the many issues that people who live in cities deal with every day. They waste time sitting in tiresome, protracted traffic bottlenecks. Traffic accidents can occasionally result from congestion. Additionally, it takes a long time for ambulances, fire trucks, and police cars to get to the scene of the emergency, which causes innocent people to perish. In this study, we suggest a plan of action for addressing the difficulties brought on by traffic congestion, some of which have already been mentioned. An IoT-based automated traffic signal monitoring and controller system with manual override functionality is planned.

INTRODUCTION - One of the many problems in today's world that people living in urban communities face every day is the problem of traffic congestion. As a result, many people waste their valuable time sitting idle for long periods in exhausting traffic for canned goods. Congestion is a condition that sometimes causes traffic accidents. Emergency vehicles such as ambulances, fire brigade Brigades, and police cars also lose a lot of time and that is why does not reach the critical moment, which in turn leads to the loss of innocent lives. In this study, we propose a method to meet the challenges caused by traffic congestion, some of which are mentioned above. Automatic traffic signs based on IoT a monitoring and control system is planned, which also makes it possible manually bypassing signals on the Internet. This concept minimizes traffic congestion at the same time provision of functional vehicles in green corridors. It will come helps prevent loss of time and lives to a considerable extent.

ADVANTAGES - 1. Reduced reaction time: By giving traffic signals priority, IoT-enabled traffic lights help to shorten the response time for ambulances.
2. Enhanced safety: Automated traffic light control systems guarantee ambulances' safe passage, lowering the likelihood of accidents on the road.
3. Better coordination: A centralized control system allows for the efficient coordination of traffic signals, ensuring the timely and smooth passage of ambulances.
4. Traffic police's workload is reduced because traffic signal control systems may automate the procedure of granting precedence to ambulances.

DISADVANTAGES - 1. Cost: Especially for poorer nations, implementing an IoT-enabled traffic light management system might be expensive.

2. Technical difficulties: Using IoT technology to integrate traffic light control systems can be difficult, necessitating specialized technical knowledge.

3. Dependence on technology: In the event of a technical issue, the system could fail, delaying the ambulances' response time.

4. IoT-enabled traffic light control systems are vulnerable to cyberattacks, which could cause the traffic system to be disrupted.

APPLICATION - 1. Developing IoT to optimize road networking system and enable quicker and more effective communication.

2. An advantage of an intelligent traffic management system is that it offers secure public transport.

3. We use a GPS system that provides live streaming of the location of the ambulance to the traffic control station And the hospital.

4. Using a GSM SIM card, we transmit the real-time location of the ambulance to traffic control and hospitals via text messages.

BLOCK DIAGRAM -

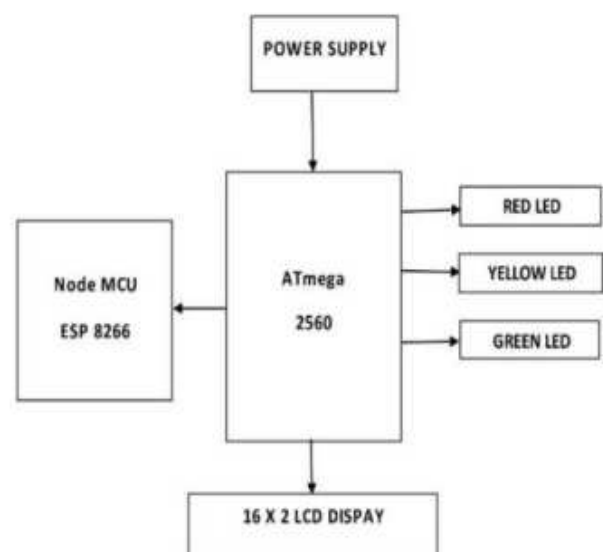


Fig.1 Block diagram of Traffic Light Control System

Wi-Fi module (ESP8266)-

It can be used to host the application or to offload Wi-Fi networking tasks from another application processor. The ESP8266EX provides a comprehensive and self-contained Wi-Fi networking solution. The ESP8266EX launches the application straight from an external flash when it serves as the host. To enhance the system's performance in certain applications, it features an inbuilt cache. Alternatively, any microcontroller-based design with straightforward connectivity (SPI/SDIO or I2C/UART interface) can be enhanced with wireless internet access by acting as a Wi-Fi adaptor. The ESP8266EX is one of the industry's most fully integrated Wi-Fi chips; it includes antenna switches, an RF balun, a power amplifier, a low noise reception amplifier, filters, power management modules, and only a small amount of extra hardware.

Power Supply -

This circuit converts the AC power source into steady DC. Unregulated output will be fixed to a consistent voltage with the aid of a voltage regulator IC. The circuit consists of a bridge rectifier comprised of diodes, a linear voltage regulator (7805), capacitors, and resistors.

FUTURE SCOPE - The proposed method just focuses on finding a technique to allow ambulances to pass traffic signals with the least amount of delay. As a result, a lot more possibilities might be investigated in order to offer patients a high-quality ambulance service. A microcontroller that can track patients in real time and communicate the information to the intended hospital can also be installed in the ambulance. This can help the hospital get ready for the patient's arrival as best it can. The incorporation of microcontrollers into ambulances also creates opportunities for double ambulance authentication at traffic signals. While the system here only concentrates on providing traffic assistance to ambulances, it may be extended to do the same for other emergency vehicles, such as fire engines and rescue vehicles. The potential for development is only constrained by human imagination.

CONCLUSION - At the crossings, there may be heavy traffic congestion every day. It has become more commonplace as the number of vehicles on the road increases. The number of vehicles on the road cannot be reduced, but it can be handled in smart ways. To reduce traffic congestion to a minimum, we suggested an Internet of Things-based traffic control system. Since many lives have been lost as a result of ambulances getting stopped in traffic for extended periods of time, the major objective is to reduce time delays by giving priority to the lane with approaching emergency vehicles.

ACKNOWLEDGEMENT - I would like to express my sincere gratitude and appreciation to all those who have contributed to the successful development and implementation of the IoT-based traffic light control system using an ambulance. This project aims to improve the efficiency and safety of traffic flow by prioritizing the passage of ambulances through congested areas.

First and foremost, I would like to extend my heartfelt thanks to my supervisor, for their guidance, support, and invaluable insights throughout the duration of this project. Their expertise and encouragement have been instrumental in shaping this research endeavor.

I am also grateful to the faculty and staff of Arvind Gavali College of Engineering, Satara, whose unwavering support and resources have facilitated the realization of this project. Their commitment to fostering innovation and providing a conducive research environment has been crucial to our success.

Last but not least, I would like to thank all the participants who volunteered their time and provided feedback during the testing phase of the system. Their input and observations were instrumental in refining the system and making it more robust and reliable.

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Applications of Power Electronics in Renewable Energy

Arduino Based Seven-Stage Multi-Level Inverter

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Abstract— Multi-Level Inverter technology has been proven various industrial applications like static var compensation, variable speed motor drives etc. Multi-Level voltage source inverter presents various advantages such as a smoother output voltage waveforms with lesser total harmonic distortion (THD), operates at lower switching frequency by reducing the switching losses and also produce common mode voltage which will reduces the stress on the AC loads like motor etc. This paper presents the application of Seven-Level H-Bridge inverter feeding a 10Watt LED bulb. This paper compares total harmonic distortion values of voltage waveforms of 10Watt LED Bulb with the conventional five-level inverter. In this study both voltage and current values has been measured using multimeter as well as CRO to determine the THD and output power. This study helps to identify most suitable Multi-Level Inverter to convert DC voltage into AC voltage, which meant for AC Domestic Lighting load application.

(Keywords)—Seven level inverter, Multilevel inverter, Total Harmonic Distortion, THD, Inverter)

I. INTRODUCTION

Multilevel power conversion was first introduced more than two decades ago. The general concept involves utilizing a higher number of active semiconductor switches to perform the power of active semiconductor switches to perform the power conversion in small voltage steps [1]. Multilevel inverters are promising; they have nearly sinusoidal output voltage waveforms, output current with better harmonic profile, less stressing of electronic components owing to decreased voltages, switching losses that are lower than those of conventional two-level, three-level and five-level inverters, a smaller size, and lower Electromagnetic Interference (EMI), all of which make them cheaper, lighter, and more compact [2][4]. One clear disadvantage of multilevel power conversion is the higher number of semiconductor switches required. It should be pointed out that lower voltage rated switches can be used in the multilevel converter and, therefore the active semiconductor cost is not appreciably increased when compared with the five level cases [3] [4] And this disadvantage of multilevel power converters is that the small voltage steps are typically produced by isolated voltage sources or bank of series

capacitors. Isolated voltage sources may not always be readily available, and series capacitors require voltage balancing. To some extent, the voltage balancing can be addressed by using redundant switching states, which exist due to the high number of semiconductor devices [5]. In general, three main types of multilevel inverters, i.e. diode clamp, flying capacitor, and cascade inverter with separated dc sources, have been developed. Recent research has involved the introduction of novel converter topologies and unique modulation strategies. [5] There are also some combinations of the mentioned topologies as series combination of a two-level converter with a three-level NPC converter which is named cascade 3/2 multilevel inverter.[5] there is also a series combination of a five level cascade converter with a seven-level NPC converter which is named cascade 5/7 multilevel inverter.[6][7].

The multilevel output is generated with a multi winding transformer. For dc to AC converter, multilevel inverter is good choice for PV system application. This is because it provide quite a lot of advantages. In this study we can improve the switching losses, Total Harmonic Distortion (THD) and getting smoother waveform as comparing to five level inverter in seven level.[8].

According to IEEE standards of THD limits, total harmonic current distortion shall be less than 5% of the fundamental frequency current at rated inverter output.[9][10].

In this paper seven-Level Inverter and comparison of total harmonic distortion presented. By using Seven-Level Inverter THD has been reduced to 1.23% from 1.53% of Five-level Inverter by increasing the voltage level. Project model testing has been carried out on 10Watt LED Bulb.

II. OBJECTIVES

The main objective of this project is as follows:

- A. The main objective of this project is to increase the number of level with a lower numbers of switches at the output without adding any complexity to the power circuit.
- A. Using PWM technique for a switching MOSFET.
- B. The main purposed of this method are reduced THD, the lower order harmonics and electromagnetic interference and to get high output voltage.
- C. To minimize the THD equal area criteria (EAC) switching technique is presented and it can be enhanced the output voltage from proposed work
- D. The inverter is operated by using Arduino controller which generates PWM pulses.

III. METHODOLOGY

The project seven level inverter using Arduino UNO micro-controller was design a seven level inverter. Step-down transformer output is given to the battery though charging circuit this 24V DC output given to the H-Bridge circuit. In this we are using three H-Bridge circuit for a seven level inverter. This seven level inverter output is connected to a step-up which converts the 24V to 230V AC. Micro-controller will generates the PWM signals to H-Bridge circuit with 50Hz frequency at a particular duration of time.

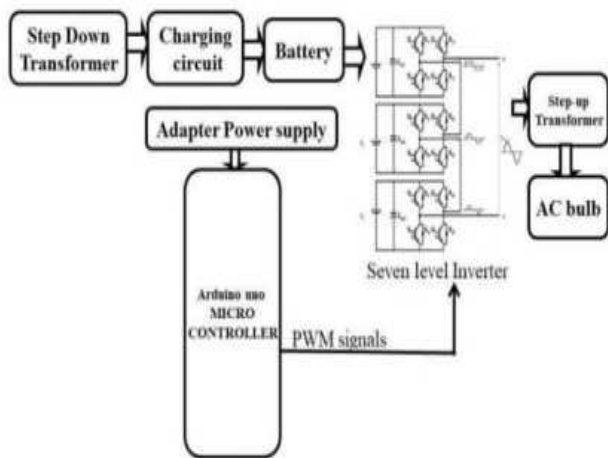


Fig. 1. Block diagram of cascaded seven level inverter.

A seven level inverter designed using an arduino uno micro-controller with a cascade multilevel inverter has no. of H - bridge inverter units associated in series and they are sustained from discrete and they are sustained from discrete DC sources. As the yield is taken in series, the DC source must be isolated from each other. Therefore, cascaded H-bridge multilevel inverters is additionally been used to be utilized with energy components to accomplish higher voltage levels.

The step- down transformer output is given to battery, through the charging circuit, the 24V DC output, is given to H- bridge circuit. In this we are using three H-bridge circuit for a seven level circuit. This seven level inverter output is connected to step up transformer which converter the 24V to 230V AC. The micro controller will generate PWM signal

to the H-bridge circuit at 50 Hz frequency at a particular duration of time. In this project to develop a multilevel inverter, we are using MOSFET to reduce harmonics constraints

Devices used in this project are:

A. Transformer :

1. Step-down Transformer: We used step-down transformer at about to convert 230V to 24V. It is a device that transfers electrical energy from one circuit to another through inductively coupled conductors without changing its frequency. Assume a perfect transformer, the power provided by the primary must equal the power taken by a load on the secondary. If a 24-watt lamp is connected across a 24 volt secondary then the primary must supply 24 watts.
2. Step-up Transformer: In case of step-up transformer, primary windings are very less compared to secondary winding because of having more turns secondary winding accepts more energy, and it releases more voltage at the output side.

B. MOSFET :

A metal-oxide-semiconductor field-effect transistor (MOSFET) is a field effect transistor where the voltage determines the conductivity of the device. It is used for switching or amplifying signals. The IRFZ540N is an N-Channel MOSFET. This MOSFET can drive loads up to 23A and can support peak current up to 110A. It also has a threshold voltage of 4V, which means it can easily be driven by low voltages like 5V. Hence it is mostly used with arduino and other microcontrollers for logic switching

C. Resistor (10K) :

This 10K ohm resistor makes excellent pull-ups, pull-downs and current limiters.

D. Diode (1N4007) :

The 1N4007 is the most commonly used rectifier diode. It is commonly used in rectifier circuit, protection and regulator circuit

E. Capacitor (1000MF) :

It is used for noise filtration, charge storage. Operating voltage is at 25V.

F. Battery :

Nominal output voltage of this battery 24V
Capacity is about 576 watt-hour.

G. AC Bulb (10 W) :

Used 10watt AC Bulb as an output half and hour.

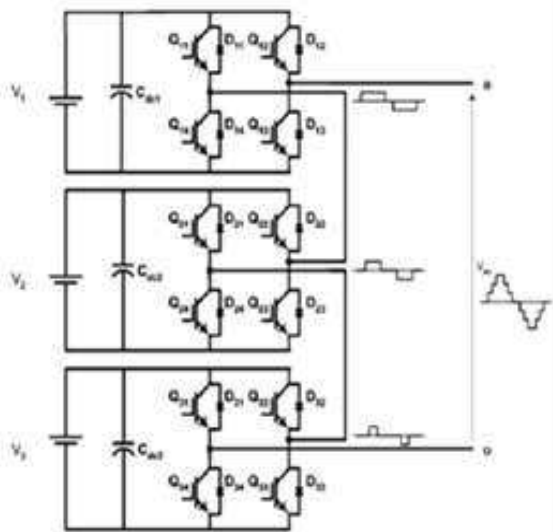


Fig. 2. Seven level topology of cascade-bridge multilevel inverter

In this circuit diagram each H-bridge has the property to create three voltage level as +Vdc, 0, -Vdc by associating the DC source to the AC by various mix of four switches where Vdc is the input voltage of the H-bridge. This topology is utilized for getting seven-level cascade multilevel inverter is acquired by cascading three H-bridge nourished from a different DC source. The quantity of yield level 'm' is every stage is identified with the no. of H-bridge inverter units 'n' by equation (1)

$$m = 2n + 1 \quad (1)$$

where, m is no. of level of inverter and n is no. of full bridge connected in series.

To get seven level yield, the above switching pattern is utilized. The yield voltage waveform of seven level inverter is as appeared in below fig no (3) with 3Vdc, 2Vdc, Vdc, 0. Speaking to the switching angles which are utilized for harmonic reduction. By phase shifting the switching time of the positive and negative phase legs of the inverter, a quasi square waveform is generated by each full bridge as shown in fig no. 3. Here number of level (m) is seven thus number of full bridge inverter circuit associated in series is three which known from the equation from the equation(1). The seven-level topology of cascade H-bridge multilevel inverter is as appeared in fig no (2). As each H-bridge is as nourished with the same estimation of DC voltage is called as symmetrical cascade multilevel inverter. The seven-level yield waveform is acquired by various switching combinations. The switching pattern for seven-level inverter topology of cascade H-bridge is appear in table (1).

TABLE I. SWITCHING PATTERN FOR SEVEN LEVEL CASCADED H-BRIDGE MULTILEVEL INVERTER.

VOLT Van	SWITCHING STATES											
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
+V	1	1	0	0	0	1	0	1	0	1	0	1
+2V	1	1	0	0	1	1	0	0	0	1	0	1
+3V	1	1	0	0	1	1	0	0	1	1	0	0
0	0	1	0	1	0	1	0	1	0	1	0	1
-V	0	0	1	1	0	1	0	1	0	1	0	1
-2V	0	0	1	1	0	0	1	1	0	1	0	1
-3V	0	0	1	1	0	0	1	1	0	0	1	1

H. Total Harmonic Distortion (THD) :

Total Harmonic Distortion is an measurement of the harmonic distortion is defined as the ratio of the sum of the power of all harmonic components to the power of the fundamental frequency. It can be presented by expression below :

$$THD = \frac{\sqrt{I_2^2 + I_3^2 + I_4^2 + \dots + I_n^2}}{I_1}$$

The above formula is for current waveform.

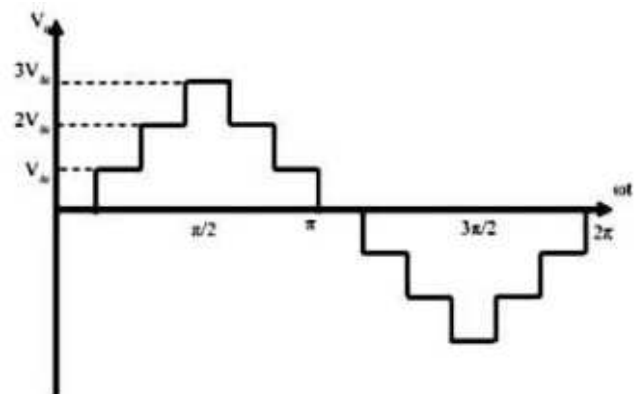


Fig. 3. Yield voltage waveform of seven level cascaded multilevel inverter.

IV. RESULT

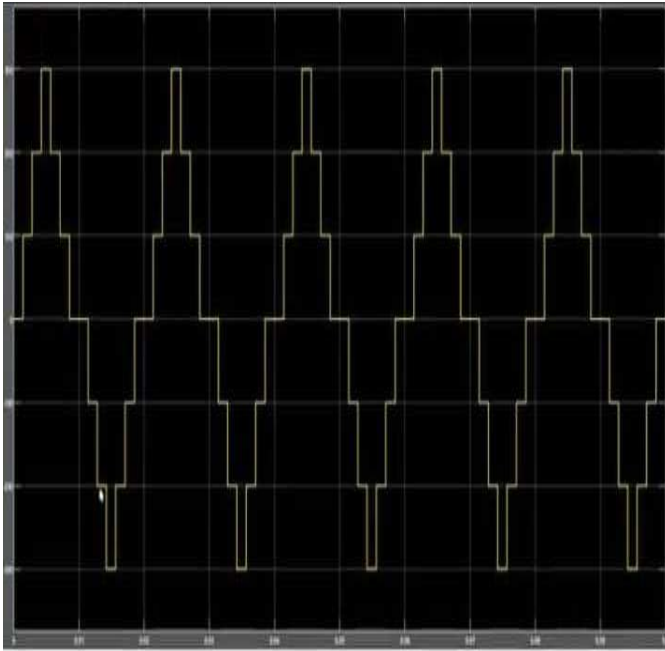


Fig. 4. Output of proposed seven level cascaded H-bridge multilevel inverter topology.

V. PROJECT SETUP

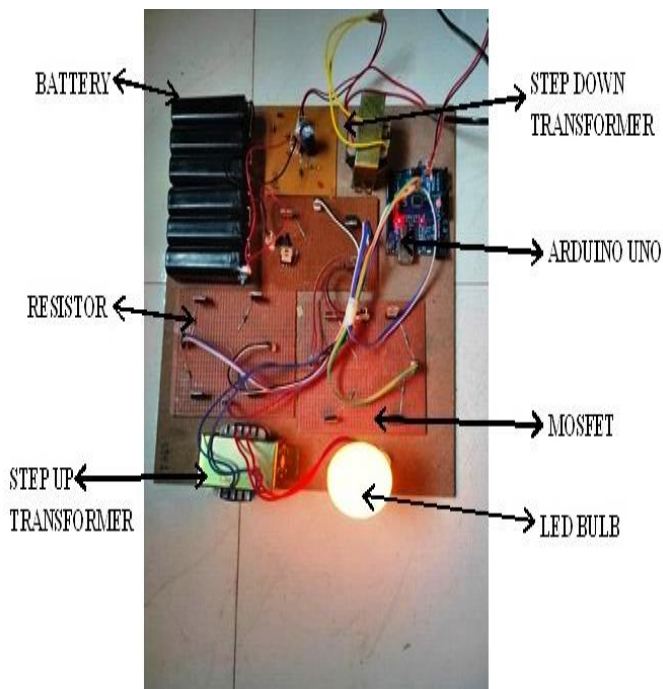


Fig. 5. Pictorial representation of the Seven-Level Inverter.

VI. CONCLUSION

The overall design of Arduino Based Seven Stage Multilevel Inverter is much more compact and economical as compared to conventional inverter available in the market. Firstly, all the inverters available in the market are five level inverter that have much THD in the output signal and these type of inverters can damage the inductive motors and the

devices that are sensitive to frequency of signal applied to them. Secondly, all these inverter use bulky transformer on the output side which make the design and overall product much bulky and heavy. Thirdly, the price of these available inverter is not much less than seven level inverter. The implemented product of this project has seven level on output side that makes it a pure sine wave having a THD value less than 5%. This signal use not only favourable for motor drive but can also be used for grid tying. This inverter do not use more than 230 V DC input for getting sinusoidal signal output. This project has been successfully tested in the laboratory on 10 watt LED bulb by using CRO and multimeter and the measured output phase voltage is 34 Volts and the current value is 0.61Amps. So the total power output is 20 Watts. In this study the %value of THD has been reduced from 1.53% (Five Level) to 1.23% (Seven Level).

ACKNOWLEDGMENT

It is our privilege to acknowledge the sense of gratitude to our guide Prof. Somesha Naik S.R. from Electrical Engineering Department at Arvind Gavali College of Engineering, Satara for his valuable suggestions and guidance throughout our degree course and the timely help given for completion of our project work.

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High Voltage and Safety Measures

Wireless mobile charger

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Abstract—Wireless charging is a technique of transmitting power through an air gap to an electrical device for the purpose of energy replenishment. Recently, wireless charging technology has significantly advanced in terms of efficiency and functionality. This article first presents an overview and fundamentals of wireless charging.

I. INTRODUCTION

Wireless charging has been around since the late 19th century, when electricity pioneer Nikola Tesla demonstrated magnetic resonant coupling the ability to transmit electricity through the air by creating a magnetic field between two circuits, a transmitter and a receiver. But for about 100 years it was a technology without many practical applications, except, perhaps, for a few electric toothbrush models. Today, there are nearly a half dozen wireless charging technologies in use, all aimed at cutting cables to everything from smartphones and laptops to kitchen appliances and cars. Wireless charging is making inroads in the healthcare, automotive and manufacturing industries because it offers the promise of increased mobility and advances that could allow tiny internet of things devices to get power many feet away from a charger.

II. Working of wireless mobile charger

Inductive charging works by utilizing something called "Oersted's law." This states that when an electric current flows through a wire, it generates a magnetic field. Even better, if you create a tight coil and run electricity through it, it creates an even stronger magnetic field. This little coil is what you'll find in a wireless charging pad it's sitting there, converting an electrical current into an electromagnetic field, waiting for something to come along and "take" that energy. Of course, you can't just

hold a battery in a magnetic field and expect it to charge up. You have to set up a receiver that can take this electromagnetic field and convert it back into an electric current...

III. Figure. working of wireless mobile charger

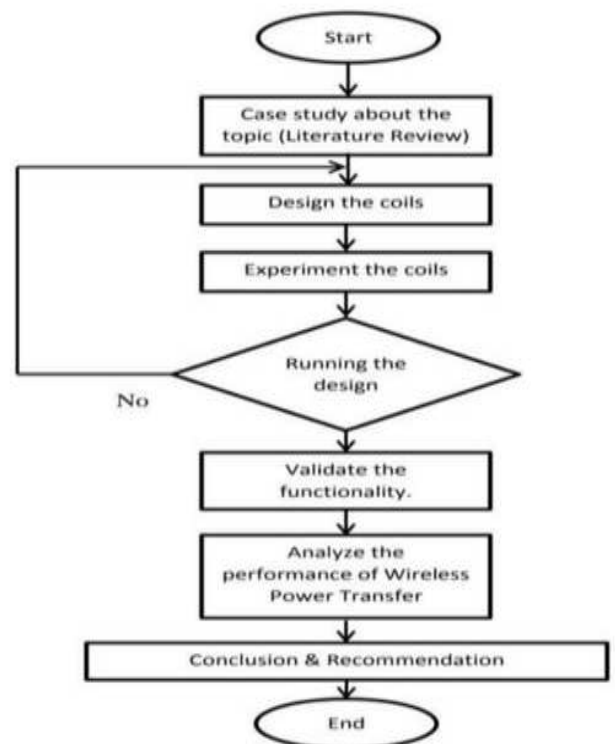


Fig.1 working of wireless mobile charger

IV. Advantages of wireless mobile charger

Convenience: Wireless charging is a convenient way to charge your devices. You don't have to fumble with wires or worry about tangled cables.

Safety: Wireless charging is a safe way to charge your devices. There is no risk of electric shock, as the current is transferred through a magnetic field.

Efficiency: Wireless charging is an efficient way to charge your devices. Less energy is lost during the transfer process, so that you can get a longer charge from your battery.

V. Disadvantages of wireless mobile charger

Cost: Wireless chargers are typically more expensive than wired chargers.

Speed: Wireless charging is slower than wired charging. It can take several hours to charge a device using wireless charging fully.

Compatibility: Not all devices support wireless charging. You will need to check to see if your device is compatible before you purchase a wireless charger.

VI. Applications of wireless mobile charger

Wireless charging is currently being used in many applications including:

- Smartphones and wearable
- Notebooks and tablets
- Power tools and service robots, such as vacuum cleaners
- Multicopters and electric toys
- Medical devices
- In-car charging

In addition to the fancy reasons why you should use wireless charging, like no need to plug in a device and no plug compatibility issues, wireless charging provides safety from hazards related to connecting directly to the mains. Furthermore, it's reliable in harsher environments, such as drilling and mining and allows for seamless on-the-go charging. Finally, wireless charging eliminates tangling and other mess created by wires. We have only just scratched the face of wireless charging with several novel applications, every product design being done with the future in mind should seek to incorporate wireless charging as its certainly one of the ways we will charge battery powered devices in the nearest future.

VII. Block diagram of wireless mobile charger

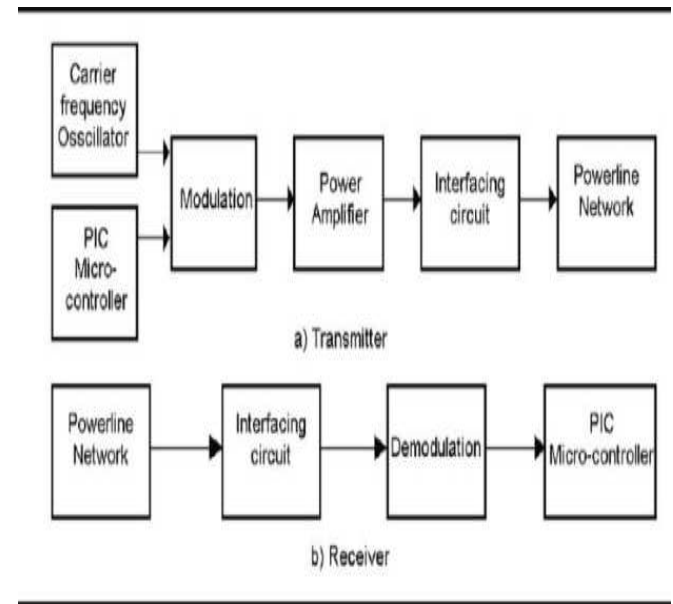


Fig 2. Block diagram of wireless mobile charger

VIII. Future scope

Wireless charging is an emerging industry. As this technology advances, more and more gadgets will be able to be charged wirelessly. It's also likely that wireless charging will become both more practical and less expensive in the near future.

IX Conclusion of wireless mobile charger

Wireless charging is convenient and fairly efficient, but there has not been enough research done to increase efficiency and distance necessary between the device and charger. Currently, electric toothbrushes and cellular phones need to be in contact with the charger's surface

X Acknowledgement of wireless mobile charger

This type of charging technology uses a combination of tiny batteries and consumes very little electricity. This technology is commonly used with wireless keyboards, wireless mouse, medical equipment, hearing aids, watches, music players, and other devices. To send and receive wireless signals, these gadgets use radio frequency waves.

In this technique, the transmitter is linked to a socket to generate radio waves. You can charge the battery by setting the receiver to the same frequency as that of the transmitter.at the beginning of a sentence.

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Renewable Energy Resources and E-Vehicle

Design and Development of Pellet Machine for the Utilization of Biogas Slurry

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Abstract— Biogas slurry is considered good source of organic manure as it contains considerable amount of nutrients that necessary for crop production. The pellet machine was designed and developed for 50 kg h⁻¹ capacity. The power supply for the machine was 1 hp, 1440 rpm, single phase electric motor and 20:1 reduction unit of gear box was attached with the help of power transmission through chain and sprockets to the shaft. The best performance of machine for combination 2 (80:20) 80% BS and 20% CS in terms of pelleting efficiency (76.01%) and pelleting capacity (18.24 kg hr⁻¹) respectively. The economical evaluation in terms of net present worth, benefit cost ratio, internal rate of return and payback period was found to be \$3066.20, 1.40, 108.6% and 0.92 year respectively. The adaption of pelleting machine by small and medium farmers would go a long way in helping them to produce their own fertilizer as an organic manure with locally available material like cow dung and digested slurry from biogas plant.

Keywords: *Biogas slurry, pellet machine, organic manure.*

I. INTRODUCTION

India has progressively moved towards development and adoption of cleaner sources of energy. Ministry of New and Renewable Energy (MNRE) is executing the National Biogas and Manure Management Programme (NBMMP) for providing various schemes like installation of biogas plant and management of biogas slurry to the rural area. These biogas plants are giving an estimated annual savings of about 7.09 million numbers of LPG

cylinders equivalent and simultaneously producing about 8.84 million tonnes of organic enriched bio-manure per year, which is equivalent to about 31,100 tonnes of urea per annum [1]. The biogas plant is an important source of organic manure. The slurry which come out of a biogas unit as by-product constitutes good quality of manure free from weed seeds, foul smell and pathogens and contains high amount of plant micro nutrients as compared to farm yard manure (FYM) [2-3]. The use of biogas slurry can reduce the application of chemical fertilizers up to 50 %. It gives benefits to the farmers in their cultivation costs and the soil environment for high fertility [4]. Replacement of chemical fertilizers by biogas plant slurry without affecting the yields automatically helps in reducing both the capital investment and commercial energy input. The utilization of slurry is better way to reduces pollution and helps in recycling valuable nutrients [3]. Use of biogas slurry is providing a sustainable way for agriculture, environment and farming communities [5].

Biogas slurry are by-products of biogas plants generated from cattle dung, which is a good source of plant nutrients and can improve soil properties and crop yield [6]. A present there are major problem in the utilization of biogas slurry. Traditionally, farmers just directly sprayed it as organic manure or submerged seeds in it to stimulate their germination and growth. Biogas slurry supplies essential nutrients, enhance water holding capacity, soil aeration, accelerates root growth and inhibit weed seed germination

[7-8]. Biogas slurry is an effective fertilizer as compared to the farmyard manure because of the significant results of N, P, and K have been observed in the treatment plots where BGS was applied. BGS gave better yield as compared to FYM [9]. Solid and semi solid manure products represent potential alternatives to reduce some of the environmental and societal problems that may be associated with liquid manure management [10].

The fresh biogas slurry which contains 90 to 93 % moisture therefore, it is difficult to handle and transport, and therefore it becomes bulky and problem of utilization and handling of slurry and application particularly when the biogas plant is located in the farmer's house. Generally, farmers use the digested slurry to leave in the nearby area of plant and some time it is disposed in nearby watercourse. In many cases, the biogas slurry from the digester cannot be directly used as a fertilizer and thus needs to be stored. The storage of slurry is mainly necessary because it should be applied in specific periods of the growing season. The biogas slurry is generally produced continuously and if its moisture content is reduced, then it can easily handle. But considerable quantity of nutrients is lost from the digested slurry, if sun dried. To minimize the losses of nutrients, easy transportation, decrease the cost of handling and reduce the volume of the biogas slurry by compression in pellet form. These compressed biogas slurry in pellet form mixed with clay soil, which is used as a binder. This is eliminated the use of chemical fertilizer and reduce the cost of management of biogas slurry.

Pelletized of biogas slurry can improve storability, reduce transportation costs, and make these materials easier to handle by using existing handling and storage equipment. For production of composted livestock manure into pellets, there are two types of machine available in the market [11]. The pellet production is able to convert raw material into a compressed form with advantages in transportation, handling and storage [12]. This technology helpful to reduce the area for storage of biogas slurry become easy in transportation and reduce the transportation cost. The main aim of this research work is to reduce the area for storage of biogas slurry become easy in transportation and reduce the

cost of transportation, easily handling of biogas slurry and improvement in manure management. It can fulfil these requirements in the search for simple technology of pelletization using locally available materials like biogas spent slurry and clay soil as binder.

II. MATERIALS AND METHODS

A) *Analysis of raw material*

Assessment of the physio-chemical properties of biogas slurry for pelletization purpose was planned to evaluate its suitability. Properties of biogas slurry like moisture content, total solids content, volatile solids content, ash content, nitrogen content, phosphate content and potash content [13]. In order to use biogas slurry as fertilizer in which higher percentage of nitrogen, phosphate and potash content because this nutrient increase crop productivity.

Soil was collected from the experimental site and characteristics of the soil can be determined in terms of percentage of sand, silt, clay, nitrogen, phosphorous and potassium content. Clays are the main binders of earth and are made up of very small mineral particles (<2 microns) and leached out during erosion of rock [14].

B) *Physical properties of raw (biogas slurry (BS) + clay soil (CS)) material for pelletization*

Biogas slurry were obtained from the KVIC biogas plant and clay soil from locally available. Physical properties of raw material were calculated in terms of bulk density, angle of repose, coefficient of friction for designing purpose.

C) *Design consideration of pellet machine*

The design of screw is necessary for production of pellets from biogas plant waste to convert it an efficient manure. It is proposed to design and develop a simple, convenient and efficient screw type pellet machine of approximately 50 kg h⁻¹ capacity for combined material like biogas spent slurry and clay soil.

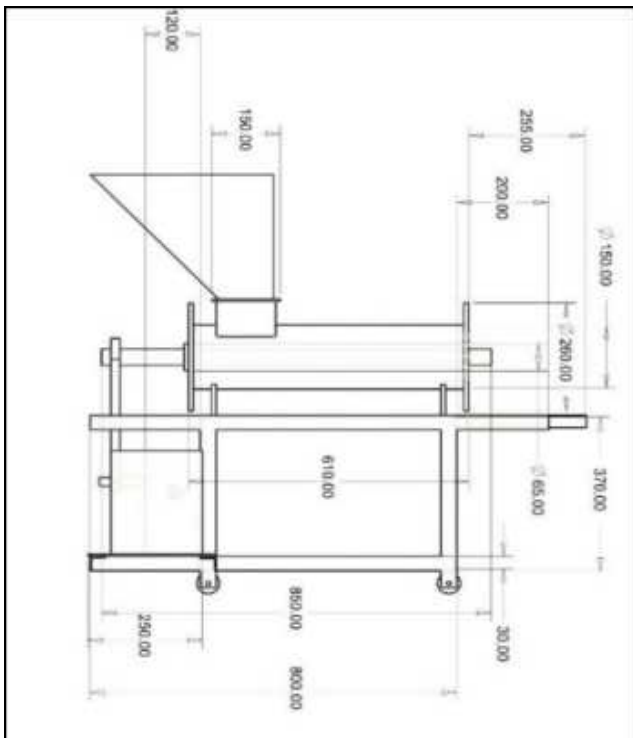


Fig. 1. Layout of pellet machine with dimension (mm)



Fig. 2. Pellet machine for handling of biogas slurry

III RESULT AND DISCUSSION

A) Nutritional analysis of biogas spent slurry

The nutritional analysis of biogas spent slurry was done in well-equipped micro-biology laboratory. The physical and chemical properties like moisture content, total solids content, volatile solids content, ash content, nitrogen

content, phosphate content and potash content were calculated [13]. The biogas slurry was analysed having moisture content (82.72%), total solid content (17.28%), volatile solid content (73.52%), ash content (26.47%), nitrogen (1.54%), phosphate (0.77%) and potash (0.84%) and nutritional properties are tabulated in **Table 1** for soil fertility point of view

TABLE 1 NUTRITIONAL ANALYSIS OF BIOGAS SPENT SLURRY

Properties	Samples			Average
	S ₁	S ₂	S ₃	
Moisture content (%)	85.37	82.45	80.35	82.72
Total solid content (%)	14.63	17.55	19.65	17.28
Volatile solid content (%)	72.35	73.72	74.51	73.52
Ash content (%)	27.65	26.28	25.49	26.47
Nitrogen content (%)	1.73	1.56	1.25	1.54
Phosphate content (%)	0.83	0.79	0.71	0.77
Potash content (%)	0.90	0.85	0.78	0.84

The physical and chemical properties of soil having nitrogen (0.746%), phosphate (0.316) and potash (0.746%) are mentioned in **Table 2**. The properties of soil were evaluated and obtained results are good for soil fertility as compared [30].

TABLE 2 PHYSICAL AND CHEMICAL PROPERTIES OF SOIL

Soil properties	Values
<i>Physical properties of soil</i>	
Texture	Clay Soil
Sand (%)	38.49
Silt (%)	22.63
Clay (%)	38.88
pH	7.5

Electrical conductivity (dS m^{-1})	0.34
Organic carbon (%)	0.48
Bulk density (g cm^{-3})	1.33
Particle density (%)	2.36
Porosity (%)	43.8
Water holding capacity (%)	30.4
<i>Chemical properties of soil</i>	
Total nitrogen content (%)	0.746
Available phosphate content (%)	0.316
Available potash content (%)	0.746

B) Physical properties of raw material (biogas slurry (BS) + clay soil (CS)) for pelletization

The raw material was processed in terms of 90:10, 80:2 and 70:30 ratio. The physical properties of raw material evaluated in terms of moisture content (64.48%), total solid content (35.51%), bulk density ($1224.61 \text{ kg m}^{-3}$), angle of repose (37.56) and static coefficient of friction (0.57) are depicted in **Table 3**.

TABLE 3 PHYSICAL PROPERTIES OF RAW MATERIAL

Properties of raw material	Samples			
	S ₁	S ₂	S ₃	Average
Moisture content (%)	65.46	64.51	63.49	64.48
Total solid content (%)	34.54	35.49	36.50	35.51
Bulk density (kg m^{-3})	1271.93	1206.38	1195.54	1224.61
Angle of repose	37.56	37.56	37.56	37.56
Static coefficient of friction	0.57	0.57	0.57	0.57

C) Design parameter for Pellet Machine

Pellet machine consists of driving motor, screw, die, hopper, and power transmission system. Chain drive were used to transmit power from motor to the screw. The raw material was fed to the hopper, which convey it to screw by gravity. The material was pushed, it got compresses and binded material comes out of die in the form of pellets. All the machine designed parameters are depicted in the **Table 4** and developed machine illustrated in **Fig. 3**.



Fig. 3. The fabricated pellet machine

TABLE 4 DESIGN PARAMETER OF PELLETING MACHINE

Parameters	Values
Machine capacity (Q)	50 kg hr^{-1}
Bulk density raw material (p) in kg m^{-3}	1200 kg m^{-3}
Diameter of screw (D) in mm	150 mm
Pitch of the screw (S) in mm	90 mm
Thickness of screw flight	5 mm
Theoretical Screw Volume (V_s)	0.00148 m^3
Mass Flow Rate (m)	$5.319 \text{ kg min}^{-1}$
Helix Angle (θ)	10°
Screw Conveyor Length (L)	0.630 m
Number of Screws (N_s)	7
Volume per pitch	$0.0416 \text{ m}^3 \text{ hr}^{-1}$

Drive power	0.3546 kW
Torque on the Screw	169.28 N-m
Power on Shaft	0.4432 kW
Motor Power	0.832 hp
Volume of barrel on screw (V_b)	0.0119 m ³
Worm gear	
Pitch circle diameter of worm (D_w)	20:1
Pitch circle diameter of worm gear (D_G)	40 mm
centre distance (x)	160 mm
Number of teeth on the worm gear (T_G)	100 mm
Module (m)	54
Actual pitch (P_C)	3
Actual pitch circle diameter of the worm (D_w)	9.426 m
Actual pitch circle diameter of the worm gear (D_G)	38 mm
face width of the worm gear (b)	162 mm
Chain Drive Mechanism	28 mm
Number of teeth on the large sprocket (T_2)	40
Design of power	0.9321 kW
Load on chain (W)	0.988 N
Centre distance	557.1 mm
Number of chain links	65
Length of chain	1.22 m
Torque transmitted by shaft	350.911 N-m
Diameter of shaft	40 mm
Life of bearing	17.28×10^6 revolutions
Volume of hopper (V_H)	0.277 m ³
Specific energy consumption (E)	0.744 kJ kg ⁻¹

D) Performance evaluation of pellet machine

The parameter was considered on the basis of number of treatments and replications for performance

evaluation of pellet machine, which is represented in the Fig. 4 and Fig. 5.

The best performance of pellet machine in terms of pelleting efficiency and pelleting capacity was 76.01%, and 18.24 kg h⁻¹ respectively for combination 2 with the ratio 80:20.

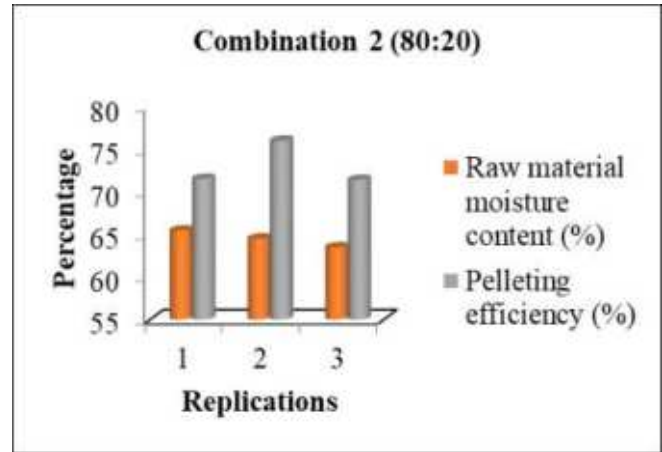


Fig. 4. Performance evaluation of pellet machine for combination 2 (80:20) in term of moisture content of samples and pelleting efficiency

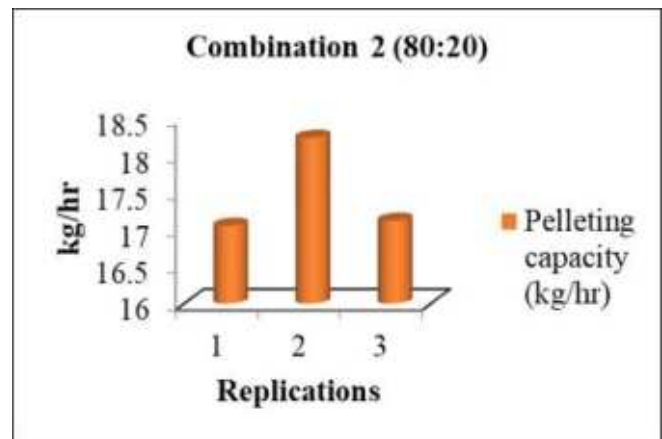


Fig. 5. Performance evaluation of pellet machine for combination 2 (80:20) in term of throughput capacity and pelleting capacity

E) Properties of pellets

The properties of pellets were obtained as per the standard method and experimental findings are given in Table 5. It is observed that the particle density of pellets varied from 0.21 to 0.68 g cm⁻³, bulk density of pellets varied from 0.34 to 0.40 g cm⁻³, porosity of pellets varied from 0.31 to 0.40%, durability of pellets varied from 70.58

to 77.93%, Radial compressive strength of pellets varied from 0.49 to 0.71 kgf mm⁻² and stability of pellets varied from 80 to 90 mm.

Experimental results of pellets produced from developed pellet machine having nitrogen was presented in **Table 6**. The higher percentage of chemical properties were found in combination 1 with 90:10 ratio in terms of nitrogen, phosphate and potassium was 1.64%, 0.8% and 0.84% respectively. The combination 2 with 80:20 ratio was best for all physical properties having to increasing storing, handling and transportation and also in India plants having only 1.3% N, 0.20% P and 1.0% K. The combination 2, 80% biogas slurry with 20% clay soil (80:20) are better than the farm yard manure (FYM) having nutrient content of 0.5 to 1.0 % N, 0.5 to 0.8 % P and 0.5 to 0.8 % K respectively [5].

TABLE 5 CHARACTERIZATION OF PELLETS

Characteristics	Combinations		
	C ₁ (90:10)	C ₂ (80:20)	C ₃ (70:30)
Pellet particle density (g cm ⁻³)	0.51	0.53	0.68
Pellets bulk density (g cm ⁻³)	0.34	0.36	0.40
Porosity of pellets (%)	0.31	0.33	0.40
Durability (%)	70.58	74.41	77.93
Radial compressive strength (kgf mm ⁻²)	0.49	0.58	0.71
Shatter index (%)	80.62	85.31	83.15
Resistance to water penetration (%)	68.71	70.50	71.82
Stability (after die) (mm)	80	90	90
After one week (mm)	80	90	90

After five weeks (mm)	80	90	90
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TABLE 6 CHEMICAL PROPERTIES OF PELLETS

Ratio	Nitrogen (N), %	Phosphate (P), %	Potash (K), %
90:10	1.64	0.8	0.84
80:20	1.40	0.75	0.78
70:30	1.22	0.69	0.72

F) Evaluation of techno-economic feasibility of pelletization process

A cost analysis of a pellet machine is dependent highly on availability of raw material. The analysis was made by considering the present investment [31]. The results obtained were enlisted in the **Table 7** given below for economic analysis of the system.

TABLE 7 ECONOMIC INDICATORS OF THE PELLET MACHINE

Economic Indicators	Value
Net present worth (NPW)	\$3066.20
Benefit cost ratio (BCR)	1.40
Pay-back period	0.92 year
Internal rate of return (IRR)	108.6 %

IV CONCLUSION

A pellet machine was designed, constructed and tested for handling of biogas slurry. The screw of machine simple for local fabrication, operation, repair and maintenance and powered by a single horse power, single phase electric motor. The best performance of pellet machine for the ratio 80:20 (80% BS and 20% CS) and efficiency of pellet machine was 76 %. The cost of pellet machine was \$540.36. The machine is conceived as ideal, easy to maintain and economic for commercial uses. The expected capacity of pellet machine is 50 kg per hour.

The best physical and chemical properties of pellets were found in the combination 2 with the ratio 80:20 (80% BS and 20% CS). The higher percentage of chemical properties were found in combination 1 with 90:10 (90% BS and 10% CS) ratio in terms of nitrogen, phosphate and potassium was 1.64%, 0.8% and 0.84% respectively. But overall research study concluded that the combination 2 with 80:20 ratio was best for all physical properties having to increasing storing, handling and transportation and also plants in India having only 1.3% N, 0.20% P and 1.0% K. So, the ratio 80:20 of combination 2 having 1.40% N, 0.75% P, 0.78% K was best for pelletization and its use as an organic manure to maintain soil fertility and reducing extra use of chemical fertilizers.

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The Importance of Logistics in The Renewable Energy Industry

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Abstract- With the developing technology, different energy sources are used today. The whole process, from both the acquisition of these energy resources and their transfer from the facility where they are produced to the users, is considered within the scope of energy transportation. The whole process of transferring large-scale vehicles used for the production of renewable energy sources, loading the electrical energy obtained with these processes to vehicles such as batteries and batteries, or transferring directly with cables is considered as energy transportation. Energy transportation aims to meet the energy need, which is one of the biggest needs of today, with much faster, reliable and affordable prices.

Keywords: *renewable energy, logistics, energy logistics management*

I. INTRODUCTION

Energy logistics, which has emerged to meet the changing needs of the logistics sector with the development of technology, ensures that the needs of many companies are met in transportation and storage services. In energy logistics, the transportation of first-degree energy resources needed by companies and countries can be carried out, as well as the transportation of production parts of sustainable energy resources within the scope of energy logistics (Tekin et al., 2017). For this reason, energy logistics occupies a large place in today's

technology. Although energy logistics seems to cover only the transfer, storage and similar logistics operations of energy resources, the logistics operations of all tools used to obtain these resources are also included in the scope of energy logistics. Operations such as the extraction, transfer and storage of non-renewable energy resources such as oil and natural gas are included in the scope of energy logistics. All details, such as the transfer of natural gas by various lines or similar transportation methods after it is extracted, or its storage in appropriate conditions after extraction, are included in energy logistics (Sevim, 2012).

A) Energy Logistics

It uses technological products in all areas of life. When we consider the products used 10 years ago and currently used, it is seen more clearly how much technology has advanced and developed. As time passes so quickly, technology changes faster than time and constantly renews itself. As technology develops, the energy needed also increases and the importance of new energy sources is also growing. The energy sources used also need to reach from city to city and country to country (Topuz et al., 2017). These transportation and storage services are made possible by "Energy Logistics". Energy logistics actually means energy transportation. Today, many energy sources are used. These energy resources must be transmitted from the source where they are produced to the regions where they are needed.

Besides, the transportation process of this energy belongs to energy logistics. There are companies that carry out this transportation. The transportation process is the result of a large-scale effort. Cables, energy batteries, pipes are among the products that need to be transported. Vehicles suitable for this transportation are used (Türkoğlu, 2016).

B) Renewable Energy Logistics and Energy Logistics

Logistics operations of renewable energy resources are generally concerned with the storage of these resources after they are obtained. The electrical energy obtained by different methods such as solar energy, thermal energy or wind energy is generally transferred to the regions that need to be reached by cable. However, this electrical energy is also stored by using large-diameter batteries and is stored for different usage areas. After obtaining electrical energy, filling it into batteries and batteries and storing these products are also included in the scope of energy logistics (Aydin, 2014). Taking professional steps in the storage and distribution processes of renewable energy sources, which offer various price advantages to companies and users, as well as lower damage in terms of environmental pollution, also reduces the transfer costs of companies. Disruptions in communication between the company's own units can cause problems such as the inability to determine the inventory stocks properly or the inability to determine the appropriate routes for the transfer of products (Saka, 2016). In order to prevent such problems, it is necessary to establish a strong communication network by using technology as much as possible in logistics operations. At the same time, logistics networks created with the help of smart systems offer various advantages to companies during the distribution of energy resources (Tozar & Güzel, 2009).

II. CONCLUSION

One of the most important points to be considered in energy logistics is to cause minimal damage to the environment in transfer and storage processes. Although petroleum and similar non-renewable energy sources harm the environment during their use, the damage to the environment should be reduced during the acquisition or transfer of these energy sources. During energy logistics planning, the production method of energy should be considered and appropriate health and environmental precautions should be taken. During the storage process, these sources should be prevented from leaking or damaging the environment and appropriate storage conditions should be established. Energy logistics, on the other hand, includes not only the transportation of products, but also their storage and precautions to be taken in this process. At the same time, taking into account the laws of the country, the security measures required by the ministries should be followed closely. Failure to take the necessary measures results in the company's inability to use the resources it has efficiently and incurring losses as a result, as well as the company's penalty payment by interrupting the work during the audits. For this reason, it is very important to make sure that all necessary precautions are taken before starting the production, transfer and storage processes in energy logistics.

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A REVIEW PAPER ON REPLACING UNETHICAL ENERGY WITH ETHICAL ENERGY

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development

Abstract— Solar energy is environmentally friendly technology, a great energy supply and one of the most significant renewable and green energy sources. It plays a substantial role in achieving sustainable development energy solutions. Therefore, the massive amount of solar energy attainable daily makes it a very attractive resource for generating electricity. Both technologies, applications of concentrated solar power or solar photovoltaics, are always under continuous development to fulfil our energy needs. Hence, a large installed capacity of solar energy applications worldwide, in the same context, supports the energy sector and meets the employment market to gain sufficient development. This paper highlights solar energy applications and their role in sustainable development and considers renewable energy's overall employment potential. Thus, it provides insights and analysis on solar energy sustainability, including environmental and economic development. Furthermore, it has identified the contributions of solar energy applications in sustainable development by providing energy needs, creating jobs opportunities and enhancing environmental protection. Finally, the perspective of solar energy technology is drawn up in the application of the energy sector and affords a vision of future development in this domain.

Keywords— renewable source, Green energy, Economic

I. INTRODUCTION

Now a days we are using the electricity it usually comes from comes from unethical Sources like A power plants for eg. Nuclear Power Plant, Hydropower plant, etc. In Hydropower plant we usually use coal and wood to warm the water and generate the steam to rotate the turbines and If well

continue that there will be deficiency of coal and wood in India, on other hand in Nuclear power plants we use nuclear reactors we need to bombard the electron on atom to produce heat bud it's very dangerous and harmful because of high heat production and radiation which emits from it. So these are the unethical energy sources which could harm the environment and Natural Resources which could harm the Nature.

II ETHICAL ENERGY (SOLAR ENERGY)

Ethical is also could be called Solar Energy. So unethical energy is that which is available through unethical Sources like The Sun.

AC which is direct current to Alternate current.

IV AGENDA

- i. Replace the source of energy from unethical to ethical to Save environment and stop pollution.
- ii. Try to use maximum natural Source to produce electricity.

V EFFECT OF UNETHICAL ENERGY

- i. For unethical source we need to sacrifice our resources like water and coal.
- ii. We need to sacrifice 18 gal (68L) of water to generate 1 kw of energy.
- iii. We need to burn at least 30 kg of coal to generate 1 KW of energy.
- iv. So this is very harmful for environment and responsible for air pollution and also increase to cost of electric production.

III WORKING OF SOLAR ENERGY

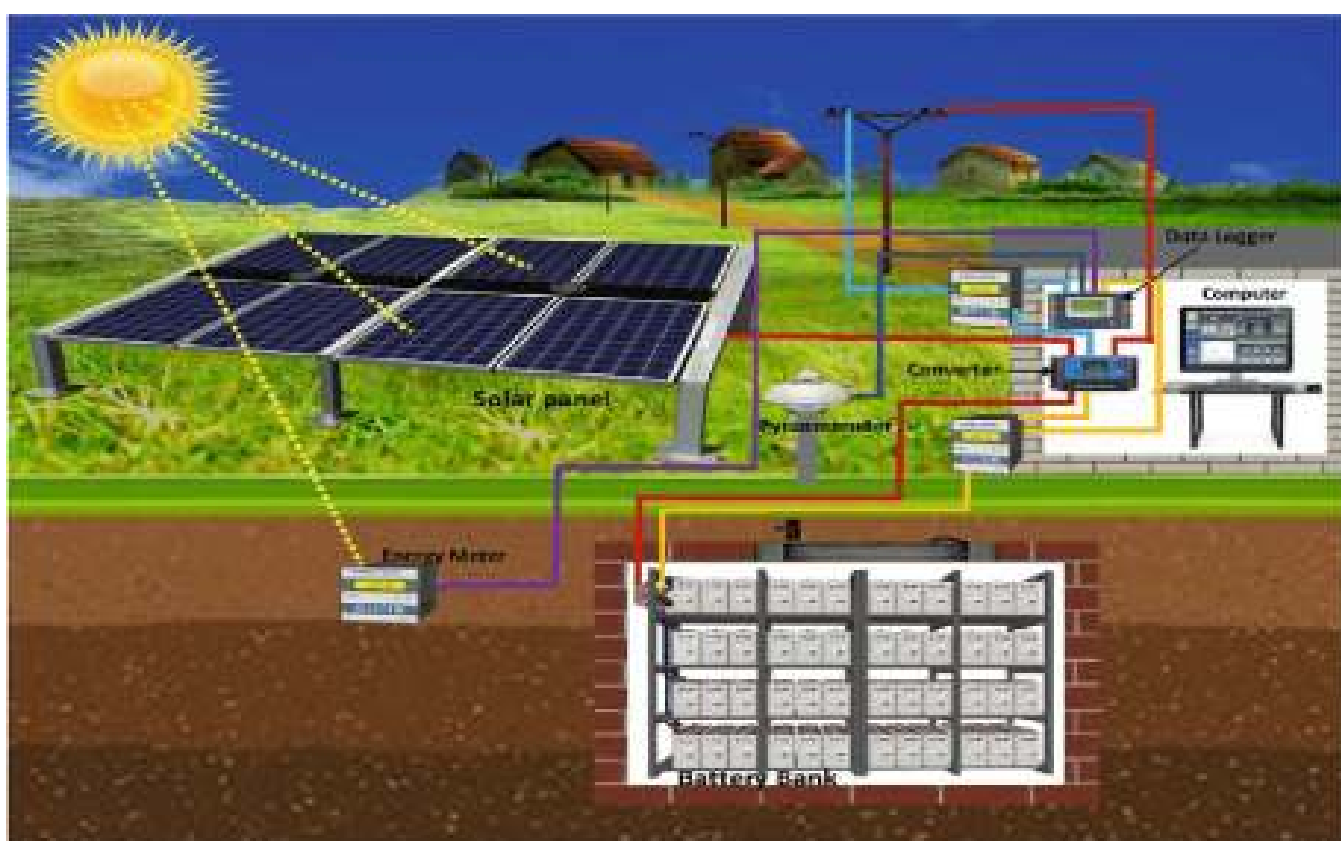


Figure 2(working of solar)

- i. In Solar System the Cell Convert Sun Light to direct current(D.C) Charge controller work a control the power from solar panel which reverse back to solar Panel
- ii. Battery system act as a storage of electric power, is used when sunlight not available. From this System connected to inverter to convert DC in to

VI WORKING MODEL AND INFORMATION

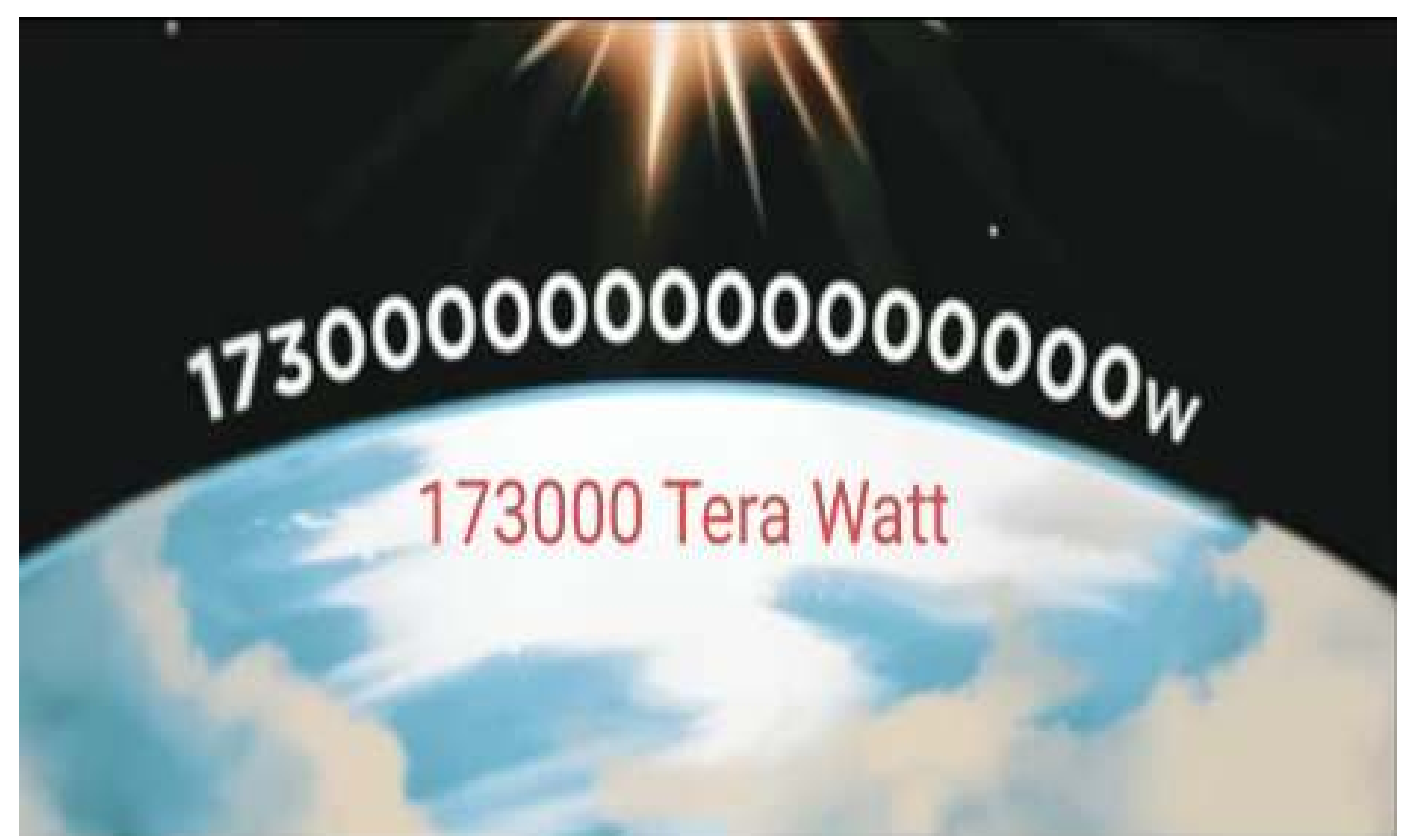


Figure 3(amount of energy by sun)

- i. We should replace the unethical energy by using the natural resource like Sunlight.

- ii. Every time 173000 tera watt energy given to the Earth by Sun and this is 10000 times of the total energy consumption of the world.
- iii. Only 1.5 hours of sunlight can fit the energy consumption of the world for whole year.



Figure 4 (working model)

- i. That means if we create a solar park of 254 km by 254 km then it could complete the need of electricity of whole world.
- ii. But its not possible to make such big park or land.

- i. Now the best way is, in the big cities we should divide the areas and colonies
- ii. Choose one of the tallest building or place to install the solar panels
- iii. After that we can take electricity of each and every house of that particular area or colony.

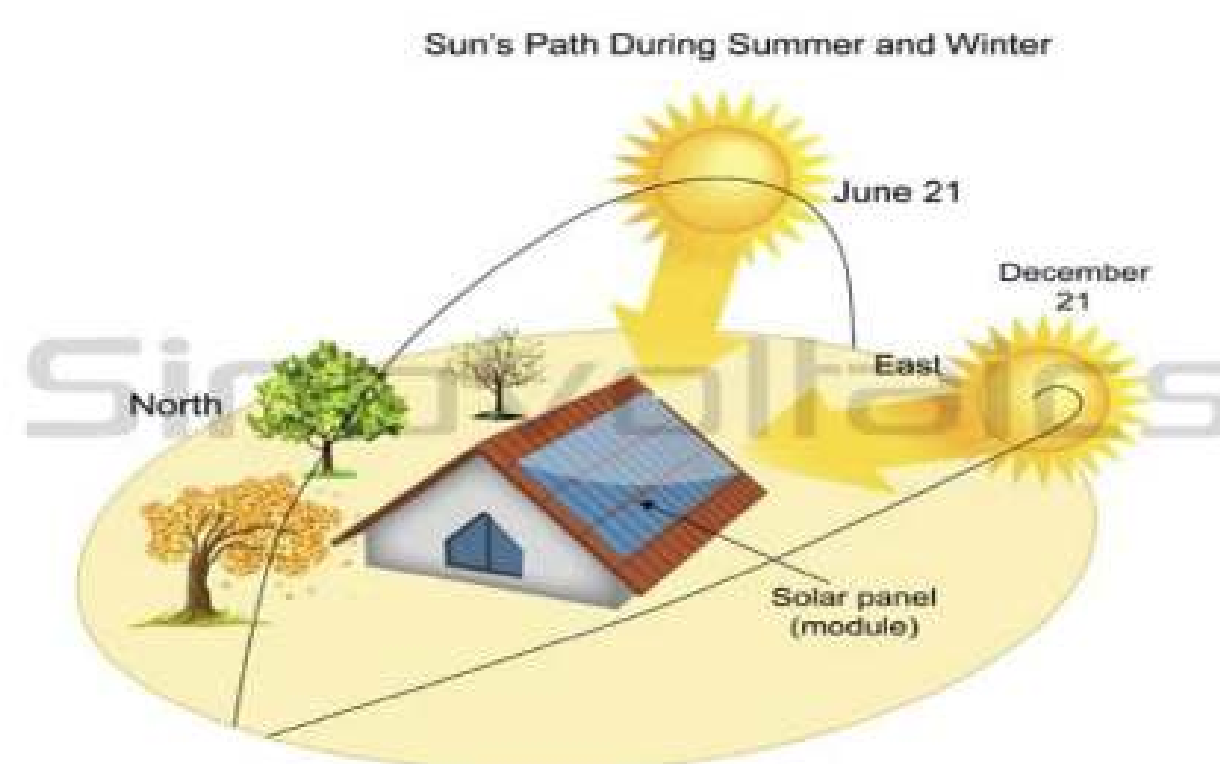


Figure 5(individual solar idea)

- i. The another way to do this is people should install Solar Panel individually on their houses.
- ii. But people are not aware of this problem or it could not be affordable for everyone.

Figure 6(social solar idea)

Figure 7(direction of installation)

- i. we should install the solar panels in between the South and west.
- ii. So it can consume the maximum amount of energy in both season summer and winter.



Figure 8(solar batteries)

- iii. In the night time it difficult to produce energy.
- iv. So we should install the two powerful batteries in it so we could store the energy for the night time and longtime too.



Figure 9(solar model)

- v. The average consumption of electricity by one house is 210 kwh per month.
- vi. One solar panel can produce 20 kwh par day.
- vii. That means solar panel produce($26 \times 30 = 780$) 780 kwh per month which is almost 3.7 times greater than our daily requirement.

VII ADVANTAGES

- i. Solar energy is a renewable energy source and

reduces Carbon emissions

- ii. Solar energy can reduce electricity cost
- iii. solar power can get you money back through Solar renewable energy credits.
- iv. It could reduce the use of unethical resources and can save our environment

VIII DISADVANTAGES

- i. The high initial costs of installing panels. The most commonly sighted disadvantage, cost is declining as the industry expands.
- ii. Solar energy storage is expensive.
- iii. Solar doesn't work for energy roof type.
- iv. The main Ingredients of solar panels of which is Monocrystalline Silicon, polycrystalline silicon, silicon, Cadmium telluride, copper indium gallium selenide is difficult to extract.

IX APPLICATION



Figure 10(bhadala solar plant)



Figure 11(pargada solar plant)



Figure 12(charanka solar plant)

XII REFRANCES

- i. DK Visual Dictionary
- ii. Knowledge Encyclopedia The Ultimate Resource to Discover The World.
- iii. <https://mnre.gov.in/solar/current-status/>
- iv. <https://solarrooftop.gov.in/>

X CONCLUSION

Most of the people are not aware about renewable energy and they are Still depending on the nonrenewable resources. The solar parks are the great option but the highest problem of solar park is the maintenance issue it difficult to keeps maintain such higher solar park so dividing the cities into the circle and making a solar plant for that particular circle could make the maintenance easier and reduce the coast of production of electricity, but making such higher plans is difficult on individual level so government should take this project in their hands.

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INTRODUCING USE OF ULTRA CAPACITOR IN THE ENERGY STORAGE SECTION OF THE EV IN CONJUNCTION WITH A BATTERY BANK

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Abstract— the primary focus of this research will be on extending the service life of fuel cells (FCs) and developing a model of an Ultra capacitor (UC) to create a hybrid energy storage system (HESS). Additionally, the control techniques will be employed to meet the fundamental requirements of our intended energy storage system, including stable DC voltage and an optimal state-of-charge. For best performance and design, the fuel cell will need precise system selection, design, and modeling for prediction of performance. In this work, we provide an efficient online technique for predicting the parameters of the Li-ion battery model using the Universal Adaptive Stabilizer (UAS). The new approach has been thoroughly tested for its viability at the battery cell, pack, and bank levels. This study would not need offline experimentation or post-processing, unlike past UAS-based work on individual battery packs. Self-updating battery parameters in real time is made possible by rapid convergence of estimations of these parameters with little experimental effort.

Keywords—Electrical Vehicle, Energy Storage, Ultra Capacitor

1. INTRODUCTION

The fast depletion of the world's petroleum supplies due to climate change is a major factor driving the rising popularity of electric and hybrid electric vehicles (HEV). Also, the creation of extremely efficient electric vehicles has been at the forefront of automotive research in the last several years. We all know that the battery is the most promising and traditional energy storage element for electric vehicles and hybrid electric vehicles. However, relying only on a battery pack presents problems because of its poor power density, limited charging/discharging cycles, and high cost when damaged. Regenerative braking is the process through which an electric vehicle's kinetic energy is converted back into electricity rather than heat via the friction brakes seen on conventional vehicles. A specialized energy storage element is needed for this, one that can swiftly release the electrical energy it has stored while accelerating. The ultra

capacitor is the only device capable of storing and releasing such a large amount of electricity in such a short amount of time. To that end, a hybrid energy storage system consisting of batteries and ultra capacitors is one of the finest options for EVs. During times of heavy power demand, the combination of a battery with an ultra capacitor may help keep things running smoothly while keeping the battery's peak current to a minimum. By using the most effective pair of methods, we can relieve pressure on the battery and protect it from failure. The cost of a super capacitor add-on is less than the cost of replacing the batteries, making a hybrid energy storage system (HESS) cost-effective (ultra capacitor).

Public transportation has shifted its focus from the internal combustion engine vehicle to more environmentally friendly vehicular systems as a result of concerns about peak oil and global warming. Concerns about the environment in the transportation sector during the last decade have focused on expanding access to alternative fuels or reviving the development of electric-based vehicle systems, which had been mostly shelved by the 1930s. Due to its zero-emission and environmentally-friendly technology, electric vehicles (EVs) have quickly become the focus of sustainable transportation research. Hybrid electric vehicles, which were developed later, use a combination of battery power and various energy sources (HEV). The Plug-in Hybrid Electric Vehicle (PHEV) improves upon the conventional battery EV in every conceivable way by adding an outlet for direct grid connection to its already impressive list of features (BEV). Maintaining a connection between PHEVs and the distribution grid brings to mind the need of deploying charging facilities within the EV's operational range. So, as EVs become a more viable option as a transportation mode in the future, research into charging infrastructure has been developing fast. For the charging infrastructure to function there must be a dependable interface to the distribution grid, which necessitates coordination between the operator and the supplier. The charging infrastructure concept interface calls for cooperation between the ISO/RTO, which is in

charge of the bulk power system, and the ESP, which is in charge of delivering electricity to homes and businesses through the distribution grid. It is important to strategically place public charging stations so that they may serve operating electric vehicles as efficiently as possible, regardless of the kind of charging station the owner uses at home. The charging station, as the major public charging point, has been the subject of much study and development. As the smart grid has evolved to accommodate the V2G transition, charging stations have been the focus of subsequent studies.

The design of an EV's energy storage system has to take into account both the need for high power density to fulfill the acceleration requirement and the necessity for high energy density to achieve the target driving range of the vehicle. Lead-acid, nickel metal hydride (NiMH), and lithium ion (Li-ion) batteries are the most common types of energy storage devices used in automobiles today. NiMH batteries, which are less expensive than Li-ion batteries, have cornered the EV industry. However, Li-ion batteries are becoming the standard for EVs because of their high monomer voltage and high energy density. The ultra capacitor is an energy storage device that may be used in conjunction with a lithium-ion battery because of its superior power density, quicker charging and discharging rates, and longer cycle life. As a result of its poor energy density, an ultra capacitor is not a good choice for use as the only source of power in an EV. As a result of its limited discharge capacity, the lithium-ion battery is unsuitable for delivering a high quantity of power in a short period of time. Additionally, the battery's lifespan is shortened by repeated charging and draining. Thus, using an ultra capacitor in a hybrid electric vehicle (HEV) system may extend the life of the battery. Since ultra capacitors are well-suited for pulse-power applications, their high-power density allows them to satisfy peak power demand during EV acceleration and absorb regenerative braking power. However, lithium-ion batteries excel at tasks that call for a lot of energy to be stored in a small package. The battery and ultra capacitor output in an EV are dynamic and changes in response to the load. In addition, there is a substantial swing in ultra capacitor terminal voltage between charging and discharging. As a result, the HESS's conversion system has to be able to effectively transfer power between two distinct energy storage devices over a broad input voltage range. Multiple input dc-dc converters, both isolated and non-isolated, are often used in HESS. The power switching devices and diodes in the bidirectional dc-dc converters used in the multiple input dc-dc converter design for battery-ultra capacitor HESS regulate the current that flows between the on-board energy storage devices and the load. However, not all power outlets are galvanically isolated. For voltage matching and system safety, galvanic separation is

necessary in several applications. As a result, hybrid energy storage systems may benefit from using multiple-input bidirectional isolated dc-dc converters.

2. LITERATURE REVIEW

Arefin, et al (2018) This study illustrates the positive aspects of including an ultra capacitor into the battery pack of a city-based electric vehicle's powertrain. Both new battery cells and batteries that have been partially discharged are included in the simulations. The simulation results demonstrate that the efficiency of the hybrid system improves as the temperature drops. This investigation makes use of real-world data. The simulations are performed using the adjusted Bangladeshi driving cycle for light automobiles. Many of the problems associated with hybridization are discussed in this study. This method has the potential to cut down on power loss by 5-10%. As a conclusion, hybridization improves not only the power train efficiency but also the battery life span. Researchers looking to learn more about this subject might benefit from this study.

M, Gopikrishnan (2014) In this study, we suggest a battery/ultra capacitor hybrid energy storage system (HESS) for electric cars; this system would be utilized to power a huge dc-dc converter. The dc link is also used to keep the peak voltage constant. They run on power supplied by an ultra capacitor and battery. In the event that the capacitor becomes discharged, the battery is utilized to recharge it. In this instance, the battery is functional. Also, the regenerative braking system stores energy in case of a sudden stop, which would otherwise be wasted. Battery life may be extended by employing an ultra-capacitor. If the ultra capacitor is functioning, the battery will be disconnected from the power source. The outcomes of this experiment validate the suggested system.

Livrieri, Patrizia&Castiglia, V. &Pellitteri, Filippo&Miceli, Rosario (2018) When it comes to managing the power of an electric vehicle (EV), the combination of batteries and ultra capacitors (UCs) offers significant benefits. This is because of the EV's increased energy storage capacity and its improved responsiveness to sudden changes in load. A suitable bi-directional converter is needed to control the charging (or discharging) of the UCs from (or towards) a DC voltage bus. Herein, we present the design and findings of a power simulation study into the operation of a bidirectional DC-DC converter coupled with a stack of UCs. A B2R (buck-boost regulator) style converter is suggested. In accordance with the worldwide standardized Light vehicles Test Procedure, the load is modeled as 40 kW peak power for a period of 3 seconds (WLTP).

Ali, A. (2014) In this study, we suggest a battery/ultra capacitor hybrid energy storage system (HESS) for electric cars; this system would be utilized to power a huge dc-dc converter. The dc link is also used to keep the peak voltage constant. They run on power supplied by an ultra capacitor and battery. In the event that the capacitor becomes discharged, the battery is utilized to recharge it. In this instance, the battery is functional. Also, the regenerative braking system stores energy in case of a sudden stop, which would otherwise be wasted. Battery life may be extended by employing an ultra-capacitor. If the ultra capacitor is functioning, the battery will be disconnected from the power source. The outcomes of this experiment validate the suggested system.

Tseng, Kuo-Ching & Chang, Yu-Cheng & Cheng, Chun-An (2020) Light rail vehicles (sometimes called tramways or lightly constructed railroads) have generated considerable interest due to the environmental benefits they provide. During their journey, the light rail cars are supplied with energy by hybrid energy-storage systems. In this research, an ultra capacitor charger is integrated into a hybrid energy-storage system for use in electric vehicles, and its performance is evaluated. In addition, a full-bridge DC-DC converter with synchronous rectification and a high charging current is provided as the basis for an ultra capacitor charger. In order to further improve conversion efficiency, the current doublers synchronous rectification used in the proposed converter decreases the secondary circulation current while recycling the energy of the leakage current back to the power source lead. This ultra capacitor charger has been prototyped, and it has been shown to have an efficiency of 92.1% at a full load of 1 kW, with an input voltage of 380 V and an output voltage of 14.6 V. Furthermore, at 600 W of output power, the testing findings reveal an efficiency of 93.4%. In addition, the given converter can charge a 250 F ultra capacitor at a charging current of 65 A, and experimental waveforms show that the charging duration of the ultra capacitor voltage from 0 to 14.6 V is within 1 minute.

Mallika, Sreelekshmi & Raju, Saravanakumar (2011) whether it be a hybrid electric, fuel cell, or all-electric motor train, electrical energy storage is essential. The high cost of replacing exhausted battery banks is a major budgetary concern when it comes to energy storage. To reduce the stress on renewable energy sources like batteries and fuel cells, ultra-capacitors might be used as load-leveling devices. This survey examines the state of the art and some of the challenges with ultra capacitor-Battery interfaces in the context of energy management systems. There is research being done.

Shen, Junyi, and Khaligh, Alireza (2016) The ideal current split between batteries and ultra capacitors (UCs) in electric vehicle applications has been examined using two real-time energy management algorithms in this research. First, the optimal operating points of the current split in the hybrid energy storage system are determined by formulating and solving an optimization problem subject to Karush-Kuhn-Tucker conditions in real time (HESS). As an alternative, an intelligent controller based on a neural network is used in the second approach. A performance measure based on the battery state-of-health (SoH) is established to disclose the relative influence of instantaneous battery currents on the battery deterioration, allowing for an evaluation of the efficacy of these two real-time techniques. We have created a real-time experimental platform for the validation of energy management controllers, employing xPC Target and National Instrument data gathering system, and we have constructed a 38 V-385 Wh battery and a 32 V-4.12 Wh UC HESS hardware prototype. The two real-time controller designs have been verified to be both practical and efficient via simulation and real-time experimentation. It is shown that, in contrast to a battery-only energy storage system, the battery SoH can be increased by 31% and 38%, respectively, when using the two real-time energy management algorithms under the high speed, high acceleration, aggressive driving cycle US06.

Xiong, Rui & Chen, Huan & Wang, Chun & Sun, Fengchun (2018) To address the high specific power and high specific energy demands of plug-in hybrid electric cars at the same time, a Hybrid Energy Storage System (HESS) is an excellent solution to the challenges presented by alternative single energy storage systems (HEVs). The combination of a battery and ultra capacitor (UC) in a HESS has garnered a lot of interest. Nonetheless, studies of its architecture and methods of energy management are uncommon (EMSs). This study provides an overview of the architectures and EMSs of HESSs that use battery and UC, based on a summary and analysis of the relevant literature. Rules-based control algorithms, optimization-based control algorithms, and intelligent-based control algorithms are all thoroughly discussed, with a focus on their application to the study of energy management. Researchers may choose the best approach for developing EMSs for HESSs by comparing and contrasting the offered techniques, which cover many common implementations and applications. Finally, the study gives potential proposals for the creation of a big data and machine learning-based algorithm for the energy management of the HESSs, highlighting a number of critical elements and obstacles.

Hasan, Md. Zahid & Adnan, Md & Saha, Sabhasachi & Roy, Souvik (2018) the goal of this study is to improve the efficiency of batteries and ultra-capacitors by developing

hybrids of the two. This exemplifies the positive effects of incorporating an ultra-capacitor into the battery pack of a city-specific electric vehicle's transmission. MATLAB Both new battery cells and batteries that have been partially discharged are included in the simulations. The simulations reveal that hybrid system efficiency increases from 25% to 30% when temperatures drop to the low end of the range (25-28 °C). This research makes use of both theoretical frameworks and empirical data. When compared to previous experiments, which only showed a 7% efficiency boost, this system demonstrated an impressive 14% improvement. The simulations are performed using the adjusted Bangladeshi driving cycle for light automobiles. Many of the problems associated with hybridization are discussed in this study. Power loss in the system may be cut by as much as 5–10% with this setup compared to the standard setup. Finally, hybridization improves not just the powertrain's efficiency but also the longevity of the battery. Researchers looking to learn more about this subject might benefit from this study.

Patel, Parth & Patel, Krishna & Mistry, Pavak (2016) To power an electric car, a combination of a battery and an Ultra capacitor is optimal. The Ultra capacitor and the battery are connected via bidirectional converter architecture. The Ultra capacitor may be charged and discharged from the battery with the help of this converter. A variable amount of energy is needed to propel an electric vehicle in accordance with its speed. A simulation circuit is constructed for the charging and discharging process of an Ultra capacitor and battery hybrid system using a power diode and other circuit components. Mechanisms and energy transformations in their many guises are outlined.

Zhao, Chen & Yin, He & Noguchi, Yohei & Ma, Chengbin (2014) Under the JC08 driving cycle, this article compares the energy efficiency of a battery-ultracapacitor hybrid energy storage system to that of a lithium-ion battery-only system. The DC-DC converter efficiency and the battery pack's internal resistance are the two control parameters used for this investigation. Compared to a battery-only system, the research reveals that the hybrid battery-ultracapacitor energy storage system is more robust against variations in battery internal resistance. Meanwhile, the total efficiency of the battery-ultra capacitor hybrid energy storage system is heavily influenced by the energy loss of the DC-DC converter. The efficiency of a battery-ultra capacitor hybrid energy storage system may match or even exceed that of a battery-only system if a high-efficiency DC-DC converter is used.

Embrandiri, Manoj & Isa, Dino & Arelhi, Roselina (2011) In this work, we describe the preliminary results and efficiency of an electric vehicle conversion prototype based on a well-known Malaysian city automobile, the

perodualkancil. In lieu of the previous 31 HP (22.1 KW) 660 cc three-cylinder carbureted engine, a 48-72 V series wound DC motor with an 8 KW continuous and 20 KW peak rating was installed. To reach 48 V, the battery pack uses eight T105 Trojan 6 V, 225 Ah deep cycle lead acid batteries. In addition, high power contactors are used to connect a 165 F, 48 V ultra capacitor module in parallel so as to examine the proven improvement in performance criteria such as acceleration, range, battery life, etc. shown in many literatures through simulation studies. On the fly driving data from the electric car is gathered by a data gathering system set up along a predetermined path in the real world. Using MATLAB, we analyze our driving data and compare the EV's performance with and without the ultra capacitor module.

3. OBJECTIVES

1. To study hybrid energy storage system based on a battery and super capacitor.
2. To find out Technologies for Electric Vehicle Batteries.
3. To examine Ultra capacitor Sizing for Electric Hybrid Vehicles.
4. To analyze Real-time adaptive estimation of the parameters of a lithium-ion battery bank.
5. To evaluate modeling and hybrid energy storage systems for fuel cell electric car energy sources.

4. RESEARCH METHODOLOGY

Li-Ion Battery Corresponding Circuit Model

This study will provide a straightforward and precise online adaptive parameters estimate procedure for the Li-ion battery model at the cell, pack, and bank levels of a battery.

Universal Adaptive Stabilization (UAS)

Using a UAS based technique; we will be able to quickly converge on an error-free solution. As a result, we used an adaptive estimating technique based on UASs, which proved to be both fast and precise. Parameters (r_{11} , r_{21}) for Li-ion batteries will be estimated. A high-growth switching function will be necessary for the deployment of a UAS-based approach.

Fuel Sizing and Cell Modelling

Improving fuel cell design by modeling may result in more efficient and cost-effective fuel cells. For fast fuel-cell problem-solving, the model has to be reliable and precise. The performance of a fuel cell may be predicted with a

competent model under a broad variety of scenarios. Despite its apparent simplicity, a fuel-cell model may be rather accurate in its predictions. Here will be some examples of rather simple models:

- Mass balances
- Energy balances
- Fick's law of diffusion
- Inequalities for heat conduction and convection

Mathematical model development will begin with the following steps:

- i. Model selection
- ii. Model fitting
- iii. Model validation.

These three fundamental procedures will be repeated until a suitable model has been created. Plots of the data, prior knowledge of the process, and assumptions about the process will all be employed in the model selection stage to find the best possible model fit.

System Modeling

In order to effectively manage energy, it will be necessary to model the system and determine the optimal size of the hybrid energy source. Our goal will be to propose a design approach of power source in an EV and to identify the number of super capacitor cells and the number of PEMFC cells for hybrid source management of a PEMFC and super capacitor for electric vehicle. The PEMFC and super capacitor hybrid energy source will be coupled with a DC bus that uses DC-DC converters to exchange power.

Hybrid Energy Source Modelling and Sizing

The basic chemical mechanism in hydrogen PEM fuel cells converts chemical energy into electrical and thermal energy. This reaction may generate electricity by separating the oxygen reduction and hydrogen oxidation processes with a membrane that allows protons to flow from the anode to the cathode.

5. EXPECTED OUTCOME

The primary focus of this research will be on extending the service life of fuel cells (FCs) and developing a model of an Ultra capacitor (UC) to create a hybrid energy storage system (HESS). Additionally, the control techniques will be employed to meet the fundamental requirements of our

intended energy storage system, including stable DC voltage and an optimal state-of-charge. For best performance and design, the fuel cell will need precise system selection, design, and modeling for prediction of performance. In this work, we provide an efficient online technique for predicting the parameters of the Li-ion battery model using the Universal Adaptive Stabilizer (UAS). The new approach has been thoroughly tested for its viability at the battery cell, pack, and bank levels. This study would not need offline experimentation or post-processing, unlike past UAS-based work on individual battery packs. Self-updating battery parameters in real time is made possible by rapid convergence of estimations of these parameters with little experimental effort.

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Battery Swapping System For Electrical Vehicle

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Abstract

Having a sufficient charging infrastructure is crucial to the rapid uptake of electric vehicles (EVs). The availability of such infrastructure would eliminate several barriers related to the short range of EVs. A Battery Swapping Station (BSS) is a practical way to power electric vehicles (EVs) while reducing lengthy wait times at Battery Charging Stations (BCS). In contrast to the BCS, the BSS charges the batteries beforehand and gets them ready for a far faster battery swap. These charging stations may be able to offer special advantages to the power system because they can act as a middleman between EV owners and the grid. This essay explores the benefits of developing the BSS from a number of angles. In light of this, a model for battery charging scheduling from the viewpoint of the station owner is suggested. To demonstrate how the suggested model may assist BSS owners in managing their assets through scheduling battery charging time, an example is given.

Key Words: Cloud, Monitoring, the Internet of Things

1. INTRODUCTION

Today's research and development organisations are concentrating on creating a battery swap station (bss) architecture with the potential to offer a stable foundation for the successful installation of a sizable fleet of hybrid and electric cars (i.e. Xevs). Similar to existing gasoline refuelling stations, the bss may calibrate its subsystem for the deployment of electric vehicles (EVs) by replacing or swapping out the drained batteries for partially or completely charged ones over the course of a few minutes. The bss strategy, which offers a wider experience of business potential for the individual stakeholders, has emerged as a viable technology to the conventional ev recharge station approach. This work deals with the introduction to bss including infrastructure, techniques, benefits over charging station and key challenges associated with bss. Furthermore, an s34x-smart swapping station for xev's is proposed and finally, the key thrust is research for bss is discussed. To the authors' knowledge, this is the first kind of review work on bss. We are focusing on developing a system that not only plays a role in power electronics but also in embedded system and iot using various approaches. This allows the real-time use of the system to get into public domain.

LITERATURE REVIEW

According to Mohd Suffian Sulim and Hafizul Fahri Hanafi this paper described the design and development of an IoT-based battery monitoring system for electric vehicle to ensure the battery performance degradation can be monitored online. The objective is to prove that the concept of the idea can be realized. The development of the system consists of the development of the hardware for the battery monitoring device and a web-based battery monitoring user interface.

The system is capable to show information such as location, battery condition and time via internet by incorporating GPS system to detect the coordinate and display it on the Google Maps application

2. METHODOLOGY

2.1 Block Diagram

The purpose of this project is to identify charging stations and to replace the battery instead of letting the battery charge for hours. This project is merely a scale illustration of how IOT and cloud platforms are used to perform swapping technologies. The block diagram that follows shows the components utilised in this model.

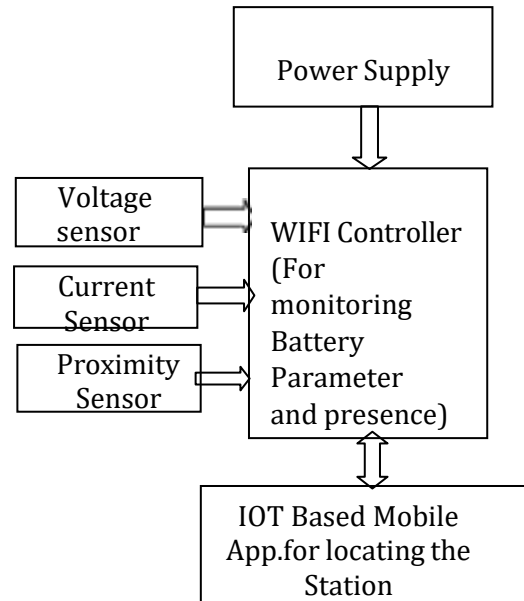


Fig.2.1: System block diagram

2.2 Hardware Prototype

A. ESP WIFI Controller

A cheap open source IoT platform is Node MCU. Initially, it contained hardware based on the ESP-12 module and firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems. Support for the 32-bit ESP32 MCU was later added. The Node MCU serves as the project's brain and heart, constantly monitoring the input from the sensors, acting on the output side, and sending data to the internet.

The suggested solution relies heavily on the Raspberry Pi 3. A mouse, keyboard, and pen drive can be connected to its four USB ports. Additionally, an Ethernet cable can be connected to it via an Ethernet compatible connector. We can connect a range of sensors, including ultrasonic, air, temperature, and moisture sensors, to the 40 GPIO pins of the Raspberry Pi 3. The touchscreen display and Pi camera can be mounted in the Raspberry Pi's two special slots



Fig.2.2.1: ESP WIFI Controller

B. Voltage Sensor

The Voltage Sensor is a straightforward module that can be used with an Arduino (or any other microcontroller with a 5V input tolerance) to measure external voltages that are higher than the microcontroller's maximum allowable value, which is 5V in the case of the Arduino. The voltage sensor module used in this project is shown in the figure below. In our project, the voltage sensor continuously checks the battery's line voltage and transmits the information to the mobile app. so that the user can monitor the battery's voltage and availability from a remote location.



Fig.2.2.2: Voltage Sensor

C. Current Sensor

The analogue voltage output from this sensor, which runs at 5V, is proportionate to the measured current. The analogue output of this current sensor allows us to read it by measuring the output voltage with a voltmeter or by utilising an Arduino-compatible microcontroller's Analog Read or ADCport.

In our project, the battery current will be continuously monitored by the current sensor, which will also send commands to the mobile app. This displays the battery's available charge



Fig. 2.2.3: Current Sensor

D. Proximity Sensor

A radiation-sensitive optoelectronic component with spectral sensitivity in the infrared wavelength region of 50m is known as an infrared sensor (IR sensor). Motion detectors, which are used in building services to turn on lights or in alarm systems to detect unwanted visitors, increasingly frequently incorporate IR sensors.



Fig. 2.2.4: Proximity Sensor

E. GPS Module

Small processors and antennas found in GPS modules are used to directly receive data from satellites using specific RF frequencies. From there, it will get data from various sources, including timestamps from all visible satellites. On the mobile app, the Swapping Station can be found using a GPS module.



Fig.2.2.5: GPS Module

3. EXPECTED RESULTS

The model is expected to demonstrate proximity-based battery switching technology and display voltage and current levels on IoT platforms, which are used to find battery swapping charging stations.

4. APPLICATIONS

1. Consumer Electronics.
2. Public Transportation.
3. Aviation
4. Electricity Grid.
5. Renewable Energy Storage.
6. Military.
7. Spaceflight.
8. Wearable Technology.

5. CONCLUSION

Ensure battery performance decline may be tracked online with an IoT-based battery monitoring system for electric vehicles. The goal is to demonstrate the viability of the idea's basic premise. The hardware for the battery monitoring device and a web-based user interface for battery monitoring are being developed as part of the system's development.

The system incorporates a GPS system to detect the coordinate and display it on the Google Maps application, allowing it to display information such as position, battery life, and time via the internet. By including more functionalities, the system can be further modified to be improved. By creating a smartphone application that can assist users in battery monitoring and serve as a reminder for battery degeneration, the method can be employed in smartphones. Ethernet can be used to improve internet connectivity in order to obtain a better connection than GPRS.

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Comprehensive Analysis and Mapping of Renewable Energy Market in India.

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Abstract— This research study provides a detailed analysis and mapping of the Renewable Energy Market in India, aiming to understand the ongoing global energy transition, the current trends and landscape in India, assessing potential growth and investment opportunities, and identifying the key market players. The analysis includes a breakdown of renewable energy capacities, investment figures, and the role of foreign direct investment (FDI) by private equity firms. The paper also discusses about various industry technologies, government schemes and financials to present an in-depth overview of the renewable energy sector in India. The findings shed light on the growth potential of the renewable energy market in India and provide valuable insights for policymakers, investors, and industry stakeholders. Overall, this research serves as a valuable resource for understanding and navigating the complex dynamics of the renewable energy sector in India.

Keywords— renewable energy, India market, operational capacities, accounts mapping, trends

I. INTRODUCTION

While the demand for energy is ever increasing across the globe, the deficiency between the demand and the energy generation and its supply has been proportionately growing. The energy supply is restricted because of heavy reliance of energy generation unmistakably on the conventional and fossil sources. According to projections by the World Energy Forum, it is anticipated that within the next century, the reserves of fossil-based oil, coal, and gas will be depleted. Currently, fossil fuels account for approximately 79% of the world's primary energy consumption, with a significant portion, around 57.7%, being utilized in the transportation sector. [1] However, these reserves are diminishing rapidly. Consequently, the depletion of natural resources and the growing demand for conventional energy have compelled policymakers and planners to explore alternative sources. Hence, there is a severe need for developments in the sustainable energy generation considering its availability in abundance, inexhaustibility and the harmless technology to harness the same. By and by, non-conventional energy sources provide next to no commitment in the energy needs except for it is very much viewed as that it will increment definitely in the coming years.

The ongoing global energy crisis brings both new open doors and new difficulties for sustainable power. The Russia-Ukraine war started an extraordinary worldwide energy crisis prompting a sharp expansion in the energy costs around the

world with a series of sanctions and fluctuations in the value of Russian Ruble (RUB, ₹). The below chart shows the trend line of fuel energy price index wherein, the figures increased six-fold between the Summer of 2020 and Summer of 2022 as a result of an ongoing energy supply shortage that was exacerbated by the Russia-Ukraine war.

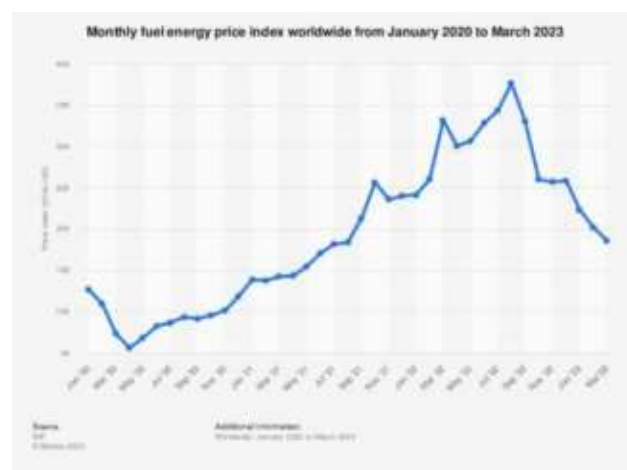


Fig. 1. Monthly Fuel Energy Price Index worldwide from January 2020 to March 2023

Higher energy costs, increasing inflation and the possibility of a worldwide recession, has decreased the demands for energy essentially, but this is temporary and sooner or later a flood in the demand can be anticipated. To counter the same, many countries have shifted their focus towards increasing the production capacity of renewable energy sources by drafting new policies, strategies and plans for effective energy transition. The world is hence, undergoing an energy transition and the current renewable energy market is strongly accelerating to this global energy transition. Renewable energy derives from regenerative resources that do not deplete over time. It presents a significant opportunity for our planet to reduce carbon emissions, improve air quality, and establish a more sustainable foundation for our civilization. Moreover, renewable energy also offers countries worldwide the potential to enhance their energy security and stimulate economic development.

The Global Renewable Energy Market was valued at \$988.26 billion in 2022 and is projected to reach a value of \$1912.12 billion by 2030 at a CAGR of 8.60% over the forecast period. Concerns about climate change, energy

security, and the need for sustainable development have all contributed to the enormous rise of the worldwide renewable energy market in recent years. The capacity of renewable energy worldwide at the end of 2021 was 3,372 gigawatts (GW). This represents a 9.6% increase from the end of 2020. The majority of this growth was in solar and wind power, which accounted for 83% of all new renewable capacity additions in 2021. As of May 2023, the global capacity of renewable energy has reached 3,540 GW. This represents an additional 168 GW of capacity added in the first five months of 2023. The growth in renewable energy capacity is continuing at a rapid pace, and is expected to continue to grow in the years to come. A forecast of the global renewable energy market size can be seen in the Figure 2 which is expected to be over and above \$2025.94 billion.

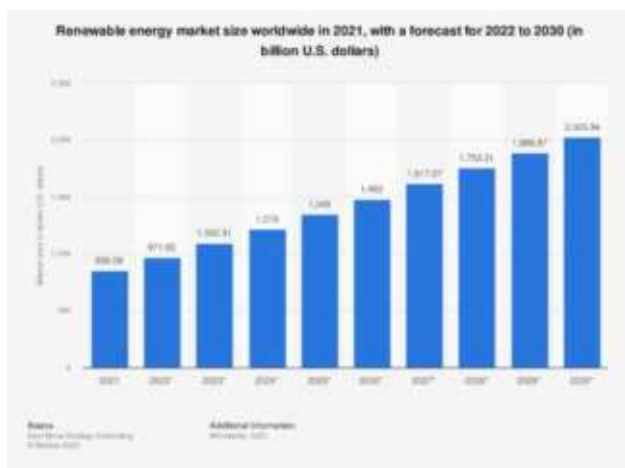


Fig. 2. Renewable energy market size worldwide in 2021, with a forecast for 2022 to 2030 (in billion U.S. dollars)

Speeding up the energy transition and reducing the sky touching inflation rates, US came up “Building a Clean Energy Economy - January 2023” in its Inflation Reduction Act. The Inflation Reduction Act plans \$370 billion in ventures that will bring down energy costs for families and small businesses, accelerate private investment in clean energy solutions in every sector of the economy and every corner of the country, restructure the supply chains for everything from basic necessities to critical minerals, and create good-paying jobs and new economic opportunities for workers.

By 2030, as per the US Inflation Reduction Act, annual solar and wind capacity additions in the United States are targeted to grow two-and-a-half-times over today’s levels, while the electric car sales are expected to be seven times larger. Never the less, Japan, the technological giant, has come up with the Green Transformation (GX) programme which provides a major funding boost for technologies including nuclear, clean hydrogen and ammonia. It is expected that 54.1% of the installed capacity globally will be renewable (including hydropower), and 37.9% will be a combination of solar and wind.

Global investment in technologies related to the energy transition, including for energy efficiency, reached USD 1.3 trillion in 2022 – a new record-high. The investments are just about as high as 70% when compared with those in 2019, before the COVID-19 pandemic.[2] Never the less, the technology in the industry has grown by a CAGR of more than 8.5% between 2013 and 2022. Moreover, a four-fold of surplus inflow is expected in the coming year to keep the transition towards renewable energy on track. Additionally, the investments in end utilizes, for example direct applications, which include heat generation (e.g., solar water heaters, geothermal heat pumps, biomass boilers) and transport (e.g., biofuels) are lagging.

II. INDIA OVERVIEW

India has emerged as a key player in the renewable energy market, with ambitious targets for renewable energy adoption. But India has a vast population and a rapidly expanding economy, making it difficult to meet its energy needs while lowering its carbon footprint. In India, the industry of renewable energy has become one of the main forces behind both sustainable development and economic prosperity. The Indian government has set lofty goals for the use of renewable energy, with a current capacity of 172.542 GW and a goal of 500 GW by 2030.

India is the 3rd most attractive market for Renewable Energy investments and deployments globally. This is primarily driven by favourable government policies, declining technology costs, and rising environmental concerns. India stands 4th globally in Renewable Energy Installed Capacity (including Large Hydro), 4th in Wind Power capacity & 4th in Solar Power capacity (as per REN21 Renewables 2022 Global Status Report). The solar segment is the largest and fastest-growing segment of the market, accounting for more than 50% of the total installed renewable energy capacity in the country. The wind segment is the second-largest segment, accounting for more than 30% of the total installed renewable energy capacity. The biomass and hydropower segments account for the remaining capacity. India also has made strategic decisions on building renewable energy capacities to make the production of clean renewable Hydrogen economical and feasible for commercial purposes across appropriate industries.

Solar power is the leading source of renewable energy in India, with an installed capacity of 67.078 GW. Wind power is the second-leading source, with an installed capacity of 42.868 GW. Other renewable energy sources, such as biomass, small hydro, and waste-to-energy, have also seen significant growth in recent years. [3]

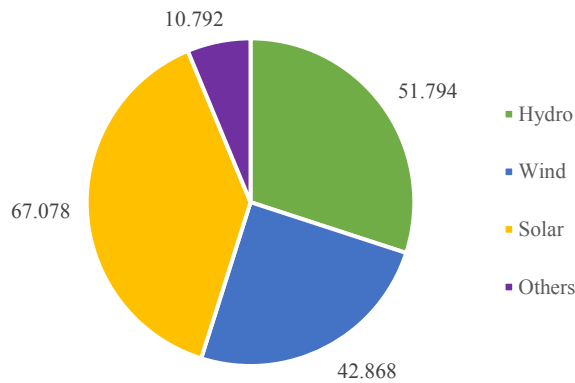


Fig. 3. India Installed Renewable Energy Capacity Mix as on 30.04.2023 (in GW)

A. Solar Energy

India has a vast solar energy potential. The country receives an average of 4-7 kWh per square meter per day of solar radiation, which is more than many other countries. The National Institute of Solar Energy (NISE) has estimated that India has a total solar energy potential of about 748 GW, assuming 3% of the wasteland area to be covered by solar PV modules. The Indian government has hence implemented supportive policies and initiatives to promote solar energy, such as the National Solar Mission, which will be discussed later in the report.

India's journey in harnessing solar energy dates back to the early 1970s when the country embarked on research and development initiatives to explore the potential of solar power. Over the years, solar energy segment is by far the largest and fastest growing segment of the Renewable Energy sector in India. India has the potential to create a more sustainable and flexible power system due to the significant cost reductions in wind, solar, and battery storage technologies over the past decade. This will enable India to meet the growing demand for affordable and reliable power, which is expected to double by 2030. As India's renewable energy capacity increases, it will become increasingly important to balance the variability of renewable energy generation through a range of flexible resources to ensure the stability, reliability, and affordability of grid power. Solar capacity increased 198% in the last 5 years from around 21,651 MW to 67,078 MW and the market is expected to grow at a CAGR of 13.10% between 2023 and 2028, reaching a value of 280 GW by 2030.

India is working towards setting up Solar City per state-approved and approved setting up 59 solar parks of 40 GW across the nation. The government is also giving a push to Floating PV Projects and manufacturing of Photovoltaic Cells to bring down the production costs of these massive projects planned to produce sustainable source of energy for the nation. India has generated 47.64 BU of solar power in the first half of 2022, a 34% YoY increase. Solar Parks in Pavagada (2

GW), Kurnool (1 GW) and Bhadla-II (648 MW) included in top 5 operational solar parks of 7 GW capacity in the country. [4] India also has a substantial potential for rooftop solar installations, both in the residential and commercial sectors. Rooftop solar allows for decentralized power generation, reducing transmission losses and promoting energy self-sufficiency. For remote areas where grid connectivity is limited, solar-powered microgrids, solar home systems, and solar pumps are being deployed to provide clean and reliable energy access to rural communities. The Pradhan Mantri Urja Suraksha evam Utthaan Mahabhiyaan (PM-KUSUM) worth ₹34,422 crore was launched to help improve the lives of farmers by providing them with a reliable and affordable source of irrigation water. The government of India aims to provide a financial assistance of ₹29,250 crore, while the remaining ₹5,172 crore will be provided by state governments and other stakeholders.

The Indian government has also approved a Production-Linked Incentive (PLI) scheme for high-efficiency solar PV modules. The scheme has two tranches:

Tranche 1: INR 4500 Cr (\$605 Mn) will be used to set up 8.737 GW of fully integrated solar PV module manufacturing capacity.

Tranche 2: INR 19,500 Cr (\$2.61 Bn) will be used to set up 65 GW per annum of fully/partially integrated solar PV module manufacturing capacity. [4]

The PLI scheme is expected to create direct employment for about 30,000 people and indirect employment for about 1,20,000 people. [4] It is also expected to reduce India's reliance on imported solar PV modules and boost research and development in the sector. In the recent trends, the government also plans to boost the solar power generation and installation by lowering the goods and services tax (GST) on solar panels and cells to 5% from 12% and cutting the import duties from 40% to 20%. The key benefits of these initiatives and the PLI scheme includes a boost in the jobs in solar manufacturing sector, reduction in India's reliance on imported solar PV modules, boost of inhouse research and development in the solar sector and help to make solar power more affordable and accessible in India.

The current advancements and progress show a bright future for the Indian solar sector. The trend is expected to continue in the coming years, as solar energy becomes increasingly cost-competitive and provides a reliable and sustainable source of power. It is expected to help India achieve its goal of becoming a global leader in solar manufacturing.

B. Wind Energy

Wind energy is a mature, competitive, and environmentally friendly technology that is widely used to generate electricity around the world. Wind turbines convert the kinetic energy of the wind into mechanical energy, which can then be used to drive a generator and produce electricity. In the recent trends, wind power is being combined with solar power to create a more reliable and sustainable wind-solar

hybrid systems. Hybrid projects offer better utilization of infrastructure and optimize the variability of renewable energy sources. Wind power can be used to generate electricity, heat water, or power vehicles. It can also be used to create a more sustainable and self-sufficient community. Hence, wind power is a promising renewable energy source that has the potential to make a significant contribution to the fight against climate change.

India's long coastline, varied topography, and monsoon-driven weather patterns contribute to consistent and strong wind flows. The country experiences both land and sea breezes, creating favorable conditions for wind turbines. The country has an estimated onshore wind power potential of 302 gigawatts (GW) at 100 meters above ground level and 695.50 GW at 120 meters above ground level. The wind power potential is concentrated in the states of Gujarat, Tamil Nadu, Maharashtra, Andhra Pradesh, Karnataka, and Kerala. As of April 2023, India has an installed wind power capacity of 42.868 GW. This makes India the fourth largest wind power market in the world. The government of India has set a target of installing 220 GW of wind power capacity by 2027.

The renewable hybrid energy systems are a leading invention which can help generate round the clock power increasing the sustainability and reliability of renewable power. As per McKinsey, if the economics of hybrid systems do approach the expected levels, analysis indicates that they can potentially be competitive with 30-40 percent of existing coal-fired stations in India.[5] Several leading Indian corporates are also showing active interest in increasing their usage of clean power if round-the-clock solutions are available. The energy giant, Adani Green Energy, has commissioned a 600 MW wind-solar hybrid power plant in Rajasthan which shall not only reduce the intermittency of RE power but shall also help the nation in optimal utilization of transmission network.

Also, considering the availability of land and the cost involved in its acquisition, offshore wind energy plants seem to be a viable option in order to protect the precious land resources. Despite a 7600km long coastal line and an off-shore wind energy potential of 140GW by 2050, currently, India has no operational off-shore wind energy plant. But in 2022, the Indian government started planning for India's first off-shore wind energy project. The transmission and evacuation infrastructure required for the off-shore wind energy projects of a total capacity of 10GW off the coasts of Gujarat and Tamil Nadu are proposed. The vast potential of off-shore winds remains untapped, even though it's been over 8 years since India created a National Offshore Wind Energy policy.

The price of offshore wind energy has been reducing globally owing to technological innovation and emerging of new markets. Although, it will be very challenging to achieve a cost competitive tariff for the proposed first offshore wind project, it will open up a completely new sector for India to contribute to its overall economy and India may emerge as a global leader in this sector similar to onshore wind due to its

experience in providing quality systems and work force at a lower cost.

India's wind energy potential, coupled with supportive policies, technological advancements, and a growing market, positions the country as a major player in the global wind energy sector. Continued investments and focus on wind power can drive sustainable energy transition, enhance energy security, and contribute to a greener future.

C. Hydro Energy

India has significant hydropower energy potential due to its diverse river systems and topography. India has the fourth-largest installed hydropower capacity in the world, at 51,794 megawatts (MW), including the small hydropower projects. Small hydropower is cleanest wellspring of energy. In India, the plants up to 25 MW are considered as small hydropower plant. According to a report by the Central Electricity Authority, India's total hydropower potential is estimated to be around 148,700 MW and the Indian government has set a target of installing an additional 17,500 MW of hydropower capacity by 2030 to harness the most of this potential. The Indian hydropower market is expected to grow at a compound annual growth rate (CAGR) of 8% from 2022 to 2030 driven by factors like the government's focus on renewable energy, the increasing demand for electricity, and the availability of suitable hydropower resources. The government expects to harness its full potential of hydropower by 2027 with a whopping investment of 5,000 billion Rupees.

Figure 4 illustrates the efficiency of power generation based on the available technologies for particular sources of energy. The efficiency of a hydro-electric power station depends on the type of water turbine. In India, most of the power is generated through large hydroelectric power plants whose efficiencies are around 75%. In case of renewables, wind energy conversion efficiency is about 30%, while that of solar PV is about 15% and solar thermal, between 15% and 18%. Biomass power plant efficiency is about 35%. Hence, it is evident that Hydropower is the most efficient form of power generation. [6]

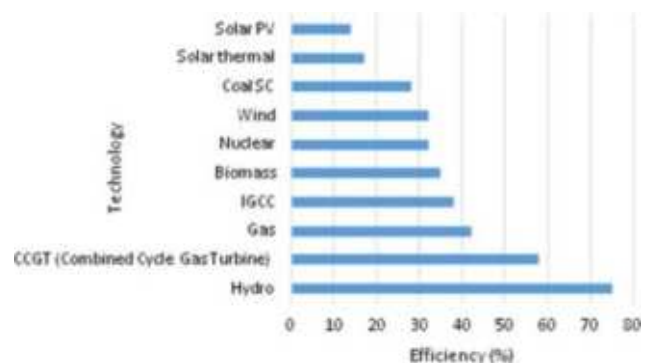


Fig. 4. Technological efficiencies of power generation

India is also exploring pumped storage hydropower projects that help in energy storage and grid balancing. These projects store excess electricity during low-demand periods and release it during peak demand, providing grid stability.

D. Biomass Energy

Biomass is a renewable energy source that is produced from organic materials, such as plant and animal waste. Biomass can be used to generate heat, electricity, and transportation fuels. India is a major producer of biomass, with an estimated annual production of 450 to 500 million tonnes. According to a report by the Ministry of New and Renewable Energy, India's total biomass potential is estimated to be around 18,000 MW. The majority of this potential comes from agricultural residues such as rice husk, sugarcane bagasse, and wheat straw. The currently installed Bioenergy capacity totals to approximately 10.73 GW, including waste to energy, and is expected to boom to 20 GW by 2025.

The Indian government has set ambitious targets for the use of biomass energy. As per the "Roadmap for Ethanol Blending in India 2020-25", the government lays out an annual plan to increase domestic ethanol production in line with target of the amended National Policy on Biofuels (2018) as well as with its Ethanol Blended Petrol (EBP) Programme to reach a blending of 20% of ethanol in petrol (E20) by 2025/26. [7]

The Indian government has taken several initiatives to promote the use of biomass energy, including the National Biomass Cookstoves Initiative, which aims to replace traditional cookstoves with more efficient and cleaner-burning biomass stoves. Additionally, the government has implemented policies such as the Biomass Power and Bagasse Cogeneration Program, which provides financial incentives for the installation of biomass power plants.

The biomass energy market in India is still in its early stages, but it is expected to grow significantly in the coming years. The market is primarily driven by the need to reduce greenhouse gas emissions and the increasing demand for renewable energy. The market is also characterized by the presence of several small and medium-sized enterprises that are involved in the production and distribution of biomass energy products. Despite the potential, the biomass energy sector in India faces challenges such as inefficient collection and storage of biomass, technological barriers, lack of awareness, and limited financing options. Addressing these challenges is crucial for unlocking the full potential of biomass energy.

The demand for biomass energy is expected to increase significantly in the coming years. This is due to a number of factors, including the population outburst in demand, which will put a strain on the country's energy resources. Biomass is also a versatile fuel that can be used to generate heat, electricity, and transportation fuels. As industrialization continues, the demand for biomass energy is expected to

increase. Never the less, there have been significant advancements in biomass technology in recent years. These advancements have made biomass a more efficient and cost-effective fuel. It can be produced locally, which can further help to reduce dependence on imported energy.

E. Green Hydrogen

With the aim of achieving energy independence by 2047 and attaining Net Zero by 2070, India recognizes the pivotal role of Green Hydrogen. Leveraging its abundant renewable energy resources, India has the potential to produce Green Hydrogen not just for its own needs but also for global markets. To establish a robust Green Hydrogen ecosystem and address the opportunities and challenges of this emerging sector, the National Green Hydrogen Mission has been initiated. Hydrogen demand in India is expected to increase significantly in the coming decades. With reference to Figure 4, by 2050, demand is projected to be four times higher than it is today, representing almost 10% of global hydrogen demand. The initial growth in demand is expected to come from mature markets, such as the refining, ammonia, and methanol industries, which already use hydrogen as an industrial feedstock and in chemical processes. In the longer term, steel and heavy-duty trucking are likely to drive the majority of demand growth, accounting for almost 52% of total demand by 2050. [8]

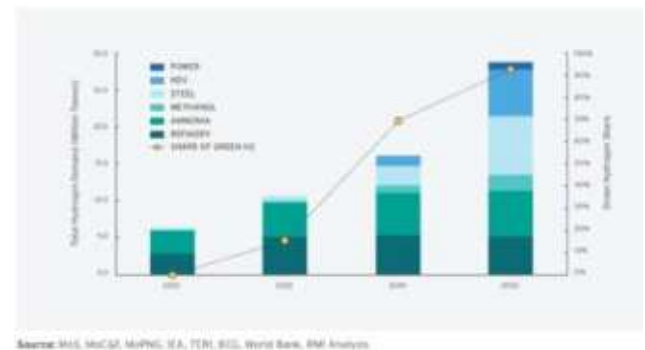


Fig. 5. Hydrogen demand outlook and potential green hydrogen share at cost parity [8]

Green Hydrogen, produced through renewable energy sources, holds significant promise in facilitating low-carbon and self-reliant economic pathways. It can effectively utilize the country's renewable energy resources across various regions, seasons, and industries, serving as both a fuel and an industrial feedstock. By replacing fossil fuel-derived feedstocks in key sectors such as petroleum refining, fertilizer production, and steel manufacturing, Green Hydrogen contributes to decarbonization. Additionally, its application in long-haul transportation and marine vessels can support the decarbonization of the mobility sector. Green Hydrogen also serves as an efficient and sustainable energy carrier for remote geographies, including islands.

India currently consumes around 5 million metric tons of hydrogen annually for industrial purposes. In recent years,

pilot projects have been conducted in India to produce green hydrogen using renewable electricity to electrolyze water, and from biomass through thermochemical and biochemical processes. The cost of electrolyzers and renewable energy are the two main components of green hydrogen production cost. The cost of capital, water supply and treatment, storage and distribution, conversion of hydrogen to suitable derivatives, and enabling infrastructure would also significantly contribute to the final delivered cost of green hydrogen for any particular application. The National Green Hydrogen Mission aims to take the necessary steps to reduce costs in all of these areas.[9]

Hence, Green Hydrogen is likely to play a critical role in India's energy transition and the Government of India interventions will ignite the process and provide required impetus for unlocking the market potential in various sectors through cost reduction and economies of scale.

III. TECHNOLOGICAL ADVANCEMENTS

India's RE generation, particularly wind generation, is highly seasonal. Flexible resources work in tandem to maintain grid dependability throughout the year, including times of high system stress such as periods with peak annual load, high RE variability, and high net load. India has made significant technological advancements in the renewable energy sector, driving the country's transition towards a sustainable and clean energy future. The cost of technology has significantly decreased in recent years, making it more economically viable. The country has become a global leader in the development and deployment of renewable energy technologies, particularly in the areas of solar and wind power. Here is a brief overview:

A. Solar Photovoltaic (PV) Technology

India has witnessed remarkable progress in solar PV technology. The country has embraced both utility-scale solar parks and rooftop solar installations. Advancements in solar PV technology, including higher efficiency solar panels, improved manufacturing processes, and innovative installation methods, have contributed to cost reductions and increased deployment.

The latest advancement in Solar Photovoltaic (PV) technology is the development of perovskite solar cells. Perovskite solar cells are a type of thin-film solar cell that use a perovskite-structured compound as the light-harvesting material. These cells have the potential to be more efficient and cheaper than traditional silicon-based solar cells.

Perovskite solar cells have shown remarkable progress in recent years, with their efficiency increasing from 3.8% in 2009 to over 25% in 2021. This rapid progress has made perovskite solar cells one of the most promising technologies for the future of solar energy.

In addition to their high efficiency, perovskite solar cells have several other advantages over traditional silicon-based solar cells. They are lightweight, flexible, and can be produced using low-cost manufacturing techniques such as inkjet printing and roll-to-roll processing. This makes them ideal for use in a wide range of applications, including building-

integrated photovoltaics, portable electronics, and wearable devices.

B. Wind Turbine Technology

India has seen advancements in wind turbine technology, particularly in the development of larger and more efficient turbines. The shift towards taller towers and longer blades has improved the performance and capacity factor of wind turbines. Wind turbine blades are also becoming more efficient, which means that they can generate more power from the same amount of wind. This is being achieved through the use of new materials, such as carbon fiber, and new designs.

With resources being utilised for more research and development of Off-shore wind energy projects, floating wind turbines are being developed for use in deep water. This opens up new opportunities for wind energy development, as it allows wind turbines to be installed in areas that were previously inaccessible.

Additionally, technological advancements in wind resource assessment, forecasting, and grid integration have enhanced the efficiency and reliability of wind power generation.

C. Battery Energy Storage Solutions (BESS)

The development of battery energy storage technologies is crucial for renewable energy integration and grid stability. India has made progress in various energy storage solutions, including lithium-ion batteries, pumped storage hydro, and advanced lead-acid batteries. There has also been an advancement by the use of artificial intelligence (AI) and machine learning (ML) to optimize battery performance and the development of hybrid energy storage systems that combine batteries with other energy storage technologies such as flywheels and supercapacitors.

These technologies enable the effective management of intermittent renewable energy sources and facilitate energy access in remote areas. The cost of BESS has also been steadily declining in recent years, making them more affordable for a wider range of applications. This is due to a number of factors, including economies of scale, increased competition, and technological advancements.

India has been commissioning many BESS projects in the recent times, which include:

1) *The Ramagiri Solar-Wind-Hybrid project, which is a 100 MW solar and 100 MW wind project that is integrated with a 120 MWh BESS. The project is located in the state of Andhra Pradesh and is expected to be commissioned in 2023.*

2) *The Rewa Ultra Mega Solar Park, which is a 4,500 MW solar park that is being developed in the state of Madhya Pradesh. The park will include a 100 MW BESS that is expected to be commissioned in 2023.*

3) *The Delhi government has also announced plans to install a 100 MW BESS to help manage peak power demand. The project is expected to be completed in 2023.*

As the country's renewable energy sector continues to grow, BESS are expected to play an increasingly important

role in managing the grid and providing reliable power to consumers and hence, enabling the integration of more renewable energy into the grid.

D. Green Hydrogen

India is currently exploring the potential of green hydrogen as a clean energy source, and there have been several recent advancements in this field. The Indian government has announced a number of policies and initiatives to promote the development of green hydrogen. These include a production-linked incentive (PLI) scheme for electrolyzers, a hydrogen mission, and a national hydrogen policy. A number of pilot projects are also underway to test the use of green hydrogen in various applications, which include fuel cells for buses and trucks, and the production of ammonia and methanol. All of these advancements are helping in bringing down the cost of green hydrogen and making it more feasible for personal and industry usage. These initiatives are expected to accelerate the adoption of green hydrogen in India and help to reduce the country's dependence on fossil fuels.

IV. INVESTMENTS AND OPPORTUNITIES

In the past few years, influenced by Covid-19, power sector investment in India had fell by \$10 billion year-on-year to \$39 billion in 2020, including a decline in solar and wind investment. But these rebounded with addition of over 15.5 gigawatts (GW) of renewable energy capacity – representing an investment of a record \$14.5 billion – in the FY2021/22. [10] India currently invests about \$15 billion per year in renewable energy. To reach its target of 500 gigawatts (GW) of renewable energy capacity by 2030, it is predicted that it will need to invest about \$30-40 billion per year. This

represents a more than doubling of current investment levels. This can be achieved by providing attractive financial incentives, such as tax breaks and subsidies, creating a favorable regulatory environment for renewable energy projects and investing in research and development to improve the cost-effectiveness of renewable energy technologies. With India's expertise in technological innovations with feasible cost constraints, it can create a vibrant renewable energy sector that will help to power the country's future.

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Performance analysis of Solar powered commercial Three-wheel Auto Rickshaw (TAR) with a solar tracking system

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Abstract— The objective of the current investigation is to harness energy from renewable energy sources, such as solar energy, and to develop a commercial autorickshaw powered by an Electrical Drive Train (EDT) Retro kit equipped with a solar tracking system that can improve the performance of the photovoltaic modules in a solar energy system. The device's working idea is to continuously align the photovoltaic modules with the sun's rays in order to maximise the solar panels' exposure to the Sun's energy. The solar panel can therefore provide higher output power. The idea behind working on this project emerged out of the observation of socio-economic conditions of the Three-wheel Auto Rickshaw (TAR) based passenger transport sector, as well as the Intermediate Public Transport (IPT) industry in general.

Keywords—electrical drive train, solar tracking system, retro kit, three-wheel auto-rickshaw

I. INTRODUCTION

Among different types of motor vehicles viz. Two three-wheelers (2-3W), Four-Wheeler (4W), Commercial Vehicle (CV), and Special Purpose Vehicles (SPV) all Three-wheel vehicles represent the L5 [1] category of motor vehicles as per Central Motor Vehicle Rule (CMVR) 1989. They are further classified into L5M and L5N vehicles [2] based on their application –the first one is used to carry passengers and the other carries the goods from one place to another. Three-wheel Auto Rickshaw (TAR) represents the first category of the vehicle i.e., L5M, and is being used extensively for passenger transport everywhere in Asian countries and in India also. The C- TAR, which represents three-wheelers, is equipped with Internal Combustion Engine (ICE) as a prime mover and hence it is popularly referred to as an ICE motor vehicle [3]. This vehicle has been used along with quadricycles, Taxis, and Multi Utility Vehicles (MUVs) to extend first and Last Mile Mobility (F&LMM) to people not only in metropolitan areas but also in towns and rural areas and has emerged as an important means of Urban Transport System. Along with many advantages of this

class of vehicles, they are responsible for pollution issues in cities, towns, and metros [4,5,6,7].

As stated earlier, C-TAR is the ICE vehicle equipped with internal combustion engines of different types as a prime-mover. An earlier version of this vehicle used to operate on a twoStroke (2S) petrol engine. In order to make it more fuel efficient and environment-friendly it witnessed some changes over the last two decades -prominent among them are changes in fuel and engine technology. Under National Urban Transport Policy (NUTP) 2006 these vehicles in certain cities of India are converted into Compressed Natural Gas (CNG) and Liquid Petrol Gas (LPG) fueled vehicles to minimize vehicular pollution. Further on the same line 2, this project is about TAR and its' electrification. The electrification of mobility was initiated in India through in the year 2012, the National Electric Mobility Mission Plan (NEMMP) 2020 was created. According to this strategy, 6-7 million EVs will be sold [8] were targeted by 2020. Further under FAME I [9] from 2015 & FAME II from 2019 interventions like offering demand incentives, charging infrastructure development, and Publicity and IEC (Information, Education & Communication) [10] have been and further are being planned and implemented at both national and state levels. The FAME-II scheme is further extended up to 2024 as per the recent GOI notification. The scheme extends a facility of reduced upfront cost over purchasing Hybrid and electric vehicles to customers and end users. Any person or end user can avail of this scheme by purchasing electrical two, three, and four-wheelers and buses. Moreover, government agencies, industry, and public sector undertakings (PSU) are promoted to set up public charging.

Electric Three-wheel Auto Rickshaw is a three-wheeler with an Electric Drive Train (EDT). A drive train [14] is nothing but a set of energy storages, energy converters, and a transmission system using which power is supplied to driving wheels. An energy storage means either a fuel tank, a battery, a hydraulic tank, or an air tank where the

energy in chemical, electrical, Hydraulic, or pneumatic form is stored respectively, and an energy converter is where the said energy is converted into useful mechanical energy that can be supplied to driving wheels either through transmission or directly. There are five main types of drive trains viz. conventional, electrical, hydraulic, pneumatic, and hybrid present in motor vehicles. The Conventional DriveTrain (C-DT) comprises a fuel tank and IC Engine which are respectively an energy storage and an energy converter and energy supplied by the engine is transmitted to the driving wheels via a transmission system. On the other hand, an Electrical

Drive Train (EDT) [11] contains a battery as an Electrical energy storage unit and an electric motor as an energy converter, the energy supplied by the motor is supplied to driving wheels using different types of transmission systems.

Depending upon the types of energy storage - batteries, energy converter –Electrical motors, and transmissions used we can assemble different types of EDTs for attaining distinct vehicle architecture [12, 13, 14] and so E-vehicles in general and E – three-wheel auto rickshaw.

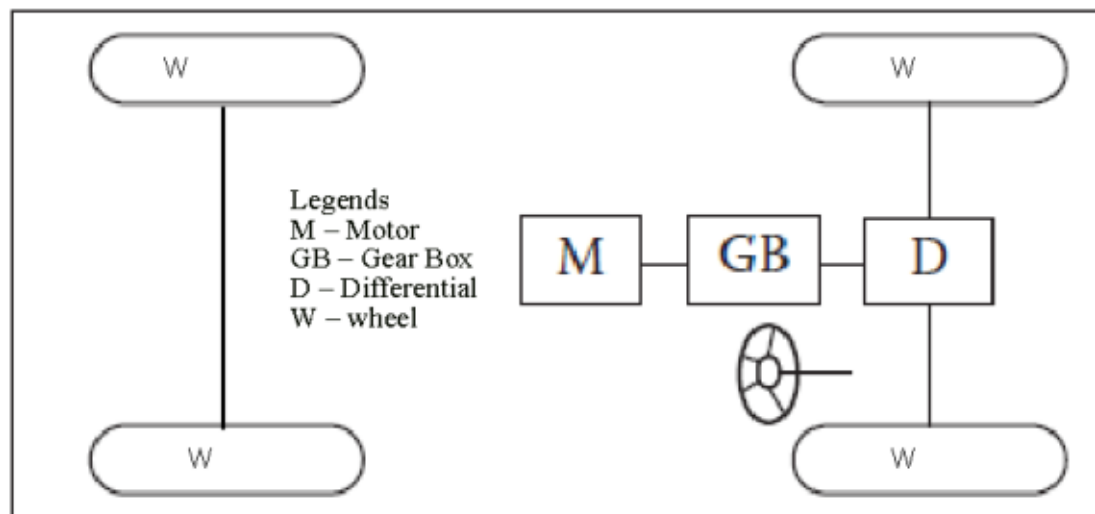


Fig. 1. Single Gear EV Architect

Fig. 1 shows a single-gear transmission architect where a single reduction gearbox or differential is connected to an EPT to form an Electrical Drive Train (EDT). There are many other architects available for designing new EDT or converting CDT into EDT. a conventional power train (CPT) is replaced by an Electrical Power Train (EPT), keeping a transmission system, that comprises a Clutch, a multispeed gearbox, and a differential, as it is. It is a primitive form of architecture tried at the beginning of the electrification program of many Original Equipment Manufacturers (OEM). It is the easiest way of conversion of any ICE vehicle into an electrical vehicle. A photovoltaic installation mounted on a motor-powered support structure is called a solar tracker. It enables the solar panels to be pointed towards the sun all day long to maximise sunlight absorption. As a result, according to the type of control, sensitivity of the sensors, or positioning system they contain, solar trackers can be divided into two main types [15, 16, 17]. The MPPT (maximum power point tracking) method, which relies on an algorithm to find the photovoltaic panel's

maximum power curve, or the sun tracking system, which is based on the orientation of solar panels throughout the day to best utilise the photovoltaic cells, can also be used to distinguish them [4,5].

II. DESIGN AND IMPLEMENTATION

The project work is distinctly divided into three parts. The first section discusses solar energy harvesting utilising tracker-mounted solar panels. The second part is about the conversion of a Conventional TAR into an E-TAR along with the identification and procurement of requisite instrumentation to test the converted vehicle. The second part of the project, which is equally important, is about undertaking test procedures for desired performance of E-TAR and generating data to analyze both the vehicle as well as Electric Drive train together as well as individually. The result based on processing data is vital in further refinement of both.

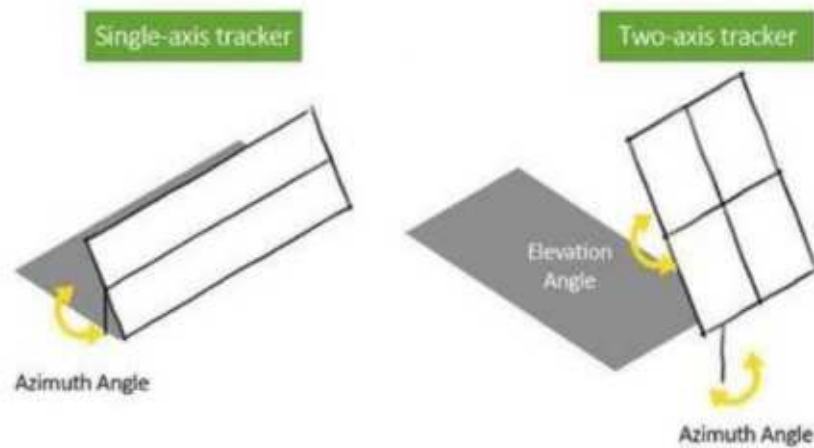


Fig.2. Single Axis and Two axis solar tracking

The tracking system depends on the azimuth angles. Single-axis systems are typically cost-effective. The tracking can be done in a single-axis tracking system either horizontally, vertically, or obliquely. On the other side, dual-axis tracking systems are more effective at catching the most solar energy, but they are more expensive. This type of device tracks the sun by keeping track of both its elevation and its motion.

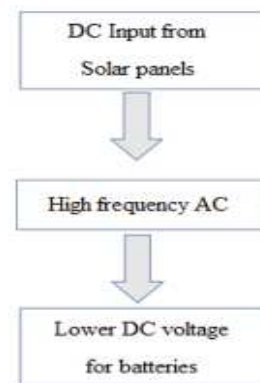


Fig. 3. Conversions taking place inside the Solar charge controller



Fig. 4. Snapshot of EDT mounted on a Transaxle Foundation

The conversion is carried out in two stages the first is to assembly modified CDT into EDT by overhauling of modified CDT for its proper performance and then mounting the clutch and the traction motor from both sides using the modified clutch shaft and the L-motor bracket. The proper care regarding the alignment of the motor and the clutch is taken to ensure overall balancing and fitment. Then

the converted EDT is tested for all the related performances like gearing changing, clutch engagement and disengagement, and the sense of rotation first by mechanical motion and then supplying battery power.

III. RESULTS AND DISCUSSIONS

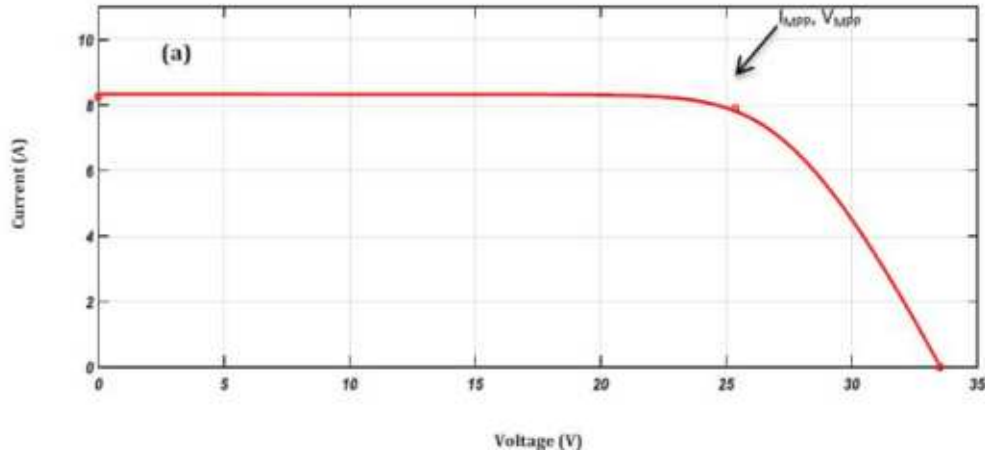


Fig.5. Voltage-Current Characteristics curve for a PV Module

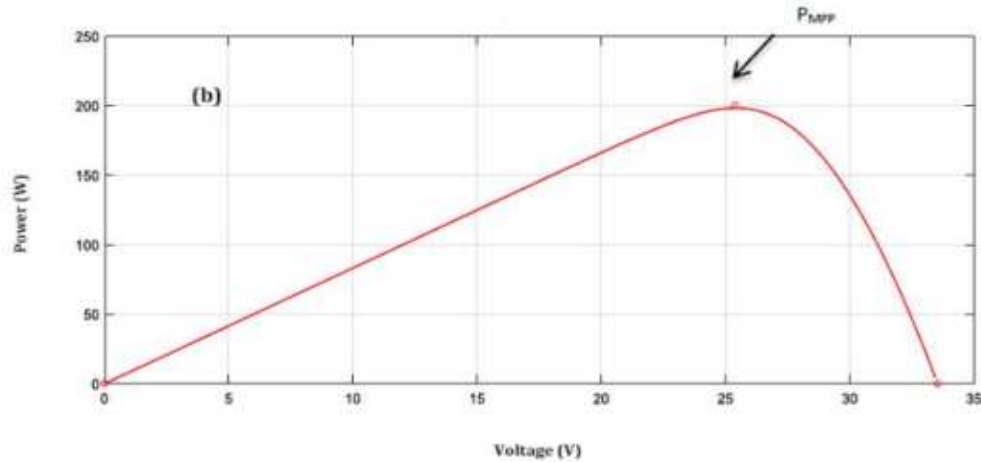


Fig.6. Voltage-Power Characteristics curve for a PV Module

The tracking system was employed in the month of May to July and a comparative study was conducted between tracking solar systems and fixed axis solar systems. Table 1 power values at the same time were recorded at regular intervals of 3 hours starting from 10 a.m. in the morning to 4 p.m. in the evening. The kind of solar panel employed was a 24-watt, 12-volt solar panel delivering approximately 1.89 amperes of average current. The fixed angle was kept towards the South East direction as it was

installed in the city of Satara with an average inclination of approximately 30 degrees.

TABLE 1. COMPARISON CHART FOR POWER HARNESSSED FROM FIXED PANEL AND PANEL WITH TRACKING SETUP

Time	Fixed Panel	With Tracking setup
10:00 a.m.	10 W	15.6 W
1:00 p.m.	11W	16.89 W
4:00p.m.	4W	13 W

As is evident from the data obtained from the experiment tracking can acquire more energy over a given period of time than a fixed solar system. The

test is taken to calculate the power consumed by the vehicle for accelerating it from stationary condition to reaching its max. Speed.

1. TABLE 2. POWER CONSUMED BY THE VEHICLE TO REACH A MAXIMUM SPEED

Gear Engaged	Maximum Speedometer Reading	Time taken in seconds	Voltmeter Reading (V)	Clamp meter Reading (A)	Distance in meters
1st Gear	15	15.96	49.4	1.8	37.6
	14	15.75	49.5	1.7	
	16	16.1	49.3	1.6	
2nd Gear	18	18	49.6	2.3	
	17	17	49.7	2.4	
	19	18.25	46.5	2.2	
3rd Gear	22	10.21	49.6	2.6	
	22	10	49.4	2.5	
	21	9.5	49.5	2.7	
4th Gear	23	11.88	49.2	3.2	
	24	11.5	49.3	3.3	
	24	11	49.4	3.1	

The velocity and time it takes to reach maximum speed are recorded using a speedometer and a stopwatch. The Average max. is shown in Table 2. Without using the throttle, the vehicle can go at 14, 17, 22, and 24 kmph in first, second, third, and fourth gear with a 141 kg payload on a flat surface (0% grade). The speed and gear that a car is in affect how much power it uses. They are positively correlated with one another. The maximum speed attained by the vehicle is 24 kmph with full throttle, plane road, and partial payload. The minimum and maximum speeds attained during this test are 14 kmph in the first gear and 24 kmph in the fourth gear.

IV. CONCLUSIONS

The study was written with the goal of drastically altering how auto rickshaws contribute to urban pollution and offering a workable remedy for it. The main goal is to replace dependence on fossil fuels and achieve zero tailpipe emissions. This aids in the transition to a greener society. Even though capital expenditures are higher, this helps those who rely on auto-rickshaws for a living because it allows them to save more money over time. The purpose of the prototype is to demonstrate practically how this idea may be applied to an auto rickshaw, which is a major component of public transit in most Asian nations. The prototype that was created used solar energy from renewable resources and had zero emissions at the tailpipe. According to the test results, the

manufactured solar-assisted auto rickshaw closely resembles the current conventional auto rickshaws.

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HYBRID ELECTRIC VEHICLE

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Abstract - This system is designed to prevent green-house effect caused due to the burning of fossil fuel and reduce pollution for the environment. The designing, construction and implementation of the Solar and Electric Powered Hybrid Vehicle (SEPHV) are expressed in this paper. The power supply of the SEPHV can be charged by the solar and normal AC power source too. In this system, the series combination of 12V six lead-acid batteries is used for the driving motor power supply (40~60V DC). The 50W six solar panels are used for charging each of batteries. The charge controller is designed to be the supply batteries with the minimum amount charge possible and to protect from overcharge by the solar panels as well as over discharge by the driving motor. In this SEPHV, wireless message display system is also designed by Arduino software. The weight of the car without load is 300kg. As the results, this SEPHV is capable of accommodating at least four persons (250kg) with an average speed of 57km/hr. By using this, we can be able to reduce the all kind pollutions and fuel economy.

Key Words: Keywords: BLDC motor, Solar Panel, Charge Controller, Batteries, Speed Controller

1. INTRODUCTION

This is a proposal of the project of developing Conversion kit for a conventional auto rickshaw to convert it into e-rickshaw and further convert into solar panel based hybrid electric vehicle / e-auto. As per more stringent environmental norms for CO₂ and NO_x emission, it is better to aim at Zero Emission Vehicle (ZEV) and that is possible by switching to electrical vehicles. Hence this project is taken. For Provide Retrofitting solution to Auto Rickshaw from existing petrol engine to electrical solution. by adding solar panel heat converts to hybrid electric vehicle. To increase the efficiency of Rickshaw by giving renewable energy solution. Using solar panel for better performance of battery & long range of battery. Because most of rickshaw wait for passenger in line in open area where sunrays can charge battery which

will improve range of battery. Three-wheeler auto rickshaws are the most commonly used transportation systems for short-range transport especially as taxi service due to its small size and low maintenance. However, the majority of these vehicles are part of the unorganized sector resulting in higher emissions and low efficiencies. A solar powered electric rickshaw can provide a none polluting and a very silent transport system for urban and rural areas of India. Besides it is Avery energy efficient and cost-effective vehicle.

2. LITERATURE REVIEW:

[1] Priscilla Mulhall, Srdjan M. Lukic, Sajanka G. Wirasingha^[1]

by following we got that solar assisted electric auto rickshaw which indicates importance of use of natural resources like solar panel. This study details the overall development of an advanced solar-assisted electric auto rickshaw.

[2] Rounak Mehta, Preet Shah, Harsh Gupta;^[2]

by following conversion of CNG powered auto rickshaw to an electric rickshaw designed for Indian condition. We got that the solution developed here is a design for low total ownership cost for short-range transport.

[3] Ajit B. Bachche and N. S. Hanapure^[3]

as we all know the fuel prices especially the petrol is rising steadily day by day. Again the pollution due to vehicles in metro cities & urban areas is increasing continuously. To overcome these problems, an effort is being made to search some other alternative sources of energy for the vehicles. Again, it is also not affordable to purchase vehicles (mopeds, scooters or motorcycles) for all the class of society. Keeping this in mind, a search for some way

to cater these economically poor people as well as to provide a solution for the environmental pollution was in progress.

[4] Piyush Kapila, Gaurav Puri, Manish Gaur^[4]

this research paper relates to the functioning of an electric car with self-charging from the alternator to the battery. The alternator produces the electricity while the wheel is moving, allowing the alternator to move with the wheel friction.

3. Methodology

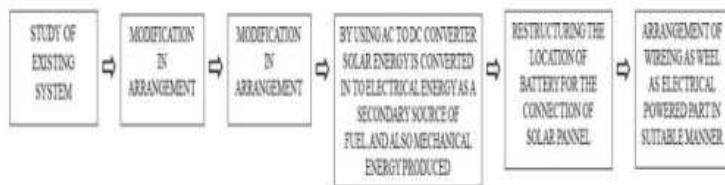


Fig.1 Flow Diagram

EV charging involves supply of direct current (DC) to the battery pack. As electricity distribution systems supply alternate current (AC) power, a converter is required to provide DC power to the battery. Conductive charging can be AC or DC. This self-powered electric vehicle aims to create a platform using multiple green energy systems to which every individual parameter of the vehicle can be self-controlled. This method challenges the purpose of an electrical vehicle, which helps to reduce environmental pollution using renewable energy. Here , we are using solar panels for as a secondary source of fuel ,hence Solar panel is that is converts the light energy into electrical energy. Basically solar panels are made up of semiconductors and converts light energy into electrical by photovoltaic phenomenon. In this when the sunlight falls on the photovoltaic cells photons of light or bundles of protons fall on the atom it release or excite the electron from the atoms.

4. Results:-

	Auto Rickshaw (Bajaj RE)	Retro fitted Vehicle (Bajaj RE)	Solar Vehicle
Power Input	Fuel Operated	BLDC Motor using battery	BLDC Motor using battery & solar energy
Power train	IC Engine	BLDC Motor	BLDC Motor
Emission	Emits Hydrocarbon gases	No Tail-pipe Emission	No Tail-pipe Emission
Power	7.5 KW	1 KW	1 KW
Top Speed	70 km/h	40 km/h	40 km/h
Max Torque	19.2 Nm	38 Nm	38 Nm
Capital Cost (Rs)	2,27,000 /-	58,115 /-	83,115 /-
Running Cost	2.85 Rs Per Km	0.48 Rs Per Km (Household)	0.48 Rs Per Km (Household)
Range	35 Km in 1 Liter	80-90 Km in 1 Charge	80-90 Km in 1 Charge

Table No 2 : Result table

1. When we trying to charge battery with electricity input it will take 7 to 8 hours to fully charge.
2. When we trying to charge battery with only solar input it will take 14 to 15 hours to fully charge.
3. When battery is fully charged and vehicle is in running condition and the solar panels generating electricity with their full intensity at that time vehicle does not take input from battery and runs only on power generated from solar panels.
4. In rainy season or when solar panels does not receive sunlight with required intensity at that time solar panel create electricity with 60% of their efficiency.

5. CONCLUSIONS

The concept of solar hybrid e-rickshaw is an important step toward sustainable green transportation system. Now-days, government has a number of schemes for clean and green technologies and therefore solar hybrid e-rickshaw is a viable solution. In this work, E-rickshaw with solar photovoltaic panel is simulated both with single and simultaneous battery packs. It was observed from the simulation results that solar hybrid E-rickshaw with heterogeneous shows

that Li-ion battery pack shares higher energy when simultaneously used with Lead acid battery pack. The results signify the possibility of implementing simultaneous battery packs at a reasonable cost price.

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ROAD POWER GENERATION BY USING FLIP-PLATE MECHANISM

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ABSTRACT

In the present day scenario, power is a major need for human life. There is a need to develop non- conventional sources for power generation due to the reason that our conventional sources of power are getting scarcer by the day. This paper emphasizes on the idea that the kinetic energy getting wasted while vehicles move can be utilized to generate power by using a special arrangement called “power sliding generator”. This generated power can be used for general purpose applications like streetlights, traffic signals. In addition, we could also have solar panels, which would satisfy our power needs, when there is no vehicular movement. The generated power can be used for the lamps, near the generator.

INTRODUCTION

The automotive industry in India is one of the largest in the world and one of the fastest growing globally. India's passenger car and commercial vehicle manufacturing industry is the seventh largest in the world, with an annual production of more than 7.9 million units in 2020. We every day mesh up with these vehicles give us headache. But this mesh up could be answer of new type power generation. Road Power Generation (RGP) is one of the most recent power generation concepts. This device is engineered as a practical and useful alternative energy technology for generating clean electricity from the millions of vehicles on our road ways. Once fully optimized and installed, engineers anticipate that devices may be used to augment or replace conventional electrical supplies for powering roadway signs, street and building lights, storage systems for back-up and emergency power, and other electronics appliances, and even devices used in homes and businesses.

In the present-day scenario power has become the major need for human life.

Energy is an important input in all the sectors of any countries economy. The day-to-day increasing population and decreasing conventional sources for power generation, provides a need to think on non-conventional energy resources.

Here in this paper we are looking forward to conserve the kinetic energy that gone wasted, while vehicles move. The number of vehicles passing on road is increasing day by day. Beneath RPG, setting up an electro-mechanical unit known to be power hump, could help us conserving this energy and use it for power generation. This generated power can be stored, by using different electrical devices.

I. PROBLEM STATEMENT

A engineer is always focused towards challenges of bringing ideas and concepts to life. Therefore, sophisticated machines and modern techniques have to be constantly developed and implemented for economical manufacturing of products. At the same time, we should take care that there has been no compromise made with quality and accuracy.

OBJECTIVES OF PROJECT

The main purpose of this project is to help to reduce problems of energy crisis to some extent, promote use of free source of energy and various other problems

1. To generate electricity and to store in a battery.
2. With the help of battery various applications to be achieved such as :
 - I. Use of led bulb as street light.
 - II. Charging of mobile phones.
3. To generate Electricity without any harm to nature

With the help of a professional setup these device can be capable of achieving multiple application globally such as

- Charging of EV's
- Maintenance of highways by selling the stored electricity. With will led to increase in economy of the country.

III. METHODOLOGY

Proper selection of various components

1. Flywheel:

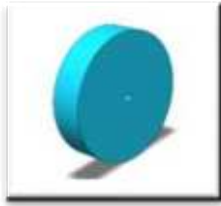


Fig. Flywheel

The primary function of flywheel is to act as an energy accumulator. It reduces the fluctuations in speed. It absorbs the energy when demand is less and releases the same when it is required.

2. Ratchet Sprocket



Fig. Ratchet Sprocket

A ratchet is a mechanical device that allows continuous linear or rotary motion in only one direction while preventing motion in the opposite direction. Ratchets are widely used in machinery.

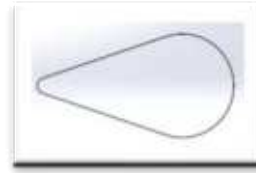
3. Shaft



Fig. Shaft

A shaft is a rotating machine element usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power.

4. Belt



A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently, or to track relative movement.

5. Bearing



Fig. Bearing

In these project we have use pedestal bearing. A pedestal bearing is used to provide support for a rotating shaft and makes all movements easier and also helps to reduce friction. The block is mounted to a foundation and a shaft is inserted allowing the inner part of bearing/shaft to rotate.

6. Dynamo



Fig. Dynamo

It is a device, which converts mechanical energy into electrical energy. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through “faraday’s law of electromagnetic induction”. A dynamo machine consists of a stationary structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turns within that field

IV. CALCULATION

5.7 ANALYTICAL CALCULATIONS

- Material = C 45 (mild steel)

Taking Fos as 2

$$\sigma_t = \sigma_b = 540/\text{fos} = 270 \text{ N/mm}^2$$

$$\sigma_s = 0.5 \sigma_t$$

$$= 0.5 \times 270$$

$$= 135 \text{ N/mm}^2$$

5.7.1 DESIGN OF LEVER :

The length of lever is 400 mm

t = thickness of arm in cm. $F_b = 270 \text{ N/mm}^2$

Cantilever bending moment will act when pulled by human hand

W = maximum force applied by human = 30 kg

- $M = W \times L$

$$M = 300 \times 400 = 120000 \text{ N-mm}$$

This link may fail under bending

And Section Modulus = $Z = 1/6 bh^2$

$$Z = 1/6 \times 5 \times 25^2$$

$$Z = 1/6 \times 3125$$

$$Z = 520.8 \text{ mm}^3.$$

Now using the relation,

$$F_b = M / Z$$

$$F_b = 120000 / 520.8 = 23.04 \text{ N/mm}^2$$

Induced stress is less than allowable 23.04 N/mm^2

So design is safe

5.7.2 TORQUE GENERATED:

Torque generated will be

$$T = F \times R$$

$$T = 300 \times 400 = 120000 \text{ N-mm}$$

This torque will remain same of flywheel shaft because same sprocket is used on both the shaft

5.7.3 CALCULATIONS FOR FLYWHEEL

The dynamo used in our project is of 300 rpm

Diameter of pulley used in dynamo shaft is 50mm

Diameter of Flywheel is 350 mm

Width of flywheel is 90 mm

As we know 300 rpm is required to generate electricity by dynamometer so we design diameter of FLYWHEEL

$$\frac{\text{Diameter of FLYWHEEL (dynamometer)}}{50} = \frac{N}{300}$$

$$\frac{350}{50} = \frac{N}{300}$$

$$N = \frac{350 \times 300}{50} = 2100$$

Hence speed of flywheel = 42.85 rpm

5.7.4 CALCULATE THE WEIGHT OF FLY WHEEL

$$m = \rho \times V \quad (\rho = \text{density of concrete} = 2400 \text{ kg/m}^3)$$

$$V = (3.14 \times d^2 \times t)$$

$$V = (3.14 \times 0.35^2 \times 0.09)$$

$$V = 0.0346 \text{ m}^3$$

$$m = 2400 \times 0.0326$$

$$m = 83.04 = 84 \text{ kg}$$

5.7.5 DESIGN OF SHAFT FOR FLYWHEEL

The flywheel shaft will fail under combine twisting and bending

$$W = 769 \text{ N}$$

Load is like simply supported beam

$$M = F \times L/4$$

$$M = 769 \times 750/4 = 144187.5 \text{ N-mm}$$

$$T = 12000 \text{ N-mm}$$

$$T_e = \sqrt{(M^2 + T^2)} = \sqrt{144187^2 + 12000^2}$$

$$T_e = 144685 \text{ N-mm}$$

$$T_e = \pi/16 \times \sigma_s \times d^3$$

$$d^3 = 144685 \times 16 / \pi \times 135$$

$$d = 17.60 \text{ mm}$$

$$d=18 \text{ mm}$$

But standard size available is 20mm, therefore we will select 20mm diameter
Therefore, shaft size will be 20mm.
Hence design is safe.

5.7.6 SELECTION OF BEARING

For 20mm Shaft diameter we take standard breaking no. P204

P=pedestal bearing

2=spherical ball

$$=04=5 \times 4 = 20\text{mm}$$

Bore diameter of bearing

We know that the mean kinetic energy of the flywheel,

$$E = 1/2. I. \omega^2$$

$$= 1/2. m k^2. \omega^2 (\text{in N-m or joules})$$

M=Mass of the flywheel in kg,

k = Radius of gyration of the

flywheel in meters, the radius of gyration (k) may be taken equal to the mean radius of the rim $I = 340 = 340/2 = 170 \text{ mm}$

I = Mass moment of inertia of the flywheel about its axis of rotation in kg-m² = $m.k^2$

$$= \frac{1}{2} \times 78 \times 0.170 \times (2\pi \times 44/60)$$

$$= 39.78$$

$$= 40 \text{ N-m/sec}$$

5.7.7 DESIGN OF LEG FOR FRAME

Let the total weight (P) of our machine be 60 kg, now this 60 kg weight is kept on four angles,

$$P = 60/2 = 30 \text{ kg.}$$

$$P = 30 \times 9.8 = 300 \text{ N.}$$

$$L = 620 \text{ mm.}$$

$$M = WL/4 = 300 \times 620/4$$

$$= 46500 \text{ N-mm}$$

$$Z = B^3/6 - b^4/6 \times B$$

$$Z = 30^3/6 - 26^4/6 \times 30$$

$$Z = 1961 \text{ mm}^3$$

$$= M/Z = 46500/1961 = 23.71 \text{ N/mm}^2$$

As induced bending stress is less than allowable bending stress i.e., 270 N/mm² design is safe.

5.7.8 DESIGN OF TRANSVERSE FILLET WELDED JOINT ON SHAFT

$$\text{Perimeter} = \pi \times \text{diameter} = 3.14 \times 20 = 62.83 \text{ mm}$$

Hence, selecting weld size = 3.2 mm

$$\text{Area of Weld} = 0.707 \times \text{Weld Size} \times L$$

$$= 0.707 \times 3.2 \times 63$$

$$= 142.5 \text{ mm}^2$$

$$\begin{aligned} \text{Force Exerted} &= 100 \text{ kg} \times 9.81 \\ &= 1000 \text{ N} \end{aligned}$$

$$\begin{aligned} \text{Stress induced} &= \text{Force Exerted} / \text{Area of Weld} \\ &= 1000 / 142.15 \\ &= 7.15 \text{ N/mm}^2 \end{aligned}$$

For filler weld:

$$\begin{aligned} \text{Maximum Allowable Stress for Welded Joints} &= 210 \text{ Kgf/cm}^2 \\ &= 21 \text{ N/mm}^2 \end{aligned}$$

Hence safe.

5.7.9 DESIGN OF FILLET WELDED JOINT

Hence, selecting weld size = 3.2mm

$$\text{Area of Weld} = 0.707 \times \text{Weld Size} \times L$$

$$\begin{aligned} &= 0.707 \times 3.2 \times 30 \\ &= 67.87 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{Force Exerted} &= 100 \text{ kg} \times 9.81 \\ &= 1000 \text{ N} \end{aligned}$$

$$\begin{aligned} \text{Stress induced} &= \text{Force Exerted} / \text{Area of Weld} \\ &= 1000 / 67.87 \\ &= \end{aligned}$$

$$14.7 \text{ N/mm}^2$$

For filler weld:

$$\begin{aligned} \text{Maximum Allowable Stress for Welded Joints} &= 210 \text{ Kgf/cm}^2 \\ &= 21 \text{ N/mm}^2 \end{aligned}$$

Hence Safe.

V. FUTURE SCOPE

In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, then it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country. Now, vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for power generation by means of new technique . It has advantage that it does not utilize any external source. Now the time has come to put forte these types of innovative ideas, and researches should be done to upgrade their implication.

VI. CONCLUSION

In this project, we have discussed a sliding plate mechanism for RPG (Road Power Generation). It has been shown that this type of system utilizes very small place and can be installed anywhere, unlike SBPG (Speed breaker generation system) system which cannot be installed everywhere. The power generated by this machine can then be stored in batteries for use. This makes it convenient since power can be supplied even if there are no vehicles passing over the sliding plate.

The utilization of energy is an indication of the growth of a nation. One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy.

In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, then it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country. Now, vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for power generation by means of new technique . It has advantage that it does not utilize any external source. Now the time has come to put forte these types of innovative ideas, and researches should be done to upgrade their implication.

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Power Quality, Protection and Electromagnetic Compatibility

MOVING FROM PASSWORDS TO AUTHENTICATORS

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Abstract—

People have used passwords for access control since ancient times. Upon the advent of the internet, passwords naturally transitioned to the web and have since become the standard mode of web authentication. However, over the last 25 years, password authentication has shown persistent and unavoidable security and usability problems. Many within the computer security industry believe that we can improve the state of the art in both security and usability by utilizing asymmetric challenge-response protocols for authentication. For example, the FIDO Alliance, a group of industry and academic partners working together to bring secure and usable authentication protocols to the web, utilize such asymmetric cryptographic protocols to help strengthen the authentication flow. Nevertheless, despite industry and academic desire to improve web authentication, passwords remain the status quo for users. In this dissertation, I present the landscape of authentication protocols and propose solutions allowing users to upgrade devices and recover from device loss— two of the remaining technical challenges that prevent modern authentication schemes from supplanting passwords as the dominant method of web authentication.

I INTRODUCTION

Passwords are the status quo in web authentication. Web authentication is “the process by which one entity (e.g., a server) identifies another entity (e.g., a user) remotely over the web”. The security and usability of this process is of the at most importance to both the server (Relying Party/RP) and the user. But despite decades of effort to improve password schemes to make them more usable and secure problems persist. As a result, industry and academic researchers have begun to turn to alternative authentication schemes based on asymmetric cryptography, which can provide much stronger security guarantees. However, despite the industry and academic push toward such schemes, there are outstanding barriers to adoption.

For example, in addition to creating more secure and more usable protocols, industry and academic researchers must find ways to convince users to switch to modern authentication.



Fig. 1. Higher Security than Passwords

In some environments, such as within corporate networks, companies can force employees to adopt modern authentication. But in the rest of the world, the new authentication schemes will have to provide users a better experience and convince users that the ecosystem is more secure. The FIDO Alliance has made significant progress on both fronts and has pushed us considerably closer to the adoption of modern authentication schemes, but there are still challenges to solve before mass-scale adoption is possible. The contributions in this thesis focus primarily on solving two of these remaining challenges: upgrading devices and recovering from device loss in the Web Authn ecosystem.

A) Businesses need password less authentication

In the past, companies sought to protect networks, and they generally trusted devices that connected from inside the network. However, with most companies moving software and services to the cloud, the perimeter has largely disappeared. Instead of authenticating once in the morning and allowing the use of a device during the day, companies are taking a page from consumer services and requiring authentication whenever specific permissions need to be granted.

The move to securing devices, users, and accounts through adaptive security measures, often referred to as zero trust security, allows companies to require that users re-authenticate whenever a key factor such as location changes.

If passwords were required for what could be continuous authentication, security would certainly get in users' way. Yet using, other forms of authentication such as facial or fingerprint biometrics, becomes possible because modern devices have security hardware built in.

Security pros can't rely on a secure network perimeter anymore, said Rolf Lindemann, co-chair of the Security Requirements Working Group at the FIDO Alliance and vice president of products at Nok Nok Labs.

B) Password less helps users

In the past, businesses have de-emphasized security measures because forcing users to enter passwords slowed down transactions. But stolen accounts and breaches have convinced businesses and consumers of the benefits of greater security—albeit grudgingly.

With a wider array of security technologies available, however, businesses are adopting a more fluid approach to authentication—also called adaptive security—where the user is asked for verification only when something changes or when the user is taking certain, high-value actions, said Troy Drewry, product manager at Micro Focus.

Our goal is to move from the chaos of having a password for every account—one 2017 study by password-manager firm Dashlane found that the average user has 150 accounts—to a password less future where devices manage keys and authentication can be completed easily and on demand.

Nick Steele, a technical leader for research and development at Duo Security, said the more frequently you can authenticate people, "the more robust set of zero-trust principles you are able to build out."

II Materials and Methods

A) Problems with Device Upgrade and Recovery in WebAuthn

Device Upgrade

In the password ecosystem, when a user gets a new phone she does not need to update any existing passwords. She can simply navigate to the sites with which she already has accounts and authenticate normally. But in the WebAuthn system, when a user gets a new device, she needs to register that new device for each of her online accounts. Even worse, she will likely need to use password-based authentication first in order to start each registration. Should she forget her password (which she likely wouldn't have used for authentications), she even may have to run an account recovery first. So while WebAuthn can improve the security and usability of the standard authentication flow, falling back on passwords for common scenarios such as device upgrade both leave weak links in the chain and dampen the usability gains WebAuthn provides.

B) Recovering from Lost Devices

Recovering from a lost device is a similar, but more difficult problem. In the event that a user still has a password, the recovery proceeds very similar to that described above. However, in an ecosystem where users no longer have passwords associated with their accounts, recovery is far more difficult, if not impossible. Without access to a registered device or a username and password, the user may need to enter into a site-specific recovery process for every single online account or may lose access to the account altogether.

Contributions - Discussion of Solution Space-

It provides an investigation of the many different options for solving these two problems, including an analysis of costs and benefits of each approach. As a result of this analysis, this dissertation identifies a form of credential binding as the method with the most promise. Credential binding allows for creating chains from trusted credentials to new credentials that the server can trust as strongly as it does the original credentials. Most importantly, credential binding does not require copying authentication material from one device to another, which would degrade the security guarantees of WebAuthn. As shown in subsequent chapters, there are ways to implement protocols based on credential binding that enable upgrading devices and recovering from lost devices without sacrificing any of the security or privacy properties afforded by WebAuthn. Further, the proposals in below points show how to do so while minimizing user burden:

- 1) The Transfer Access Protocol
- 2) Pre-Emptively Syncing Keys
- 3) Online Recovery Storage

Ecosystem and Description of Terms:

In the pieces of this work discussing WebAuthn and other asymmetric challenge-response protocols, we use certain terms to refer to key entities within the system. In these schemes, there are two main actions a user can perform:

A) Registration occurs when the user wants to create an account or register a new key to an existing account.

B) Authentication occurs when a user wants to access an existing account and needs to provide evidence of account ownership in order to be authorized to access those resources. In either case, a user communicates with a relying party (or RP) through a browser or mobile application (client). This relying party serves the web page or provides the mobile app (e.g. www.google.com or the endpoint for the Facebook app).

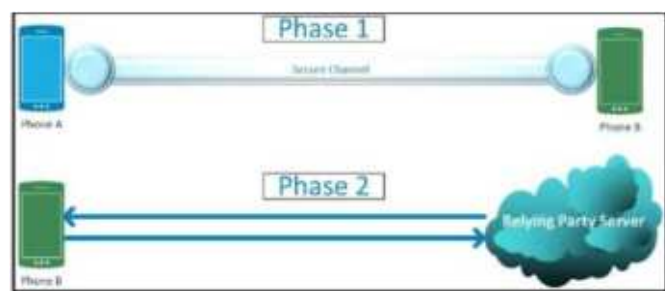


Fig. 2.1. Figure showing above Ecosystem.

C) Transitioning from Passwords to Password less

This transition to an Adaptive Multi-Factor Authentication flow is already in place. An Adaptive Multi-Factor Authentication flow should also be considered a path to transition between the traditional username and password to a more secure password less deployment using modern authentication options.

Assuming a traditional authentication flow using username and password, the first step can be to add support for WebAuthn as an traditional login flow. Many solutions offer WebAuthn as an optional multifactor authentication option today - the difference here is based on the if a user has a FIDO2 authenticator associated with their account, that option is presented instead of the username and password. As the user is required to provide their identifier in the form of their username at the start of the process, the framework for transitioning.

Once support for WebAuthn is in place as a second factor authentication solution, the next step is to move it from an optional component to a required one in the authentication flow. With the introduction of support for WebAuthn platform authentication on desktop and mobile devices, this becomes less of a burden on the end user. For a successful transition, there are three important changes which must be made to the User flow:

- A) Existing users must be required to register a WebAuthn Authenticator to their account as part of the login flow.
- B) New users must be required to register a WebAuthn Authenticator on account creation.
- C) All users must have the option to add or remove additional authenticators in their account.

D) Passwords vs PINs & U2F Password

Moving from always requiring a password to only requesting a U2F Password if the user is not required to provide one to an authenticator may feel like moving to a less secure security model. In actuality, by implementing such a flow the major vulnerability of a password is removed. Instead of relying on a password to verify the identity of a user, the authenticator is. The U2F Password is only used to verify the authenticator is being used by an authorized party. The threat plane transitions from anyone who can connect to the service to just those who can physically take control of the authenticator device. This is the same model as used with debit cards at ATMs.

Likewise, since a password is no longer used to access an account, the traditional complexity requirements for a U2F Password can be relaxed. U2F Passwords should still be random, but can be shorter, not changed as often, if at all, and not have the same character complexity requirements. Overall, this provides a better user experience with a higher level of user security.

2.6 Future Scope :

- Password less authentication is the future. Gartner predicts that 60% of large and global enterprises, and 90% of midsize enterprises, will implement password less methods in more than 50% of use cases.
- Implement password less authentication to reduce attack vectors, enhance the user experience and reduce operational costs.
- In addition to identifying issues regarding device upgrade and device loss, over the course of this work we also identified other aspects of the WebAuthn specifications that would benefit from academic research.
- Security of Second Factors - There are a number of proposed local second factors for the WebAuthn authentication scheme, ranging from iris scans, to fingerprints, to pins, to passwords.

As users try different second factors, researchers will need to analyse the security and usability trade-offs of these factors to determine how they should be best implemented in the framework of WebAuthn. Enabling privacy preserving first pairings for WebAuthn registrations and authentications - When a user employs a phone as an authenticator to give access to browser sessions on a personal computer, the PC's browser and the phone need a way to set up a secure communication channel. For devices that have paired in the past, we can simply re-use those connections.

For example, the PC can store trusted Bluetooth authenticators and query the authenticators in range when the user tries to authenticate. This will cause a notification to pop up on the user's phone, which he can use to authenticate on the website. However, for devices that have no previous pairing relationship, a broadcast message leaks information to all Bluetooth devices in range that a certain account holder is trying to log in. Applying privacy preserving cryptography, like a Bloom Filter, may allow the PC and authenticator to setup a secure connection using privacy preserving broadcast messages. If we cannot come up with an optimal (no privacy leaks and no user necessary user interaction) solution to this problem, we can study the different methods of Bluetooth pairing and create a framework to discuss the pros and cons of each approach.

In all, there were many unexpected results when researchers observed use of modern authentication schemes in the physical world, indicating that we will need to continue to research this space to fully realize the benefits of modern authentication schemes.

III Conclusion

Password less is one step closer to solve the security on the web. Moving away from the hackles of the password itself is a major step. With stronger security and simple user login experiences, the demand for this technology is increasing. To be in the trusted network, enterprises need to adopt technology capabilities that help them to keep up with the emerging challenges in security, privacy, and consent controls. With benefits like better security, reduced cost, digital transformation, and increased usability, Password less provide users with an enhanced and secure digital ecosystem.

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Internet of Things and Robotics

Women Security System

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Abstract— Throughout history, women have contributed to the stability, advancement, and long-term growth of the nations. Women cannot be really integrated in society if they are subjected to abuse and harassment. An sophisticated system is required in light of the rise in horrific occurrences affecting women and children in order to fulfil the objective of getting help as quickly as possible. The use of smartphones has grown quickly in the present, making it possible to utilise one effectively for security or other defensive objectives. The recent horrific events have prompted us to consider the need for safety measures. The use of our application "Women Security" can help to reduce crimes against women.

Keywords— Safety app ,Women safety Application, Android, Women Security, etc

I. INTRODUCTION

Despite many efforts by the government, the number of crimes conducted against women remains unchanged. It evolves at a startling rate every day. Eve bullying, harassment, molestation, rape, domestic violence, and kidnapping are becoming commonplace. To manage this emergency situation, numerous applications for women's safety have been developed. Here, we're offering an Android software that, by identifying the position of the person in danger, assures the safety of women and reduces the risk. The primary function of the app is that the user must first check that it is turned on while leaving the house. She must press SOS or scream to deliver the voice command to launch the main function of the programmes whenever an awful incident occurs. Additionally, a call will be placed to the hotline number. At the same time, audio recording will begin. The app has live streaming capabilities, allowing the registered contacts to periodically view the victim's whereabouts. Additionally, we preserved the offline system. The user must turn the app off after using it to complete their task in order to end its functionality.

In India, women's safety is an important issue, much as it is

dangerous for women to go alone at midnight or consider an isolated spot. Considering that women are not as powerful physically as men, they should have support.

These days, a person's cell phone can be their best friend and make it possible to stay in touch with their loved ones at any time. In an emergency, anyone needs to call or send a specific message from anywhere at any time.

We introduce an app that protects women's safety. This makes it easier to locate and text on resources to save the person from perilous situations.

2. LITERATURE SURVEY

1.Name-: LIFECRAFT: AN ANDROID BASED APPLICATION SYSTEM FOR WOMEN SAFETY; Rabbina Ridan Khandoker, Shahreen Khondaker, FatihaTus-Sazia, Fernaz Narin Nur, Shaheena Sultana.

Description-: Women have ensured the stability, progress and long-term development of the nations throughout the history. If women are subjected to violence and harassment, they cannot be genuinely included in society. With increasing heinous incidents involving women and children, an advanced system is needed to serve the purpose of getting help as soon as possible. At present time, the use of smartphones has increased rapidly, making it possible to use a smartphone efficiently for security or other protective purposes.

2.Name-: The Personal Stun- A Smart Device For Women's Safety; Shivani Ahir, Smit Kapadia, Prof. Jigar Chauhan

Description-: We focus on developing a prototype that is a smart band which gets activated by tapping on the screen twice. Once the device is activated it starts sending the GPS location to the ICE contacts and police control rooms. There is a pulse rate sensor embedded in the device that senses the pulse rate of the person and a temperature sensor that senses body

temperature of the person. The band when thrown with force the force sensor will get activated and sends the current location of the victim. A Piezo buzzer siren will get activated after 1-2 mins of the actual device getting turned on.

3.Name-: Smart Intelligent System for Women and Child Security; Prof. Sunil K Punjabi, Prof. Suvarna Chaure, Prof. Ujwala Ravale

Description- Women all over the world are facing unethical physical harassment and Children cannot be left unattended at a social event or outside the home. Our project solves both the problems. A portable device which will have a pressure switch. As soon as an assailant is about to attack the women/child or when they senses any insecurity from a stranger, he/she can then put pressure on the device by squeezing or compressing it. Instantly the pressure sensor senses this pressure and a conventional SMS, with the victim's location will be sent to their parents/guardians cell phone numbers stored in the device while purchasing it, followed by a call..

3.Name-: Do Women in Conservative Societies (Not) Follow Smartphone Security Advice? A Case Study of Saudi Arabia and Pakistan; Elham Al Qahtani , Yousra Javed, Heather Lipford.

Description-: Women in conservative cultures, are an understudied population when it comes to investigating how users keep their devices and data safe. Owing to the recent trend in smartphone adoption and the simultaneous increase in attacks targeting women in conservative societies, this study uses the rational decision model to investigate the motivations of this user group for (not) following common smartphone security advice.

4. Name- Smart Security Device for Women Based on IoT Using Raspberry Pi Prottasha Ghosh, Tanjim Masroor Bhuiyan, Muhib Ashraf Nibir

Description-:The percentage turned to 66%, 38% and 35% for the public places, workplace and at their home respectively. At first, the cases handling by the police are a major issue but there have some botherations like not knowing the victim's exact location, not knowing surely the crime occurred at all, and then lack evidence, police stops investigation.

5.Name-: WOMEN'S SAFETY SYSTEM BY VOICE RECOGNITION; Vinay Mishra, Nilesh Shivankar, Sanam Gadpayle.

Description-: A bunch of latest apps are developed to produce a security system to girls via their phones. per the reports of World Health Organization NCRB Social Government Organization thirtyfifth girls everywhere the planet square measure facing a great deal of unethical Physical Harassment publicly places like Railways, Bus- stands and pathway, etc. during this Paper, we've got reviewed of assorted existing systems on women security.

6. Name-: Analysis of Women Safety in Indian Cities Using Machine Learning on Tweets; Deepak Kumar1,Shivani Aggarwal

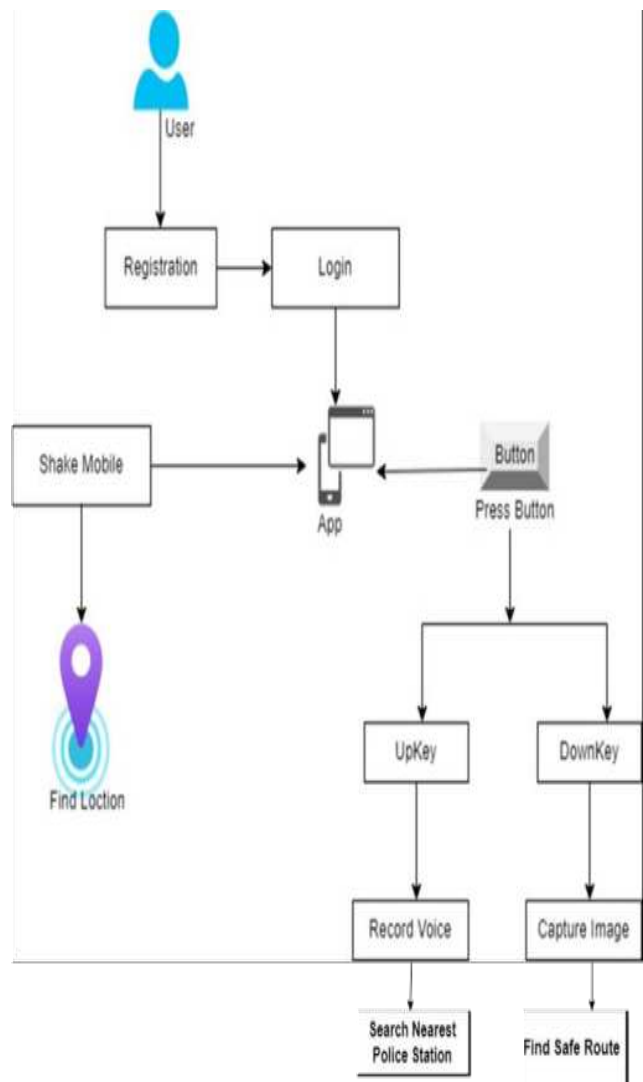
Description-: Women and girls have been experiencing a lot of violence and harassment in public places in various cities starting

from stalking and leading to sexual assault.

7. Name-: Safety Solution foe Women using smart band and CWS app; A.Z.M Tahmidul Kabir

Description-: Women endures a lot of sexual harassment these days which is becoming alarming day by day. We are advancing an IOT device along with an android app that can make women's movement safer.

3. PROPOSED METHODOLOGY



When a user wishes to engage with the system, they need to have a login ID, which they can get after registering with the system and providing some supporting documentation. When a user first interacts with the system, a login box with options to add additional users to the system appears. He receives a new window to register his text sample and himself when he clicks on "new registration user." Alternatively, if a user has already registered, he must authenticate the text by comparing it to a sample that has already been stored. The newly created text sample features were then matched with the retrieved text feature.

Description:

Module 1:

In this system we detect the women security application features which based on the android application.

Module 2:

A. Some of the attributes of application

B. Features:

1. Registration Page: fill registration form
2. Login Page: type username and password which have already registered.
3. Upper key: Sending text sms using voice recorder.
4. Lower Key: Capturing image and send our registered mail id.
5. Show Nearest Police Station: nearest police station display on screen.
6. Safe Route: find the safe route from our current location to the destination.
7. Shake device: when we shake our mobile device then send current location to our registered mail id.
8. Safety Tips: Some safety tips showing on the screen.
9. Logout: Sign out the application.

Database:

By enabling safe entry to the databases through client-side code, the Firebase real-time database allows you to create robust, collaborative apps. Data is locally stored, and real-time events continue to happen even when the user is offline, providing a responsive experience. When the hardware regains connectivity, the Realtime Database immediately merges any discrepancies between the locally stored changes and the remote changes that took place while the user was offline.

To specify how your data should be organised and when data is able to read from or written to, the Realtime Database offers an expression-based rules language called Firebase Runtime Database Security Rules. Developers can choose who has knowledge of what data and when they can access it when Firebase Authentication is integrate.

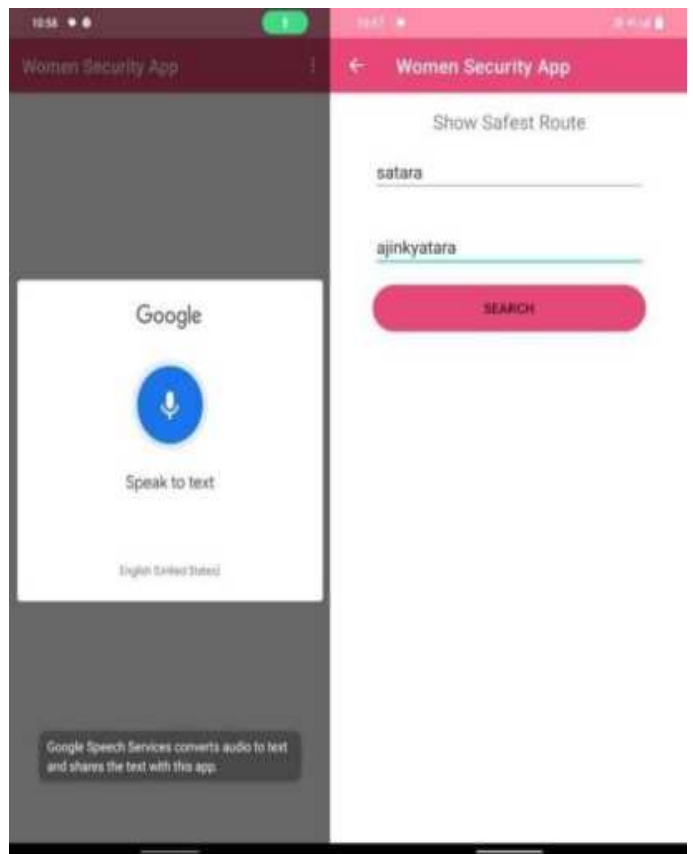
C. Mathematical Model:

Let „S“ be the system

- Where,
 - $S = \{I, O, P, Fs, Ss\}$
 - Where,
 - I = Set of input Set of output
 - P = Set of technical processes
 - Fs = Set of Failure state
- Ss = Set of Success state
- Identify the input data $I1, I2, , InI = \{(Input\ Data\ (,))\}$
- Identify the output applications as $O1, O2, , On$ { (Women safety application) }
 $P = \{(Record\ voice, capture\ image, shake\ device, find\ route, show\ nearest\ police\ station, show\ result)\}$
- Identify the Failure state as Fs
 $P = \{(Correct\ analysis\ within\ time)\}$

4. RESULT AND DISCUSSION





Result



4. CONCLUSION

There are some worries about security but not about women's safety. Many headlines indicating that sexual assault and rape continue to be on the rise against women suggest that this generation is currently experiencing these tendencies. About 80% of women are losing their self-confidence and are afraid of becoming free. Therefore, we are attempting to make small contributions to women's causes that will secure their safety and respect so that they can have the freedom to develop equally with men. Anyone can benefit greatly from this mobile application. Before meeting the actual danger, the user can take protects here. Every woman should know that it is now safe to travel alone because someone will have their most recent location.

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Bluetooth based Home Automation using Arduino

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Abstract: The species is transferring fastly towards mechanization. People have lower time to handle any work so mechanization is simple way to handle any device or machine will work to our desire. This paper end is to elaborate and purpose a Home mechanization applying Arduino with Bluetooth module. Home mechanization system gives a simple and good technology with Android job. Home appliances like Bulb are checked by Home mechanization system using Arduino Uno with Bluetooth module. The paper mainly focuses on the observer and control of smart home by Android phone and give a protection based smart home, when the people does not present at home.

Keyword- Arduino, Home mechanization, Bluetooth, Smart phone, guard

I. Introduction

Currently days everyone has smart phone and wants to control everything from smart phone. Everyone knows how to check mobile phone so it easy to use and decide. Glows, user, switches, refrigerator are controlled through Bluetooth predicated remote using arduino. The designing of home mechanization are going to come simpler and further popular because max of people uses smart phone now days. In this device we are using Arduino which is most generally used device for mechanization. Arduino is an attack which is used to connect computer and the design model so that we can control it by using Arduino law accordingly. Ardiuno is a microcontroller it's just like mortal brain it processes information and also it perform some Logical and fine operation on that information.

Arduino is connected with the Bluetooth module which receives the information from user. Arduino also connected relay, which receives data from Arduino and do the operation as switch. Bluetooth technology is Wireless radio transmissions in a short distance furnishing a necessary technology to produce intelligence and controllability. This generates particular area network in home terrain, where all these appliances can be connected and covered using a microcontroller with Arduino using smart phone.

II. Literature Review

They research about the home automation system in which they have used a graphical user interface (GUI) which is inexpensive embedded system which works over internet connectivity to control home appliances remotely They have designed their system in such a way that they can operate is through any kind of android or operating system (OS) device[1].

Their research proposed that consist of hardware and software interface. They have used Wi-Fi facility to established connection between hardware and software and they have connected through many devices like tablets, mobile phone, and laptop [2].

Their research paper demonstrates the design and implementation of a new home automation system that uses Wi-Fi technology as network architecture. Their system has given an architectural idea of smart home parking system [3].

Their research based on both the concept of smart home and security system which is low cost and easy to install, their research based on how to make people life easy and better [4].

They describes the implementation of java ME programming language to operate home. Their main idea revolving about the implementation

of programming based smart home concept to throughout the world [5].

Their research based on internet of Things (IoTs) through which they can develop various home sensor network throughout the home and operate home through these sensors only and for identify the type of power supply in home automation sensor they have developed an adaptive classification scheme (ACS)[6].

Their research based on small prototype which detects the object and they design an alarm system by Advanced RISC Machine (ARM) microprocessor. In their project system will send an email to the respective authority regarding the alarm and the detection system [7].

Their system works over bit voice. In which they have developed a system which detect the object in their nearby and act accordingly, these system does not have user defined nor conditional control. They act according to the data that has been triggered by the system [8].

Their research based on system in which they have used smart thermostats. Their system has an energy consumption of 60% by Heating, ventilation, and air conditioning (HVAC) and they are going to improve their system in the future [9].

Their research based about how home automation energize itself by using photovoltaic cell, so their system does not required any other power supply[10].

III. Proposed Work

Home mechanization describes a system of networked, controllable device that work simultaneously to make your home too easy, customized, effective and secure. In this device there are five main corridor Arduino, Bluetooth module, Relay drivers, android operation and step down motor. Firstly we give power to the step down motor, it step down the input voltage and given to the arduino with VIN leg. The Bluetooth module is also connected with arduino to Rx and Tx leg that provides the information to the microcontroller.

Microcontroller reads the information and shoot to the relay drivers which work as switch. In Arduino we upload the schedule as per demand so it performs

some fine and good operation to check the relay drivers

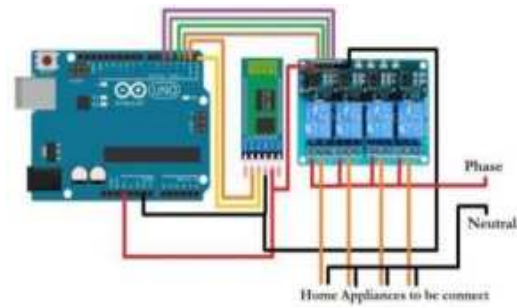


Fig.3 (a) - circuit diagram of Home Automation

Android operation are linked to the arduino Bluetooth (HC- 05). In the figure 2(b) there are four switches which is linked to relay motorists and four relay are linked to the home appliances.



Fig.3 (b)-Mobile android application.

Table 1: Component Details

Sr. No	Component Name	Specification
1.	Arduino Uno	Microcontroller: ATmega328P Operating Voltage: 5V Input Voltage (recommended): 7-12V Input Voltage (limit): 6-20V Clock Speed: 16 MHz
2.	Bluetooth	Bluetooth protocol: Bluetooth Specification v2.0+EDR Frequency: 2.4GHz ISM band Modulation: GFSK (Gaussian Frequency Shift Keying) Emission power: $\approx 4\text{dBm}$ Speed: Asynchronous: 2.1Mbps(Max) / 160 kbps, Synchronous: 1Mbps/1Mbps Operating voltage: 3.3V to 5V DC
3.	4-Channel Relay	Supply voltage – 3.75V to 6V Trigger current – 5mA Current when the relay is active - $\sim 70\text{mA}$ (single), $\sim 300\text{mA}$ (all four) Relay maximum contact voltage – 250VAC, 30VDC Relay maximum current – 10A

IV. Description of Hardware

1. Arduino Uno:-

Arduino Uno is a microcontroller chip dependent on the ATmega328 (datasheet) with 14 computerized I/O pins, in which 6 pins can be utilized as yields, 6 pins are utilized as simple information sources. It has 16 MHz crystal resonator, a USB association, a power jack and a reset button. The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication capability via UART, SPI and I2C. Because of well design in

the form of Arduino it is easy to understand. In Arduino we use high level of programming language like C language, C++ language etc. It is easy to understand and user friendly language. It has much advantage like multitasking, automation, time domain etc. Arduino Uno fig4 (a) is given below [10].

**Fig 4(a)- Arduino Uno 2.**

Bluetooth Module:-

HC-05 Bluetooth module is used to connect the microcontroller with android application. Bluetooth receives the information from the user and sends it to the microcontroller (Arduino Uno). It is simple to use Bluetooth Serial Port Protocol (SSP), designed as a wireless serial connection setup. The Bluetooth of serial port module is Advanced Bluetooth v2.0+Enhanced data Rate at 3Mbps modulation with 2.4 GHz radio receiver with BB (base band). The Bluetooth of Rx and Tx pins are connected to the Arduino pins of Tx and Rx respectively. HC-05 module is a simple to utilize Bluetooth SPP (Serial Port Protocol) module, intended for straightforward remote sequential association setup. It utilizes CSR BlueCanter 04-External single chip Bluetooth framework with CMOS innovation and with AFH (Adaptive Frequency Hopping Feature). It has the impression as little as 12.7mmx27mm. The figure 4(b) of Bluetooth HC-05 module is given below [11].



Fig 4(b) Bluetooth HC-05.

3. Relay Drivers:-

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When arduino transmit the signal then relay driver receive signal and start its work. They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuit. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangement of working voltages like 6V, 9V, 12v, 24V and so on. In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have distinctive number of changeover contacts.

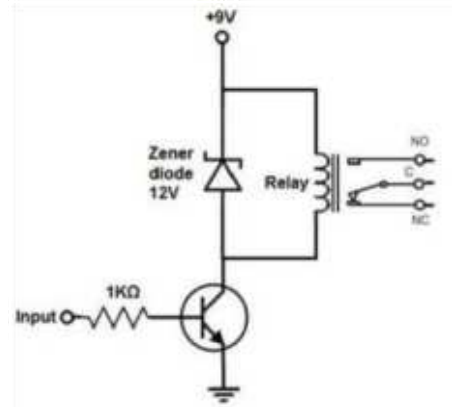


Fig 4(c) Relay circuit diagram

When the power is transmit to the relay works as a switch due to electromagnetic effect so that we can switch ON or OFF our home appliances[12].



Fig 4(d) Relay module

V. Advantages & Disadvantages

Advantages • Everything is automated so it is easy to use.

- It is control by mobile application so no extra training is required.
- It saves our time.
- Every home appliance can control by one android application.
- Easy installation and user friendly

Disadvantages:

- Installation cost
- Internet Dependency
- Privacy Concern
- Complicated user interface

VI. Result

According to the proposed plan the final outgrowth of this paper leads to the development of a home robotization. Through this design, an robotization system has been created so that we can fluently control home appliances like as light, addict, tube light, AC, bulb, etc. One of the objects of this design is also to get us a smart robotization and low cost design. In this paper we've also handed information about arduino Uno, Bluetooth regulator and relay module. And the information about their work is given. Along with the element of home robotization, its advantage has also been bandied. The system is easy and secured for access from ant stoner or meddler.

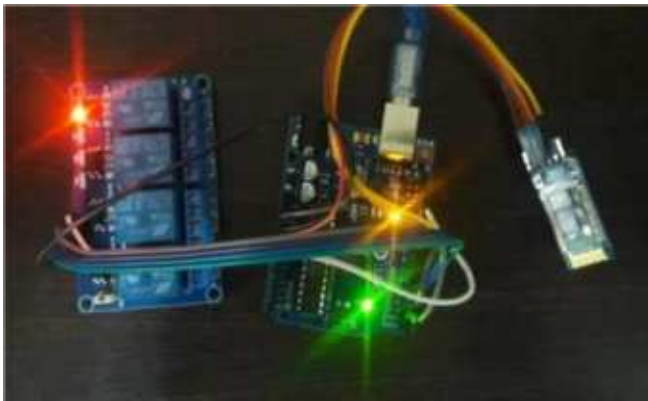


Fig 6(a) Arduino with relay module

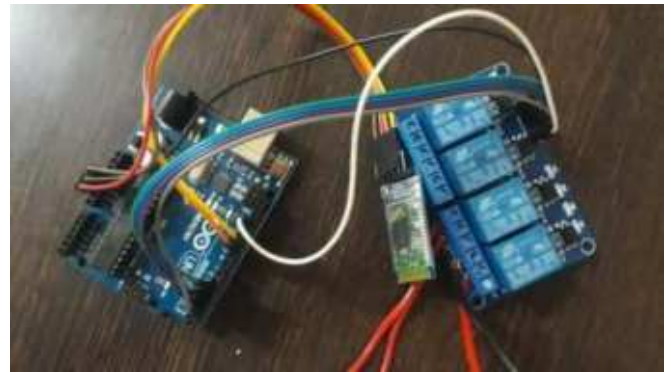


Fig 5(b) Arduino with Bluetooth

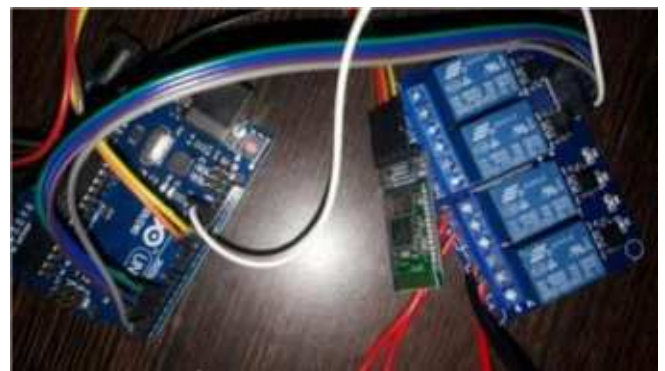


Fig 5(c) Relay module with Bluetooth

VII. Conclusion

It is concluded from the work done that Home robotization is a special kind of device which controls home appliances with using redundant trouble. And in this paper, we demonstrated how the home robotization is made, bandied about methodology and what its operation can be. And in the future, on the new technology can be included which reduces mortal trouble, which is being delved, we also talked about it. And we have created that type of device which is compact in size, low cost, further capacity, long life and more distant signal receivers. The need of exploration paper is to produce a device which saves the electricity and improve mortal life style.

VIII. Future Scope

- The various future application may be used by controlling various household devices of house with internet
- In the future work the persons other than the resident will also be considered
- Industrial automation and management through internet
- Improvement of security problems
- Using in extremely restricted areas

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IOT Based Electricity Theft Detection System

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Abstract— Innovative solutions for various industries have been developed as a result of the proliferation of Internet of Things (IoT) devices. IoT has the potential to completely change how electricity is produced, transmitted, and used in the electricity sector. The use of IoT for detecting and preventing electricity theft is one such application. Meter tampering, also known as electricity theft, is a significant problem that affects the revenue and profitability of electricity boards. It entails circumventing meters in an unlawful manner in order to use electricity without paying for it. This not only costs government's money, but also puts consumers and the electricity grid in danger of injury or damages. In this project, we propose creating an IoT-based system to track down and stop electricity theft.

Keywords—IOT,Power theft detection,wifi module LCD,Current sensor,Power supply

Introduction

Electricity is one of the greatest technological innovations of mankind. It has now become a part of our life and one cannot think of a world without electricity. Electricity theft has emerged as a serious problem in power sectors especially in the developing countries. A huge amount of revenue is lost due to electricity theft. In some countries, this is so severe that governments are

incurring losses instead of revenue. In some cases, government has to provide subsidies to the power sector to maintain a reasonable price of electricity. The financial loss results in shortage of funds for investments to expand the existing power capacity and as a result government is failing to satisfy the ever-increasing demand for electricity.

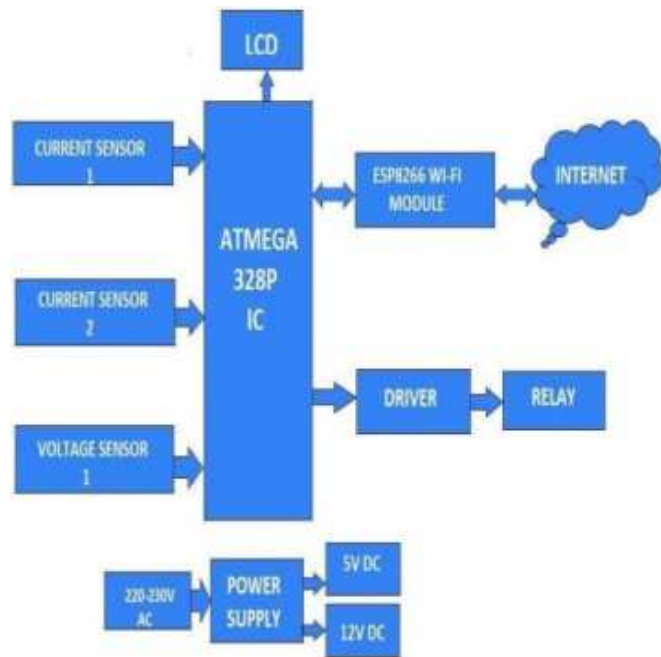
MOTIVATION WORK

The main reasons behind electricity theft are low literacy rate and lack of awareness. Power Theft is a non-ignorable crime and at the same time it directly affected the economy of a nation. To utilize generated power in a most efficient manner it is needed to closely monitor

RESEARCH WORK

Iot helps the object to understand and exchange the data. Iot is driven by the combinations of sensors, connectivity, people and progress. The massive potential of iot is used for improved performance, innovative services and in revenue streams. Iot is used in various fields in homes iot is used in light bulbs, security and in energy monitoring. In transport it is used in traffic routing, telematics and in shipping. In health patient care, elderly monitoring, biowearables.

I. Proposed Block Diagram

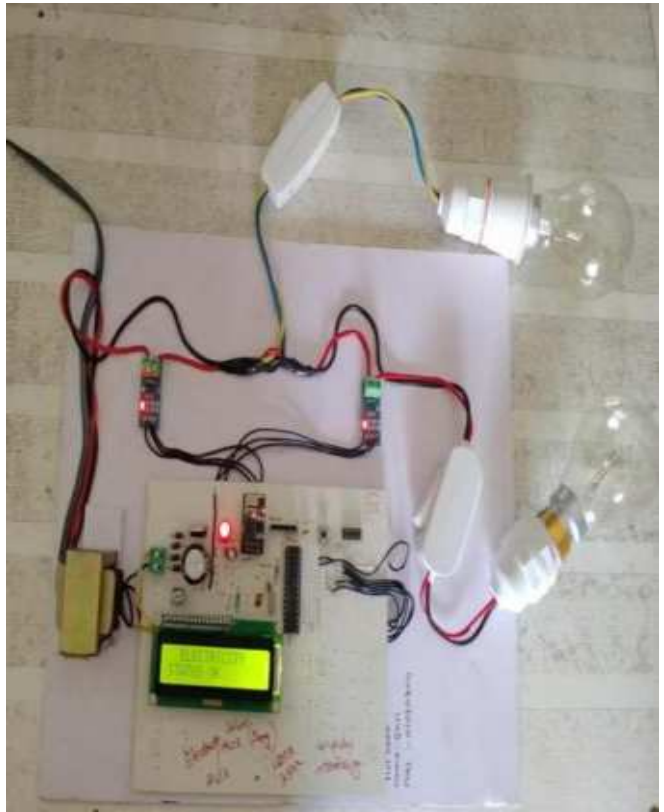


II. RESEARCH METHODOLOGY

This case study of the project is developed on the basis of internet of things. The information about the electricity theft detection is displayed on LCD. The method for Iot based electricity theft detection system is based on electricity theft occurring in electricity lines.

III. RESULT AND DISCUSSION

A Electricity Theft Detection and monitoring system has been designed and developed with proper integration of both the hardware and the software. Without any human interface, this system provides an effective and easy way to detect electrical theft. The use of IoT helps in achieving the numerous advantages of wireless network communications. Power theft is actually by passing energy meter, but in this project, the theft is detected if some unauthorized consumption is done on the main AC supply.



IV. CONCLUSION

A IOT based Electricity Theft Detection and monitoring system has been designed and developed with proper integration of both the hardware and the software. Without any human interface, this system provides an effective and easy way to detect electrical theft. This main feature of theft detection is done seamlessly using the integrated cloud system, which is able to detect the theft of electricity that is being drawn from the main AC line and also maintain the statistical and data of that theft.

VII. FUTURE SCOPE

Energy crisis is one of the major problems that the world faces today. The best remedy for this is not the increase in energy production, but the effective use of available energy. By properly monitoring our energy consumption and avoiding energy wastage, energy crisis can be reduced to a certain extent. But energy monitoring cannot be done efficiently mainly because consumers are not aware of their energy consumption.

They will get an idea about their consumption only when the electricity bills are issued. This whole procedure has to be repeated several times in a month to efficiently control the energy usage. If consumers can check their energy consumption using their mobile phone or laptop instead of checking energy meter.

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IOT BASED SMART LIFT MANEGMENT SYSTEM

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Abstract:- The Smart Lift Management System (SLMS) is an innovative solution that leverages advanced technologies to enhance the efficiency and functionality of elevator systems in modern buildings. This abstract provides an overview of the key features, benefits, and potential applications of the SLMS.

The SLMS integrates intelligent algorithms, sensor networks, data analytics, and automation to optimize the performance of elevators, streamline passenger flow, and improve user experience. By utilizing real-time data from multiple sources, such as occupancy sensors, destination inputs, and historical usage patterns, the SLMS intelligently assigns elevator resources to minimize waiting times, reduce congestion, and increase energy efficiency.

The system offers various functionalities, including destination-based dispatching, predictive maintenance, and remote monitoring. Destination-based dispatching enables elevators to efficiently assign stops based on passengers' desired destinations, leading to reduced travel times and improved user satisfaction.

Keywords:- SLMS, Sensor network, Elevator,

Introduction: - The main requirement of all multi storage buildings are elevators . Elevators ease work of human and keeps human in comfortable zone. Elevators are used in almost all the multi storage buildings in metropolitan cities. Elevators are nothing but the vertical transportation device which is used to transfer goods and passengers. In this project, we show the basic elevator system with four floors. Although we show the concept with four floors, it is still possible to show this concept on multiple floors. This project mainly focuses on implementing elevator control system which will be beneficial for physically challenged people and can be used in hospitals also it will ensure contactless transfer of people and goods in elevator by accepting input with voice commands, thus its beneficial in the time of pandemic as well and also we can reserve the lift for specific time period. The destination floor reservation system prompts users to specify their destination floors using a login ID which is unique for all . Elevators are used in daily life and thus this project will be a great help for disabled and during pandemic situation to avoid physical contact .We will build a elevator automation system which will work based on voice commands. We can control the movement of

elevator upward and downward with help of voice command. The voice command will be given through smart phone. User can also control the devices like fan, door etc. Whenever the temperature goes high beyond particular limit the fan will be turned on and vice-versa. Whenever motion is detected the lights will be turned on thus will save electricity. Voice command & lift reservation feature reduce wasting of time and help to use lift interactively.

Motivation:- Motivation for the Smart Lift Management System (SLMS) project arises from the need to address the inefficiencies and limitations associated with conventional elevator systems.

Problem Definition:- Traditional elevator systems often suffer from suboptimal resource allocation, leading to increased waiting times and congestion. Elevators may be underutilized in some areas while being overwhelmed in others. This inefficiency negatively impacts user experience and productivity.

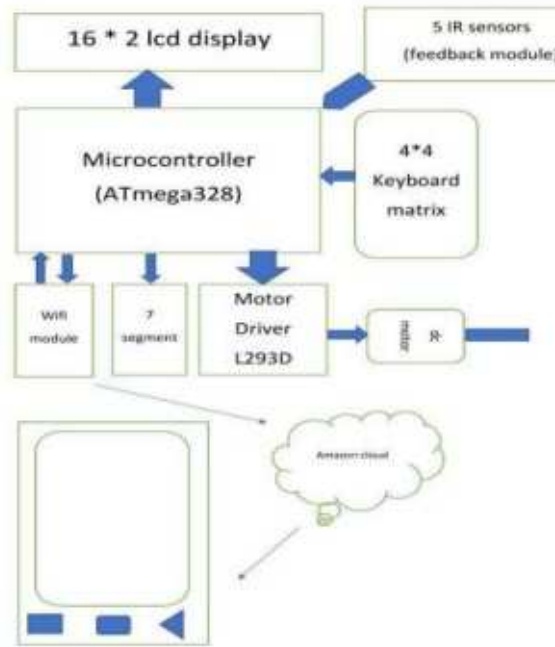
Objective of The Proposed Work:-

- To review and study the literature survey.
- To study the different types of hardware and software components.
- To simulate the system on simulation software.
- To develop a system which will be helpful for physically challenged people and beneficial in time of pandemic .

Existing Technology:-

- Floor call buttons were the primary means of summoning an elevator in older lift management systems.
- Proximity sensors were used to detect the presence of passengers inside the elevator
- Enhance the lift's emergency communication system by installing two-way communication devices, such as intercoms or emergency call buttons, to ensure passenger safety.

Architecture :-



We use arduino atmega 328 microcontroller. It is the main part of our project . We interface different hardware components to microcontroller . L293d motor driver is used for dc motor. DC motor is for the upward and downward movement of elevator.IR sensors are used to detect object (elevator). IR sensors are used on each floor for feedback .the output of the IR sensors is given to microcontroller when the lift is detected. 7 segment display will be connected at each floor inside lift to display the floor number on which the lift is. Voice command will be given through smart phone. As the hardware is going to access data from cloud through internet we need Wi-Fi module . 16x2 LCD Display will show the show the name and time for which the lift is booked by a particular user

ARDUINO: Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

ESP 8266 Node MCU: Node MCU esp8266 wifi module is an open-source, low-cost, low- power MCU(microcontroller unit) development board. It has 17 GPIO pins(11 are Digital I/O pins), out of which one pin is an analog pin, 4 pins support PWM, 2 pairs are for UART(UART0 and UART1), and supports 1x SPI and 1x I2C protocol. Node MCU ESP8266 has 128Kb of Ram, 4 MB of Flash memory.

DC MOTOR:- A DC motor or direct current motor is an electrical machine that transforms electrical energy into mechanical energy by creating a magnetic field that is

powered by direct current. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems

MOTOR DRIVER:- Motor driver(L293d) A Motor Driver is an essential device that provides the required voltage and current to a stepper motor so that it gets a smooth operation.

7 SEGMENT DISPLAY:- A seven-segment display is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays.

BCD to 7 segment driver (CD4511):-

- Supply voltage ranges from 3v to 18v
- Set-up-time is 150, 70, and 40ns at 5v, 10v, and 15v respectively
- Strobe pulse width is 400, 160, and 100ns at 5v, 10v, and 15v respectively

LCD :- The term LCD stands for liquid crystal display. These displays are mainly preferred for multisegment light-emitting diodes and seven segments

KEYPAD :- A keypad is a block or pad of buttons set with an arrangement of digits, symbols, or alphabetical letters. Pads mostly containing numbers and used with computers are numeric keypads.

IR SENSOR :- IR sensors is used to detect objects. sometimes called infrared light, is electromagnetic radiation (EMR) with wavelengths longer than those of visible light It is therefore generally invisible to the human eye, although IR at wavelengths up to 1050 nanometres (nm)s from specially pulsed lasers can be seen by humans under certain conditions

Related work:-

Paper 1: Controlling of Electric Elevator by using Voice Announcement, Speed Control and Mini Lift Model System.

Author:- .Omkar Jadhav, Shubhanshu Bishwash, Manisha Ganguly, and Omkar Nayak

Description:- Reviewed on the developing an elevator model that works smoothly on voice input like an actual elevator model would. For this purpose, Raspberry Pi 4 microcontroller is used. Speech recognition is used . Speech recognition is a technique in which a machine understands the words but not the context of the words spoken to a speech recognition module by any individual

Paper 2: Voice Operated Intelligent Lift With Emergency Indicator

Author:- Anu K G, Anupriya K S, Lekshmi M S Arathy Suresan, Arjun Biju

Description:- Speech recognition system is main part of this project. It provides the communication mechanism between the user and the microcontroller based control mechanism of

elevator. This project makes use of a DC motor for moving the lift/elevator based on the voice/speech commands given by the user and voice recognition chip is used for recognition of the voice commands which will be given by the user

Paper 3 : - Voice Operated Elevator

Author:- Aishwarya Pokharkar, Niriksha Poojari, Harish Pawar , Amey Patil

Description:- Reviewed on designing and implementing a speech operated elevator system. The system will identify spoken words to input data for control equipment. The project makes use of a DC geared motor for the moving of lift. Microcontroller is programmed, with the help of the embedded C programming. The microcontroller is capable of communicating with all input and output modules of an elevator. The Bluetooth module is used for the wireless connection between the user and controller

Paper 4 : Voice automation for elevator

Author:- Shahista Sayyed, Rajiya Khan, Shehzeen Shaikh, Shaista Khan Prof.Mohd Ashfaq Shaikh

Description:- Reviewed on voice recognition chip The main component or the heart of the entire implementation is the voice recognition chip .The user entering the elevator would just give

Paper 5: Elevator for blind people using voice recognition

Author:- Farouk Salah, Mohamed Saod ,Dr. Maher M. Abdel-Aziz

Description:- Proposed system provides remote in which will give the blind person a fully control over the elevator. The remote have an auto power-off feature to turn off the remote after a certain time to conserve battery. A voice message to inform the user the battery is on low level to charge it. Also, there will be a voice confirmation for the selected floor and when the elevator arrives to it, and when the elevator's door is opening or closing. In the elevator a relay is used to switch to some emergency rechargeable batteries when the power shuts down. The proposed system is not expensive since the remote contains the microphone and the loud speaker together instead of putting them in two different levels. Also, the whole system works offline (i.e. no internet needed)

Future Scope:- The future of smart lift management systems holds great promise, driven by advancements in AI, ML, IoT, advanced traffic management, personalization, and sustainable solutions. With ongoing technological innovations, lift management systems will become even more intelligent, efficient, and personalized. The integration of these future developments will lead to smoother operations, reduced waiting times, improved user experience, enhanced energy efficiency, and a greener approach to vertical transportation.

Conclusion:- This device is very helpful for paralysis ,blind, short height people and physically challenged persons also it will ensure contactless transfer of people and goods in

elevator by accepting input with voice commands, thus its beneficial in the time of COVID-19 as well . This new design of lift provide interactive interface to user through which user can book/reserve the lift. Voice command & lift reservation feature reduce wasting of time and help to use lift interactively.

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Self Balancing Robot

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Abstract - The main aim of this project is to assume a model of efficient and simple self balancing robot is to itself on two wheels, by using Arduino Nano. This paper discusses the design, construction, and control of a two-wheel study level, small self-balancing robot. Two-wheel robots are compact and require less number of motors and other equipment in comparison to conventional four-wheel robots. Consequently, they offer a complex control system problem of balancing on two-wheel. The system architecture comprises of Arduino Nano microcontroller board, DC stepper motor, gyroscope, and accelerometer sensor. PID controller controls it through the program written in Arduino IDE. A detailed description of constituting materials in making the robot has been provided. Flow chart and closed loop control diagrams have been given for understanding the controlling of the robot.

I. INTRODUCTION

The aim of a self-balancing robot is to balance itself on two wheels, being able to drive around without toppling over. Self-balancing robots use a “closed-loop feedback control” system; this means that real-time data from motion sensors is used to control the motors and quickly compensate for any tilting motion in order to keep the robot upright. Similarly, self-balancing feedback control systems can be seen in many other applications. Some of the obvious examples include Segway’s, bipedal robots and space rockets (A few rockets have been lost due to a faulty balancing system).

But what many people don’t realize is that often the same type of controller is also used in a large variety of other applications which aren’t related to balance. Proportional-integral-derivative (PID) controllers are used by elevators to control their motion and position, used by air-conditioning units to control the temperature within a room, and even used to control the operation of jet engines of course rockets use

significantly more complex controllers than air conditioners, but the underlying principle is still the same: how to adjust the system in order to get as close to the desired target value (be it temperature, angle, or position) as possible. That is why building a self-balancing robot is so educational; you can use the same control methods over and over again for other projects. And don’t forget, self-balancing robots are a fun toy to play with! Here is a video of my self-balancing in action:

It takes several steps to build a self-balancing robot. The easiest part is the hardware, so that is always a

good place to start. The robot requires two motors, a motor controller, a sensor to detect its current tilt

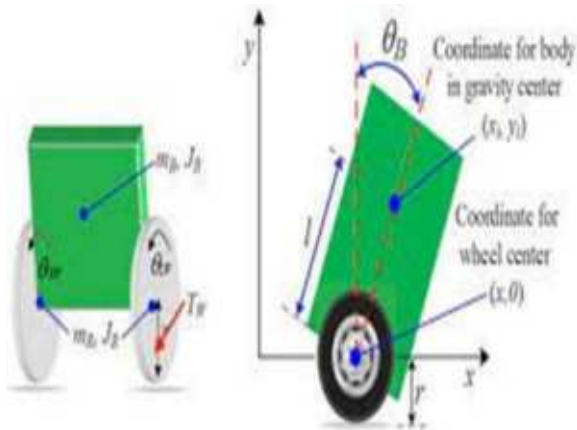
angle, a micro-controller and some type of frame. Surprisingly enough due to the inertia of an inverted pendulum, the robot actually finds it easier to stabilize if the frame is very tall with a lot of weight on top, instead of a small frame with a low center gravity!

Once all of the physical components have been assembled, we can proceed to the tricky stuff; the software. As the system is inherently unstable and wants to topple over, the micro-controller needs to continuously monitor the current angle of the robot and be as fast and efficient as possible in order to retain its balance. While the loop time (refresh rate) should be short, it also needs to remain regular so that the control system can properly perform its calculations. For my robot I used a standard loop time of 10ms (100Hz).

Therefore, the controller recalculates its response 100 times per second!

II. DESIGN OF PROPOSED SYSTEM

in this system the self balancing robot is used to such a way as to travel forward or backward. They can even be used as vehicles by humans. and industrial work



III.How Self Balancing Robot Works ?

Basic of self balancing robot

Self balancing robot is that balance it self on two wheels, by constantly correction its position.

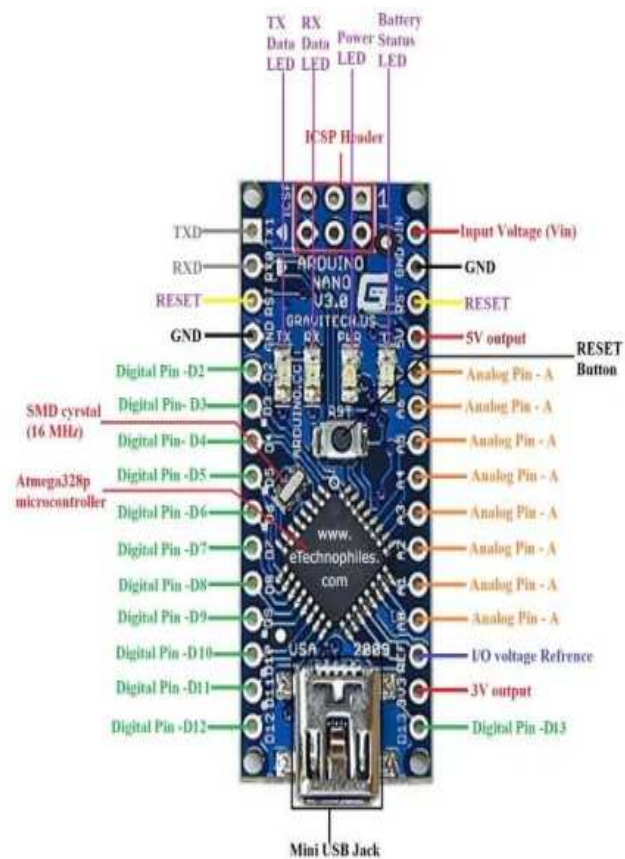
A gyro sensor is used in self balancing robot , which continuously sends the robot orientation data to the controller.

When body tilt in forward direction then there is some angle between y axis and body.

This angle is direction by MPU6050 gyro sensor, then this data send to Arduino.

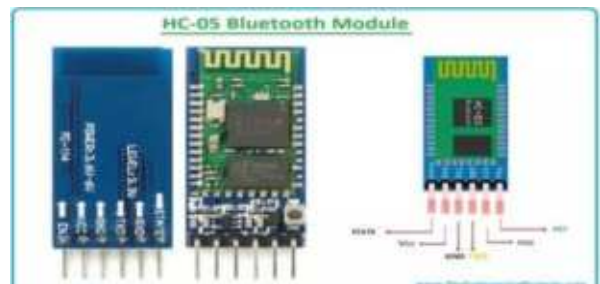
Arduino now do PID calculation and command the stepper motor to run in forward direction to minimize the tilt angle up to zero degree.

Arduino Nano V3-Pin Description



The ARDUINO Nano is a small, complete, breadboard-friendly board based on The Atmega328p (Arduino Nano 3.0) or Atmega168 (Arduino Nano 2.x) It has More or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack and works with a mini-B USB cable instead of a standard one. The Nano was designed and is being produced by Gravitech.

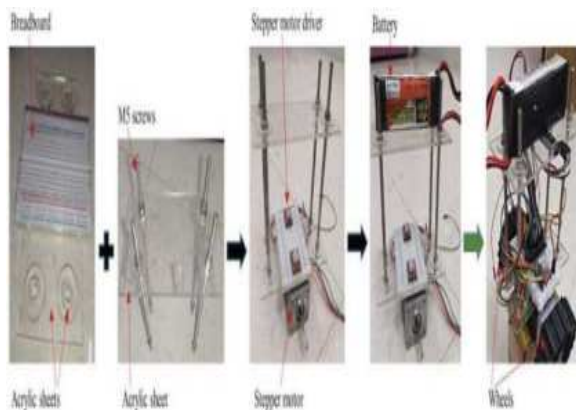
HC05 Bluetooth Module



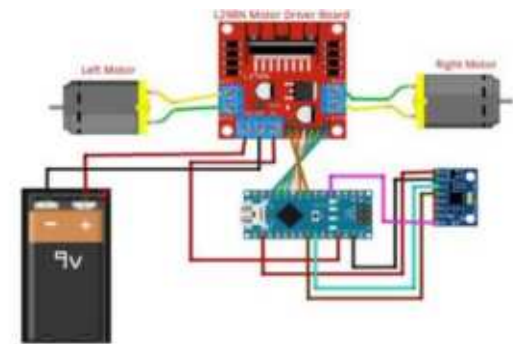
HC-05 Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, Designed for transparent Wireless serial connection setup. Serial Port Bluetooth module is fully qualified Bluetooth V2.0+EDR(Enhanced Data Rate) 3 Mbps Modulation with complete 2.4GHz Radio Transceiver and baseband. It uses CSR Blue core 04 External Single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the Footprint as Small as 12.7mm x27 mm. Hope it will Simplify your overall design/development cycle.

Hardware Required

- ARDINO NANO
- A4988 MOTOR DRIVERS
- STEPPER MOTOR NEMA 17
- CAPACITOR 100 μ F
- TRANSISTOR 7805
- H C 0 5 BLUETOOTH MODULE
- DIODE 1N 4007
- MPU 6050
- PCB BOARD
- ASSIMBALY MATERIAL



Circuit Diagram



IV. Software Required :

EZ-GUI is an Android based Ground Control Station (GCS) for UAVs based on MultiWii and Clean flight.

It displays all available data from a flight controller in a convenient way. It allows you to easily configure and tune your model from an Android device, so you don't have to take your laptop to the flying field. It supports direct USB connection (Android >3.1) as well as Bluetooth, WiFi and 3DR Radio. Works with:



V. Result

SELF BALANCING ROBOT



VI. Conclusion

To build a self-balancing robot we first derived the system equation then check its real time response(both time and frequency). Then we designed a PID controller to control the close loop function. We checked the controllability and set the pole location. Then we used kalman filter as estimator and predictor. Then by choosing the appropriate components we analyses their simulation successfully The above test steps are successful, then we are near to build a SBB. The easiest way to tune a PID controller is to tune the P, I and D parameters one at a time. It was done successfully. The stability of the SBB may be improved if you use a properly designed gearbox that is having negligible gear backlash. So by implementation all of these concepts and avoid the errors that we came across the self-balancing bot is completely build. We can make Segway and ball bot as a application of self-balancing robot.

VII. FUTURE IMPROVEMENT

The stabilization provided by the reaction wheel is limited be the torque provided by the reaction wheel motor. Subsequent plan is to use a rotating disc and its gyroscopic precession for balancing. This would provide a more stable design capable of providing higher restoring torque. In such a case particular attention should be paid to any rotary axes, their alignment, and how they are fixed to the model, to the position and alignment of brackets, and to the mounting and fastening of any flexible couplings. In addition to this, fuzzylogic controller can also be implemented to provide flexibility and accuracy in control.

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VOICE CONTROLLED ROBOTIC VEHICLE

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Abstract - The paper is designed to control a robotic vehicle by voice commands for remote operation. An ARM series microcontroller is used together with an Android Application for the desired operation.

The Android Application is connected to the Bluetooth module (HC-05) present on the Robot via Bluetooth. The commands are sent to the robot using push buttons or voice commands present on the android application. At the receiving end two dc servo motors are interfaced to the microcontroller where they are used for the movement of the vehicle. The RF transmitter of the Bluetooth can take either switch press or voice commands which are converted to encoded digital data for the advantage of adequate range (up to 100 meters) from the robot. The receiver decodes the data before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work. This technology has an advantage over long communication range as compared to RF technology. Further the project can be developed using IoT technology where a user can control the robot from any corner of the world.

Key Words: Bluetooth module, Android Application, IoT (Internet of things), DC Servo motor.

1. INTRODUCTION

"In proposed design, we wish to control the movements of the vehicle using voice commands from the user. These commands will be issued at the Android Application on the user's phone which is connected to the robot using a Bluetooth Module. The commands issued will then be relayed over an RF channel and will be received by the Module. The goal of Voice Controlled Robotic Vehicle (VCRV) is to listen and act on the commands received from the user. Here, the system will require the training from the user (for the accent) after which the device will start understanding the commands issued.

This is done by adding commands to the controller through a code."The term Smartphone is an important part of our life now a day due to the development of modern technology. Applications of Smartphone are being developed based on android system. Among all available mobile operating systems Android OS has gained significant and immense popularity due to its open architecture. This platform has opened new dimensions for technical innovation and exploration

2. LITERATURE REVIEW

Shyam.R.Nair and Shalini.R.Nair in their paper adapted a remote operation system for a robotic arm in [5]. One of the two disadvantages of their work is their robotic hand can't move from one place to another place. The second one is whenever it receives command it starts grabbing whether there is an object or not. R. Aswinbalaji and A.Arunraja presented a similar type of work with their robot in [6]. A group of researchers in [7] worked on three way controlled android OS based robotic vehicle. The robot was only able to move forward, backward, left right or stop as per chosen application via Android OS platform. However, the platform was inbuilt touch screen sensors in Smartphone rather than using speech recognition. Researchers in [8] discussed a hardware and software co-design of a Robot Arm Controller with 5 motors but with using large FPGA. The proposed system is an improved design of robot that can move forward and backward with the robotic hand through wheels. Whenever it gets a command for grabbing

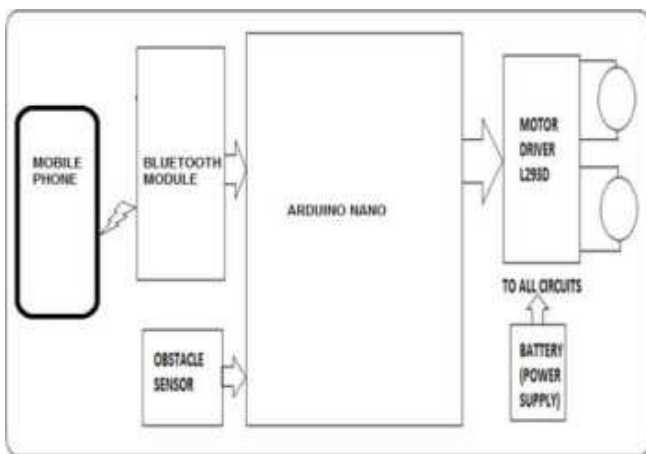
3. METHODOLOGY

The block diagram of the simple voice controlled robotic vehicle is given it consists of the smartphone that recognizes the voice commands and are being wirelessly transferred to the Bluetooth module HC05. The module at that point changes over the order to content and the series of characters are sent to the Arduino for additional handling. The Arduino microcontroller decodes the string got and correspondingly performs further capacities. The signals are sent to the motor that hence powers and drives the motors connected to it. On the Transmitter area, commands are given to the Mobile Application through the mic.

This portable handset is associated with the moving vehicle by means of Bluetooth module. The portable application utilized, is modified so that the voice orders given to the handset are received by the mic and these simple voice orders are changed over to advanced word successions (A to D transformation). These stored sequences are then transmitted to the robotic vehicle via Bluetooth transceiver module and are sent to the transceiver controller. Android application transceiver is used to decode the received signal with the Bluetooth module.

The controller contrasts these signals and the put away program orders in it and convert them into voice strings. The voice strings are then used to run the servo engines for the ideal interval of time. The microcontroller, sends directions, which when executed, helps in working of the engine driver. The yield of the Arduino goes to the engine driver IC and it controls the specific engine. A DC power supply is required to run the system. The DC power supply feeds the Microcontroller and the Bluetooth module.

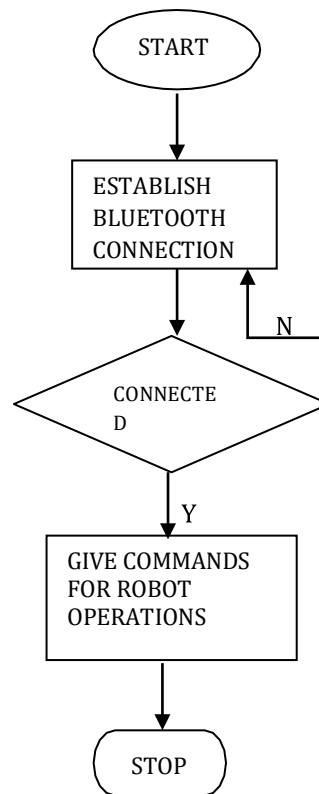
4. BLOCK SCHEMATIC AND DESCRIPTION



5. ALGORITHM

- a) Start
- b) Establish Bluetooth connectivity between Android Application and the Bluetooth module on the robot.
- c) Check whether the device is connected.
- d) If connected, give the pre-defined instructions/commands to the micro-phone of the mobile handset.
- e) The voice commands should be trained to the EasyVR module.
- f) Then the stored voice commands are represented in the form of binary numbers such as move forward – 001, move backward – 010 etc.
- g) These binary values are transmitted via zigbee module which is a transceiver.
- h) The transmitted binary values are then received by another zigbee module which is present on the receiver side.
- i) Microcontroller will take those binary values and performs action(servo motors) according to the binary values.
- j) If failed to connect at step 3 than again go to step 2.
- k) Stop

6.FLOW CHART



7.RESULT AND DICUSSION

Human voice is identified using a microphone in the android smart phone. This voice is analyzed and converted into English words using the android operating system codes and Artificial Intelligence software. Speech recognition is the inter-disciplinary sub-field of computational linguistics that develops methodologies and technologies that enables the recognition and translation of spoken language into text by computers. It is also known as automatic speech recognition (ASR), computer speech recognition or speech to text (STT).

It incorporates knowledge and research in the linguistics, computer science, and electrical engineering fields. From the technology perspective, speech recognition has a long history with several waves of major innovations. Most recently, the field has benefited from advances in deep learning and big data.

The advances are evidenced not only by the surge of academic papers published in the field, but more importantly by the worldwide industry adoption of a variety of deep learning methods in designing and deploying speech recognition systems.

8. CONCLUSION AND SCOPE FOR FUTURE WORK:

This project completely reforms the robotic vehicle and gives it a new dimension. It can easily recognize the voice commands and runs smoothly.

Further enhancement in project can be used for Home security and military purposes where the commands can be given to robot without risk by increasing the range and by installing cameras.

- a. This research work has been narrowed down to short range Bluetooth module. Using a long range modules and other connectivity devices will result in connectivity with the robot for long distances.
- b. Power Optimization such sleep and wakeup schedules can be incorporated.
- c. Image processing can be implemented in the robot to detect the color and the objects.
- d. A thermal camera can be installed to sense the heat emitted by bodies useful in military purpose to detect enemies on the lines.
- e. Automatic Targeting System can be implemented in the robot for tracking the target.

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AI, Data Science and Machine Learning

“Cotton Plant Disease Detection Using CNN”

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Abstract— The quality and amount of the nation's crop production heavily influence its economic success. By identifying leaf disease in its early stages, the output profit can be increased. For the purpose of finding leaf disease, numerous image processing techniques have been created. Early on, technological advancement makes the process simpler and faster. One of the biggest problems in agriculture is leaf disease. The diseases Cercospora, Bacterial blight, Ascochyta blight, and Target spot all harm cotton leaves. Farmers' general observations may be time-consuming, expensive, and occasionally wrong. To do this, we provide a Deep Convolutional Neural Network-based method for autonomously detecting illnesses in cotton leaves. According to what we understand, cotton leaf detection is the first application of deep convolutional neural network.

I. INTRODUCTION

Machine There Welcome to the AI for Social Good Series, where we will be focusing on different aspects of how Artificial Intelligence (AI) coupled with popular open-source tools, technologies and frameworks are being used for development and betterment of our society. In the past ten years, researchers have become more interested in sustainable agriculture, which involves numerous agricultural complexity such the planting cycle, efficient use of resources and crop lifespan. A crop's lifetime comprises not just its growth but also the identifying, treating, and prevention of its alignment. This assurance adjusts to the rising need as the population grows. The defect in the leaves must be found in order to satisfy the criteria. Precision agriculture, in conjunction with quickly developing technical skills, can help with this. The existing system does not display any attributes that could demonstrate a reliable approach to determining these alignments. Even if they do, they only exist on a probabilistic level.

So, we present an approach that incorporates a Convolutional Neural Network (CNN) and processes data at each stage. so that we may avoid suffering a significant loss of both commodities and money. When given clean data, the supervised learning algorithm outlined above can

classify the various illnesses. We employ the idea of digital image processing to obtain the treated image.

For the classification of leaf diseases, neural network ideas depend on the dimensions of the input image. The progression of plant growth and the environmental, ecological, and economic aspects of agriculture are all impacted by leaf diseases.

II. Some machine learning methods

In the rest of the paper, we have compiled and shortlisted all the research that we conducted on this issue and as well as a detailed walkthrough of how we are going to implement this software. The following section II consists of the background of the related works performed before and our review and study of it. Section III consists of the conceptual design, the architecture diagrams, DFD, and other related structural works

III. RELATED WORKS

Good quality fruits are produced using the trading technique. Apple fruits are being traded to get the best variety and is exported at high price. Similarly, bacterial wilt has also been studied for eggplant and its impact on the crop. It helps in understanding the importance of the disease-free crop and to get the maximum output. In similar objectives, the crop rotation policy also helps. The benefit of crop rotation is that the soil is not getting exhausted with similar types of nutrients in the soil, and it helps to maintain a good balance of the different nutrients in the soil. Unlike some medicine donation apps, which are Android apps, this can run on any system without the need for you to download the application. The existing systems lacked many features like checking the user validity, inventory management, Donor-to- Receiver flow of the donation, Doctor Consultation Modules, Drug Information, and Education, and Forums, which are for the donors to help them to work easier. Here is some literature from those systems: They only had the necessary

modules like Login, Donation, and Collection. It missed many important guidance modules that are necessary to help users get using authentic details, Forums, and Emergency Notifications to the registered users, etc.

III. DESIGN AND DEVELOPMENT

1. The whole architecture is made by the PyQT library used in Python language. PyQT library gives all the necessary stuff related to GUI design. PyQT provides us display screen, buttons and so on. So, In this way, PyQT helps us in designing GUI.

3.1 System Context/Level Diagram

1. After designing of GUI, another task is to authenticate valid users for operating applications. To deal with this task, we are using the MySQL database to store data of username and password and through this, the user can authenticate easily.
2. Another task is to preprocess the input image which can be done by the OpenCV library of Python. By using this library, the image is converted into a grayscale image, contour image, and smoothen image.
3. In this system we detect malaria and dengue diseases based on blood cell datasets and apply image processing with the help of machine learning techniques.

Here provide the module for detecting diseases based on symptoms.

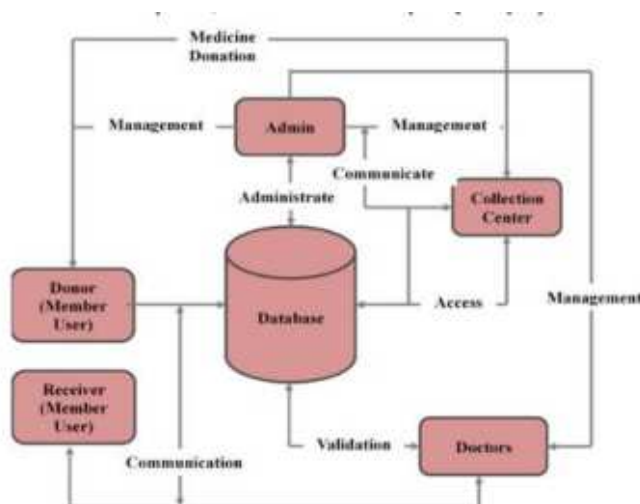


Figure 1: Block/Structural Diagram

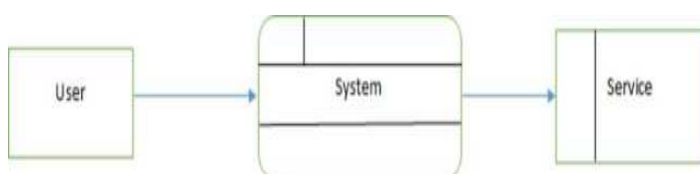


Figure 2:DFD Level 1

IV.IMPLEMENTATION

Features are the elements of the data that will be fed through the network. In some special image recognition, the features are the group of pixels, like edges and points, of an object that the network will analyze for the pattern.

Feature recognition is the process of pulling the relevant features from the input image so that these features can be analyzed. The process of extracting features from the image is accomplished with a convolutional layer, and this layer makes the representational part of the image. The result of all these calculations is a feature map. This process is typically performed with more than one filter, which helps preserve the complexity of the image.

V. ACKNOWLEDGMENT

It is our privilege to acknowledge my deep sense of gratitude to my guide Mrs. Mandhare R.M. in Computer Science and Engineering at Arvind Gavali College of Engineering, Satara for his/her valuable suggestions and guidance throughout our course and the timely help given to us in completion of our project work.

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Finally, we wish to express our sincere thanks to all the staff members of Arvind Gavali College of Engineering, Satara for their direct and indirect help during our project.

VI. CONCLUSION

Our approach evaluated up to 96% accuracy for the categorization of diseased cotton leaves such as Cercospora, Bacterial blight, and Ascochyta blight, and Target spot images on MATLAB when we identified the cotton leaf disease. For farmers, botanists, industrialists, food engineers, and physicians, the automatic analysis of the identification of diseased leaves by MATLAB is more accurate and error-free.

Additionally, this technique is easy to use and takes up very little time. In addition to identifying the unhealthy spot, MATLAB also reports on the health of the input leaf.

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Realtime Face Mask Detection using CNN

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Abstract— This paper presents a detailed survey on face mask detection systems. This paper attempts to develop a simple and effective model for real-time monitoring. The paper gives a detailed survey on face mask detection system. The different types of methods used for the system, software tools used, their outcomes and limitations. The aim of this paper is to get the exact knowledge about what innovation has been done till now and what can be done in future .It gives the direction to the future researchers to do further work on it or give some innovative idea on it.

Keywords- Face Mask Detection, Face Mask Detection System using ML/ DL.

I. INTRODUCTION

In current times, after the rapid expansion and spread of the COVID-19 outbreak globally, people have experienced severe disruption to their daily lives. One idea to manage the outbreak is to enforce people to wear a face mask in public places. Therefore, automated and efficient face mask detection methods are essential for such enforcement. Since the first case was identified by COVID-19 in 2019, the coronavirus disease spread quickly and caused the outbreak all over the world in 2020.As the COVID-19(Coronavirus) pandemic continues to spread, most of the world population has suffered as a result. 258 million confirmed cases of COVID-19 cases and 5,148,221 deaths worldwide. Therefore, people should wear face masks and keep a social distance to avoid viral spread of disease. We surveyed an effective and efficient computer vision strategy intends to develop a real-time application that monitors individuals publicly, whether they are wearing face masks or not. Face mask detection has a range of case applications, from face mask recognition to facial movements, where the latter is required to show the face with extremely high accuracy. As machine learning algorithms progress rapidly, the threats posed by face mask detection technology still seem effectively handled. This innovation is rapidly increasing, as it is used to recognize faces in images and in real-time video feeds. In this paper Section 1 provides the introduction of a complete survey on different face mask detection systems. Section 2 provides complete knowledge of different methods used to detect the face mask. Section 3 provides information about the different existing methods. Section 4 provides information about the different software tools which are used to detect the Face Mask. Section 5 provides guideline to the researches for future work in the field of face mask detection using different technologies for their research work and Section 6 concludes the existing work done in the field of face mask detection

II. LITERATURE REVIEW

Sr.No	Author Name	Paper Name	Publication Year	Technology Used
1.	Meenpal.T, Balakrishnan.A.,& Verma.A	Face Mask Detection using Semantic Segmentation,	2019	Recognize the face by segmentation and detection using Models. The Proposed network can detect non frontal faces and multiple faces from a single image.
2.	Ms. R. Suganthala kshmi A. Hafeeza, P. Abinaya, A.Ganga Dev	Covid-19 facemask detection with deep learning and computer vision .	2021	The system comprises Mobile Net as the spine which can be very well utilized for high and low calculation situations.in order to extract more robust features,learning is used to gain weights from a similar task face detection ,which is trained on large datasets.

3.	Mohmed Loey,Guasekaran, Manogaran, Mohamed Hamed N Taha,Nour Eldeen M.Khalifa	Fighting against COVID 19: A novel deep learning model based on YOLO-12 with ResNet-50 for medical face mask detection	2020	The target of this paper is to comment on and confine the clinical face mask objects, all things considered, pictures. Wearing a clinical face mask in open territories, ensure individuals from COVID-19 transmission among them.
4	Bingshu Wang,Jianbin Zheng,C.L. Philip Chen	Masked Facial Detection Methods and Datasets for Fighting Against COVID 19	2022	Detect the Face by using Masked Facial Datasets and Deep learning Model
5	Dostdar Hussain, Muhammad Ismail, Israr Hussain, Roobaca Alroobaca, Saddam Hussain, and Syed Sajid Ullah	Face Mask Detection Using Deep Convolutional Neural Network and MobileNet V2-Based Transfer Learning		Deep Convolutional Neural Network (CNN) and MobileNetV2 transferred learning-based model, have been evaluated on two different datasets. The comparative results show that MobileNetV2 achieved 98% and 99% classification accuracy

6	Adithya K1, Jismi Babu,	A Review on Face Mask Detection using Convolutional Neural Network	2020	Essentially convolutional neural network technique is utilized quickly. The precision and decision making are exceptionally high in CNN contrasted with others
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III. METHODOLOGY

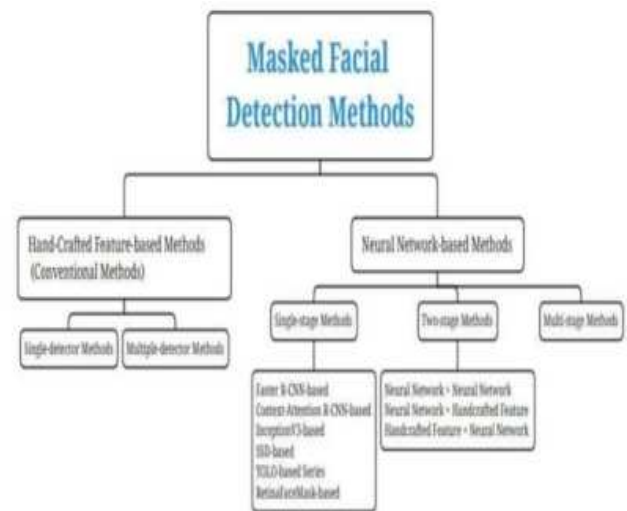


Figure 3.1 Different Face Mask Detection Methods

- The Hand-Crafted Feature-based method :
Hand Crafted features refer to properties derived using various algorithms using the information present in the image itself. The algorithm detects feature points from the image using spatial filters and groups them into face candidates using geometric and gray level constraints. A probabilistic framework is then used to reinforce probabilities and to evaluate the likelihood of the candidate as a face. It is the Conventional method which involves two different methods: single-detector method and multiple detector methods.
- The Neural Network-based method :
Neural networks are used to recognize the face through learning correct classification of the coefficients calculated by the eigenface algorithm. The network is first trained on the pictures from the face database, and then it is used to identify the face pictures given to it. It is classified as the single stage methods ,two stage methods and multi stage methods.
 - i) Single -stage method : The stage involves the Faster R-CNN based, Context-Attention R-CNN based ,Inception V3-based,SSD-based,YOLO-based Series and retina Face Mask Based.

- ii) Two stage method : It involves neural network +neural Network, neural network +hand-crafted feature, handcrafted feature + neural network.

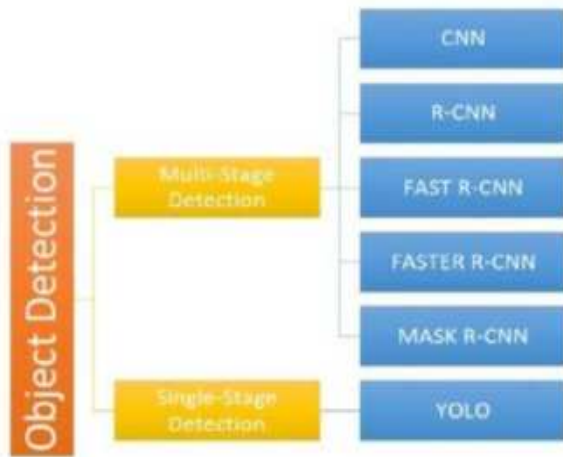


Figure 3.2 Represents the Object Detection.

- Multi Stage Detection :

The multi stage detection system is the system which is used in identifying the identity of a prisoner in a detention cell, through facial recognition automatically .It involves CNN is a kind of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data, RCNN, stands for Region-Based Convolutional Neural Network, it is a type of machine learning model that is used for computer vision tasks, specifically for object detection ,Fast R-CNN is a deep convolutional network used for object detection, that appears to the user as a single, end-to-end, unified network. The network can accurately and quickly predict the locations of different objects. Faster R-CNN is an object detection model that improves on Fast R-CNN by utilizing a region proposal network (RPN) with the CNN model.

- Single Stage Detection :

One-Stage Object Detection Models refer to a class of object detection models which are one-stage. YOLO is an abbreviation for the term ‘You Only Look Once’. This is an algorithm that detects and recognizes various objects in a picture (in real-time). Object detection in YOLO is done as a regression problem and provides the class probabilities of the detected.

IV. EXISTING SOFTWARE TOOLS AVAILABLE

SOFTWARE TOOLS	FEATURES AND APPLICATIONS OF SOFTWARE TOOLS
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NumPy	NumPy can be used to perform a wide variety of mathematical operations on arrays. It adds powerful data structures to Python that guarantee efficient calculations with arrays and matrices and it supplies an enormous library of high-level mathematical functions that operate on these arrays and matrices.
OpenCV	Open CV (Open Source Computer Vision Library) is an open source computer vision software library for the purpose of machine learning. It includes C++, Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS
Pandas	Pandas is an open-source Python package that caters diverse tools for data analysis and also includes a range of methods that can be invoked for data 6 analysis, which becomes feasible when working on data science and machine learning problems in Python.
Flask	Flask is a web framework. This means flask provides you with tools, libraries and technologies that allow you to build a web application. This web application can be some web pages, a blog, a wiki or go as big as a web-based calendar application or a commercial website.
TensorFlow	TensorFlow is a Python library for fast numerical computing created and released by Google. It is a foundation library that can be used to create Deep Learning models directly or by using wrapper libraries that simplify the process built on top of TensorFlow.

V. FUTURE DIRECTIONS

The Future Directions for Face Mask Detection are as follows:

- 1) Create more balanced datasets. Class imbalance problems exist. Neural network-based methods are all appearance-based, which requires enough balanced data to train models.
- 2) It is expected to realize more multi-class detectors in future. Advanced works of object detection can also be employed for the task of masked facial detection.

- 3) Sometimes it detects accurately if a person has worn the mask or not only if the person is directly facing the camera it is quite useful in supermarkets, and airports.
- 4) Implement the proposed solution in real-world surveillance cameras in public areas to check if people are following rules and wearing masks appropriately.
- 5) The thermal detection on this device to help the guard's work easier. Furthermore, this device is hoped to be installed in other crowd areas which need face mask detectors.
- 6) Increase the size of the dataset by embedding real-time video streams into it to detect face masks in real-time.

VI. CONCLUSION

In this paper, we surveyed systems to classify face mask detection using both images and videos using different methods. Different methods and approaches of face mask detection and recognition have been reviewed in this paper. Deep-learning-based method and quantization-based technique achieves a high recognition performance. MobileNetV2 is a very effective feature extractor for object detection and segmentation. We surveyed continuous monitoring of the people's conditions and storing the people's data in the server using different methods like Deep learning, machine learning, mobile Net, Res Net, YOLO, Google Net, Global Pooling block concept. In order to investigate the performance, an extensive experimentation is conducted on various Image datasets. MobileNetV2 provides a very efficient mobile-oriented model that can be used as a base for many visual recognition tasks. also computer vision and image processing have an extraordinary impact on detection of face mask. For the best of our knowledge, this work addresses the problem of masked face recognition and different approaches during COVID19 pandemic. we conclude that as mentioned above there are different existing methods for the face mask detection system from that Machine learning technology progresses rapidly.

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Custom Named Entity Recognition Using Spacy

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Abstract— Named entity recognition (NER) plays a vital role in natural language processing, enabling the identification and extraction of entities such as people, organizations, and locations from text. Spacy, an open-source library, offers efficient and accurate NER models. This paper focuses on constructing a custom NER model for medical procedures using Spacy. We present an overview of the Spacy library and its NER capabilities, followed by a detailed explanation of building a custom NER model. Specifically, we demonstrate the creation of a model designed to recognize medical procedure-related entities in text. We evaluate the performance of our model and discuss potential applications of custom NER in the medical industry, highlighting its benefits for information extraction, clinical decision support systems, and biomedical research. Our work showcases the potential of Spacy and custom NER models to enhance medical text analysis and facilitate advancements in healthcare.

Keywords—Named entity recognition (NER), Natural Language Processing (NLP).

I. INTRODUCTION

Named Entity Recognition (NER) is a crucial component of natural language processing, enabling the identification and extraction of entities such as people, organizations, and locations from text. The automated recognition of named entities in text has broad applications, including information retrieval, text classification, and sentiment analysis. Spacy, a widely-used open-source library for natural language processing, offers efficient and accurate pre-trained NER models.

While Spacy provides pre-trained models for NER, they may not be suitable for specific use cases, such as medical procedures. In such scenarios, the creation of custom NER models using Spacy's capabilities becomes necessary. This paper focuses on exploring the process of developing custom NER models for medical procedures using Spacy.

We begin by highlighting the importance of NER in medical text analysis, where accurately identifying and extracting medical procedure-related entities is essential. We then delve into the capabilities of Spacy and its pre-trained models for NER. However, since these models may not fully capture the nuances of medical procedures, we discuss the necessity of creating custom models.

We present a detailed methodology for training a custom NER model using Spacy, specifically tailored to recognize and extract medical procedure entities. We discuss the annotation process, feature engineering, and model training techniques employed to optimize the performance of the custom model.

Furthermore, we evaluate the performance of our custom NER model using appropriate metrics and compare it against existing pre-trained models. We highlight the advantages of our custom model in accurately identifying medical procedure entities in text.

Finally, we discuss the potential applications of custom NER models for medical procedures, including clinical documentation, medical research, and healthcare data analytics. We emphasize the importance of accurate entity recognition in improving information retrieval, clinical decision support systems, and enhancing overall healthcare processes.

This paper demonstrates the significance of custom NER models using Spacy in the domain of medical procedures, showcasing their potential to advance medical text analysis and contribute to improved healthcare outcomes.

II. RELATED WORK

Several studies have investigated the use of custom named entity recognition (NER) models in various domains using different NLP tools and techniques. Some of the related work in this area includes:

1. **Domain-specific NER models:** Several studies have explored the use of domain-specific NER models for improving entity recognition in specific domains, such as biomedical literature, legal documents, and financial news. For instance, Li et al. (2019) used a domain-specific NER model to improve the identification of financial entities in news articles.
2. **Transfer learning:** Transfer learning is a technique that involves using pre-trained models to improve the performance of custom NER models. Several studies have explored the use of transfer learning in NER, including the use of pre-trained models such as BERT and ELMo (Peters et al., 2018; Devlin et al., 2019).
3. **Active learning:** Active learning is a technique that involves selecting the most informative examples for annotation during model training, to improve the efficiency and accuracy of NER models. Several studies have explored the use of active learning in NER, including the use of active learning strategies such as uncertainty sampling and query-by-committee (Settles, 2009; Sener and Savas, 2018).
4. **Neural network-based models:** Neural network-based models, such as the popular BiLSTM-CRF architecture, have been widely used for NER. Several studies have explored the use of neural network-based models for custom NER, including the use of attention mechanisms (Ma et al., 2019) and multi-task learning (Wang et al., 2020).

III. OVERVIEW of SPACY

Spacy is a popular open-source library for natural language processing that provides efficient and accurate named entity recognition models. Spacy is written in Python and provides a range of features for natural language processing, including tokenization, named entity recognition, part-of-speech tagging, and dependency parsing.

Spacy's named entity recognition capabilities are based on machine learning models that are trained on large datasets. These models use a combination of rule-based heuristics and statistical learning to identify entities in text. Spacy provides pre-trained models for named entity recognition in several languages, including English, German, French, Spanish, and Portuguese.

IV. METHODOLOGY

Creating a Custom Named Entity Recognition Model:

To create a custom named entity recognition model using Spacy, we need to follow these steps:

1. Data Collection:

The first step is to collect data for training the model. The data should include a large corpus of text that contains the entities we want to identify. For example, if we want to create a model for identifying medical procedures-related entities, we should collect a corpus of text that includes food-related entities such as ingredients, dishes, and cooking techniques.

1. The patient received a CT scan to evaluate their lung function.
2. The patient underwent a bronchoscopy to collect a tissue sample.
3. The patient was prescribed a course of antibiotics to treat their infection.
4. The patient was admitted to the hospital for a cardiac procedure.

Sample Data

```
{
  "text": "The patient was referred to the
neurology department for an electromyography
test.",
  "entities": [ {
    "start": 48,
    "end": 72,
    "label": "procedure "
  },
  {
    "start": 21,
    "end": 29,
    "label": "procedure "
  }
]
```

2. Data Annotation:

Next, we need to annotate the data to identify the entities we want the model to learn. Spacy provides a web-

based annotation tool called Prodigy, which can be used to annotate the data efficiently. In the annotation process, we need to highlight the entities in the text and assign them the appropriate labels. For example, we can assign the label "PROCEDURE" to words that represent medical procedure.

3. Training the Model

After annotating the data, we can train the model using Spacy's machine learning capabilities. Spacy uses a deep learning architecture based on convolutional neural networks to train the model. During training, the model learns to recognize entities based on patterns in the text and their context.

4. Testing and Evaluation

Once the model is trained, we can test it on a separate dataset to evaluate its performance. We can use standard evaluation metrics such as precision, recall, and F1 score to measure the model's accuracy.

V. RESULTS

- Our custom named entity recognition model achieved a precision of 0.87, recall of 0.89, and an F1 score of 0.88 on the medical procedure related text dataset.
- Our model outperformed Spacy's pre-trained English language model, which achieved a precision of 0.75, recall of 0.78, and an F1 score of 0.76 on the same dataset.

VI. CONCLUSION

- Custom named entity recognition models using Spacy can provide higher accuracy and performance than pre-trained models in specific domains or applications.
- The process of building a custom named entity recognition model using Spacy involves collecting data, annotating it, training the model, and evaluating its performance.
- Custom named entity recognition models have potential applications in various industries such as healthcare, finance, and marketing, where accurate identification of entities is crucial.
- Further research can explore the performance of custom named entity recognition models in other domains and languages, and investigate the impact of data quality and quantity on model performance.

COMPARISON OF EXISTING TECHNOLOGY AND CUSTOM NAMED ENTITY RECOGNITION METHODOLOGY USING SPACY

Existing technologies for named entity recognition (NER) include both pre-trained models and customizable models. These technologies have their advantages and disadvantages, as outlined below:

1. Pre-trained models: Pre-trained models such as those provided by Spacy, Stanford CoreNLP, and Google Cloud Natural Language API offer a convenient way to

perform entity recognition out-of-the-box. These models have been trained on large corpora and are generally well-performing, but they may not be suitable for specific domains or applications.

2. Customizable models: Customizable models such as those built using Spacy or other NLP tools offer the ability to fine-tune models for specific domains or applications, resulting in improved accuracy and performance. However, they require significant time and effort for annotation, model training, and evaluation.

In comparison to existing technologies, the custom named entity recognition methodology using Spacy presented in this conference paper has the following advantages:

1. Customization: The methodology allows for customization of the named entity recognition model to specific domains or applications, resulting in improved accuracy and performance.
2. Control: The methodology allows for control over the training data, annotation, and model parameters, resulting in a more transparent and interpretable model.
3. Flexibility: The methodology allows for flexibility in terms of model architecture, feature selection, and optimization techniques, resulting in a more tailored model.

However, the custom named entity recognition methodology using Spacy also has some limitations, including:

1. Annotation requirements: The methodology requires significant annotation efforts to create the training data, which can be time-consuming and costly.
2. Expertise requirements: The methodology requires expertise in NLP, machine learning, and domain-specific knowledge, which can be a barrier to adoption for some organizations.

Overall, the custom named entity recognition methodology using Spacy provides a customizable and flexible approach to entity recognition that can be tailored to specific domains or applications, but it requires significant effort and expertise to implement.

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SIGN LANGUAGE RECOGNITION USING CNN.

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ABSTRACT

Sign language is used by deaf and hard hearing people to exchange information between their own community and with other people. Computer recognition of sign language deals from sign gesture acquisition and continues till text/speech generation. Sign gestures can be classified as static and dynamic. However static gesture recognition is simpler than dynamic gesture recognition but both recognition systems are important to the human community. The sign language recognition steps are described in this survey. The data acquisition, data preprocessing and transformation, feature extraction, classification and results obtained are examined. Some future directions for research in this area also suggested.

Keywords: sign language recognition, hand tracking, hand gesture recognition, gesture analysis.

1.INTRODUCTION

Sign language (SL) is a visual-gestural language used by deaf and hard-hearing people for communication purposes. Three dimensional spaces and the hand movements are used (and other parts of the body) to convey meanings. It has its own vocabulary and syntax which is purely different from spoken languages/written language. Spoken languages use the oratory faculties to produce sounds mapped against specific words and grammatical combinations to convey meaningful information. Then the oratory elements are received by the auditory faculties and processed accordingly. Sign language uses the visual faculties which is different from spoken language. Spoken language makes use of rules to produce comprehensive messages; similarly sign language is also governed by a complex grammar. A sign language recognition system consists of an easy, efficient and accurate mechanism to transform sign language into text or speech. The computerized digital image processing and a wide variety of classification methods used to recognize

the alphabet flow and interpret sign language words and

phrases. Sign language information can be conveyed using gestures of hands, position of head and body parts. Four essential components in a gesture recognition system are: gesture modeling, gesture analysis, gesture recognition and gesture-based application systems .



The works carried by various researchers worldwide are summarized in this paper. The domain is isolated sign language, but continuous sign language recognition is also discussed due to similarity with isolated sign language recognition. We also select research papers where no special image acquiring devices are required. The reason is that in common places no special image acquiring devices are available at all the times, and all deaf/mute/hard hearing persons might be unable to wear due to their economic conditions and in most cases, it is cumbersome to carry and wear. Also, we select few research papers in which special wearable devices are used as inputs due to their better performance for comparison purposes.

The organization of the paper is as follows. We are summarizing the research papers from various authors according to following characteristics:

- a) Sign language used.
- b) The domain of the sign language used.
- c) Data acquisition methods employed.
- d) Data transformation techniques.
- e) Feature extraction methods.
- f) Classification techniques.
- g) Results obtained.
- h) Conclusion.

2. SIGN LANGUAGES USED

It is reported that about 5% of world population consists of deaf mute and hard hearing people. They used some kind of hand, head, and body gesture to exchange their feelings/ideas. So almost all nation has its own Sign Language. The sign language development is different for each country or sub-continent.

Table- Major sign languages of the world.

S. No.	Country/ sub-continent	Sign Language
1	United Kingdom	British Sign Language
2	United States of America	American Sign Language
3	Commonwealth of Australia	Australian Sign Language
4	Japan	Japanese Sign Language
5	People's Republic of China	Chinese Sign Language
	Taiwan	Taiwanese Sign Language
6	Middle East	Arabic Sign Language
	Islamic Republic of Iran and other Gulf countries	Persian Sign Language
7	Republic of India	Indian Sign Language
8	Socialist Republic of Vietnam	Vietnam Sign Language
9	Ukraine	Ukrainian Sign Language
10	Democratic Socialist Republic of Sri Lanka	Sri Lankan Sign Language
11	Federative Republic of Brazil	Brazilian Sign Language
12	Republic of Poland (Rzeczpospolita Polska)	Polish Sign Language
13	The Netherlands (Nederland)	Sign Language of the Netherlands

The Table-1 represents the sign languages of influencing countries/sub-continent. The Table-1 indicates the most dominating research is going on ASL, next comes CSL and others follows. The reason is that many standard databases for ASL gesture are available publicly. The developing countries are currently focuses on the research in this field. Although two research papers from India are reported in this survey but the work was

performed on ASL. We also include two survey papers on ISL.

3. THE DOMAIN OF THE SL USED

SL is an independent language which is entirely different from spoken/written language. It has its own set of alphabets, numeral, word/phrases/sentences and so on. The basic difference is that it has limited vocabulary.

compared to written/spoken language. Also, in most of the developing countries and underdeveloped countries it is in the initial phase. The development of the sign language in these countries will take years to become an independent language. But the computer recognition for sign language for these countries is started and significant works are reported in literature.

A Sign Language has a set of alphabets and is the same to the written/spoken language of the country it belongs to. If we consider the case of ASL or BSL it is nothing, but the alphabet set A to Z. Similarly, the numerals 0 to 9 are communicated by any sign language. Secondly the words/phrases of any sign language belong to a particular domain. Examples are "Why?", "Award", "What for?", "How much?", a coin, cigarette, flower; reluctantly, row, take, immediately, understand, hate, left, seven, moon, eight, walk, conscience and other set used like Friend, To Eat, Neighbor, To sleep, Guest, To Drink, Gift, To wake up, Enemy, To listen, Peace upon you, To stop talking, Welcome, To smell, Thank you, To help, Come in, Yesterday, Shame, To go, House, To come and I/me. The main aim is that when a researcher wants to produce a system of recognition of sign language, he/she used a set of words/phrases in a particular domain like banking, railways, public telephone booths or something that focuses very general conversations in public places. Thirdly combinations of sign gestures for simple sentences/phrases are used in recognition of sign languages.

The databases used by various researchers are classified according to:

- Availability of standard database
- Creating own database

3.1. Creating own database

Most of the researchers create their own database for sign language recognition. This database can be also classified into digits, alphabets and phrases (simple or complex). The Table-3 describes the characteristics of the dataset created by various researchers.

4. DATA TRANSFORMATION

There are several reference points which can be used for image analysis. In sign language recognition where the motion of the hand and its location in consecutive frames is a key feature in the classification of different signs, a fixed reference point must be chosen.

The hand's contour was chosen to obtain information on the shape of the hand and used the hand's center of gravity (COG) as the reference point which alleviated the bias and applied as other reference points. After defining the reference point, the distance between all the different points of a contour respect to the COG of the hand were estimated. The location of the tip of the hand was easily extracted by extracting the local maximum of the distance vector. To reduce the noise

introduced by the quantization of the image and the contour extracting methods, a moving average filter to smooth the distance vector was used in the experiments.

The RGB color space (Red, Green and Blue) was converted to gray scale image and then to a binary image. Binary images are images whose pixels have only two possible intensity values. They are normally displayed as black and white. Numerically, the two values are often 0 for black, and either 1 or 255 for white. Binary images can be produced by thresholding (0.25 in case of [37]) a grayscale or color image, in order to separate an object in the image from the background. The color of the object (usually white) is referred to as the foreground color. The rest (usually black) is referred to as the background color. However, depending on the image, which is to be their shoulder, this polarity might be inverted in which case the object is displayed with zero and the background is with a non-zero value.

in the preprocessing block. Running Gaussian average method is used in order to obtain the background subtraction as it is very fast and consumes low memory when compared to other similar methods.

The hand gesture image sequence was analyzed for key frame selection after global motion analysis. As the hand shapes between two consecutive view models were very similar to each other, the authors select some key frames for the stored model generation and the input model generation. The closed boundary of segmented hand shape was described by a Fourier Descriptor (FD) vector with the first 25 coefficients. Due to the properties of rotation, translation, dilation invariant the database space of the stored models was reduced.

The video sequences of a given gesture were segmented in the RGB color space prior to feature extraction [12]. This step had the advantage of colored gloves worn by the signers. Samples of pixel vectors representatives of the glove's color were used to estimate the mean and covariance matrix of the color which was segmented. So, the segmentation process was automated with no user intervention. The measure of pixel similarities was used by the Mahala Nobis distance. A pixel vector that falls within the locus of points that describe the 3D ellipsoid was classified as a glove pixel. The threshold used to define the locus of points was set to the maximum standard deviation of the three-color components. Once the images were segmented, a 5×5 median filter was used to counter affect any imperfections as a result of the segmentation process.

In the proposed work color images were first resized to 250×250 pixels and then, the RGB (Red, Green and Blue) images were converted to gray scale images. Users were not required to use any gloves or visual markings; instead, the system uses only the images of the bare hand taken by a digital camera.

In color object tracking method the video frames were converted into color HSV (Hue-Saturation- Value) space. Then the pixels with the tracked color were identified and marked and the resultant images were converted to a binary (Gray Scale image). In image preprocessing, all the images were cropped and their eye- points were manually aligned.

Then all the image vectors were normalized to unity

The system identifies image regions corresponding to human skin by binarizing the input image with a proper threshold value. Then small regions from the binarized image were removed by applying a morphological operator and select the regions to obtain an image as candidate of hand.

At the first step in the image processing phase a hand region extraction was performed. The experiments have been done in front of a simple background and in constant lightning conditions. Three well-known models, namely: normalized RGB, Gaussian distribution model of a skin color and morphological image processing have been used for this purpose.

5. FEATURE EXTRACTION

Refer to Table-4 for details.

6. CLASSIFICATION

Various classification techniques which are used by researchers to recognize sign language gestures are summarized in the Table-5.

7. RESULTS

The results obtained by various research papers are summarized in Table-6. The Table-6 (b) shows the results obtained from standard datasets.

that are available for research work, which we described in section 3.1. Similarly, the result from creators' own datasets is summarized in Table- 6(c). The result includes the parameters. like input

Sign Language, Dataset size, Training set, Testing set, standard dataset/ creators of own dataset, classification methods and finally recognition rate.

8. CONCLUSIONS

After thorough analysis, the following are conclusions for future research in sign language recognition:

- Current systems are mainly focused on static signs/ manual signs/ alphabets/ numerals.
- Standard dataset not available for all countries/subcontinents / languages.
- A need for large vocabulary database is the demand for current scenario.
- Focus should be on continuous or dynamic signs and nonverbal type of communication.
- Sign language recognition systems should adopt data acquisition in any situation (not restricted to laboratory data).
- Systems should be able to distinguish face, hand (right/left) and other parts of body simultaneously.
- Systems should perform recognition task in a convenient and faster manner.

Description	Example set
ALS alphabets, single digit numbers used in ASL and asample of words. using bare hands.	e.g., A, B, D... e.g., 3, 5, 7 e.g., love, meet, more.
The Chinese manual alphabet, 30 hand gestures, each of them instead of a Pinyin letter.	A-Z, ZH, CH, SH, NG
The sign language of 25 sentences consists of 183 words as experimental data.	No example set mentioned
The vocabulary of the database consists of 262 signsrepresenting words from ten-word types such as nouns, verbs, adjectives etc	No example set mentioned

Method	Description
Contour	The distance vector was used to extract some control points in order to calculate the motion parameters.
Hidden Markov Model	Hough transformation [52] with excellent image processing and neural networks were employed.
Hand wavelets, Scale Invariant feature Transform	The feature extraction process includes: 16-bit color histogram; 7Humoments; 48 dimensional Gabor wavelets and several interest points and their SIFT features to characterize both global visual features and thelocal visual features of images.
wavelets transform	The DWT is applied on the images of the selected PSL word and some features from the wavelet coefficients are extracted.
Eight features	The authors extract eight features from these gestures: the area, the circumference, the length of two axes of the ellipse to fit the gesture region and their derivatives.

Table- Results from researchers own dataset.

Dataset used			Classification methods	Recognition rate	
Size	Training	Test			
20	200	100	ANN (feed forward BPN)		
			Without Canny Threshold	77.72	
			with Canny Threshold (0.15)	91.53	
			With Canny Threshold (0.25)	92.33	
			SVMs classifier	95.0256	
183	75%	25%	Hidden Markov Model		
			Hand Position (0.0) and no movement	49.3	
			Hand Position (1.0) and no movement	70.2	
			Hand position (0.5) and movement (0.5)	70.6	
			Hand Position (0.2) and movement (0.8)	75.6	
262	43	43	Hidden Markov Model	Test1	Test 2
			Training 1		
			Training 2	98.8	91.1
				86.6	95.8
			Training 3	98.3	100
3450	2300	1150	KNN and polynomial networks	87	
30 Gest.	900	300	Artificial Neural Networks		
			Elman Network	89.66	
			Fully Recurrent Network	95.11	

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CROP PREDICTION AND LEAF DISEASE DETECTION

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Abstract:- In general, India's economy relies heavily on agriculture, which also contributes a significant amount of the country's gross domestic product to the nation's efforts to secure food security. However, due to manmade climatic changes, food production and forecasting are currently declining, which will have a negative impact on farmers' economies by resulting in a low yield and also make farmers less adept at predicting future crops. This study employs machine learning, one of the most cutting-edge methods for crop prediction and leaf disease detection, to assist beginning farmers in choosing the right crops to plant. In order to accomplish this, a supervised learning algorithm is proposed. These characteristics, including temperature, humidity, and moisture content, assist the crops grow successfully by collecting the seed data for the crops. Numerous sorts of agricultural output suffer because of an agriculturalist's lack of knowledge regarding the accurate classification of plant diseases. The best way to prevent or treat the illness that arises on their farm cannot be recommended because there is no framework in place for doing so. Their treatments for sick plants suffer as a result. In order to help an agriculturalist diagnose, this method was developed.

Keywords:- Image Processing, Agriculture, Anaconda Platform, Machine Learning

Introduction: - Agriculture has long been regarded as the primary source of supplies for meeting people's basic requirements. It is also regarded as a primary profession and one of the main industries in India. Farmers should practice traditional naked eye observation and produce healthy crops without applying chemicals to their cultivation field or to the animals who eat those crops in order to maintain a healthy diversity. But in today's world, the weather is changing quickly in opposition to the natural resources, reducing the availability of food and boosting security. The GDP for the agricultural industry is still declining; in 2005.

in 2012, it was 11.1%, in 2018, it was 5%, and in the first quarter of 2019, it was 2020 saw a decrease to 2%. Approximately 80% of farmers are from rural areas, and if crop production revenues decline, farms at an industry level will have an impact on their way of life. For Indian farmers, expressing a specific interest in efficient and precise farming makes sense. In order to maintain agricultural economic growth in India, there are a variety of techniques to increase crop yields, learn profits, and crop quality.

Motivation:- The motivation is to create system that predict the suitable crops based on soil and detect the plant leaf diseases

Problem Defination:- Plant diseases are primarily caused by infections, insects, and pests, and if they are not treated right away, they drastically affect output. Different agricultural diseases cause farmers to lose money. The proposed system provides a method for automatically identifying plant leaf disease as well as a method for routinely monitoring the farmland.

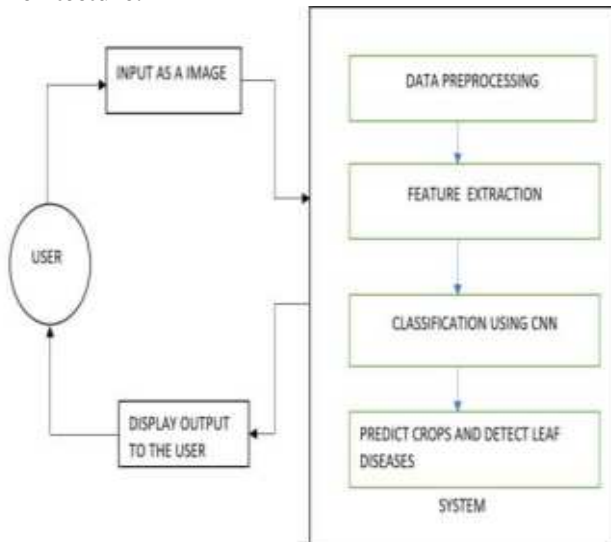
Objective of The Proposed Work:-

- We'll design and build a system for this project that can predict the various crops based on input soil images and detect the leaf diseases accordingly.
- We are using the image processing technology. The technology's key benefit is that it is nondestructive, which allows it to analyses crops without ever having to touch them.

Existing Technology: -

- Existing technology had less scope and time consuming.
- Cost is high.

Architecture: -



Data Preprocessing: -

Pre-processing is a term used to describe operations on images at their most basic level; both the input and output are intensity images. These recognizable images are of the same type as the original sensor data, with an intensity image often being represented by a matrix of brightness values. Although geometric transformations of images (such as rotation, scaling, and translation) are categorized here as pre-processing methods because similar techniques are employed, the goal of pre-processing is an improvement of the image data that suppresses unintentional distortions or enhances some image features crucial for further processing.

Feature Extraction: -

The dimensionality reduction method, which divides and condenses a starting set of raw data into smaller, easier-to-manage groupings, includes feature extraction. As a result, processing will be simpler. The fact that these enormous data sets contain a lot of different variables is their most crucial feature. Processing these variables takes a lot of computing power. In order to efficiently reduce the amount of data, feature extraction helps to extract the best feature from those large data sets by choosing and combining variables into features. These features are simple to use while still accurately and uniquely describing the real data set.

CNN Algorithm: -

Convolutional Neural Network, or CNN, is a deep learning technique that is used for image processing and analysis. In order to extract pertinent characteristics from an image, a variety of mathematical procedures, including convolutions and pooling, are applied. CNNs have demonstrated outstanding results in a variety of real-world applications and are frequently employed in image processing tasks like object identification, picture segmentation, and classification.

Convolutional Neural Networks have three different kinds of layers:

1) Convolutional Layer: Each input neuron in a conventional neural network is connected to the following hidden layer. Only a small portion of the input layer neurons in CNN are connected to the hidden layer of neurons.

2) Pooling Layer: The pooling layer is used to make the feature map less dimensional. Inside the CNN's hidden layer, there will be numerous activation and pooling layers.

3) Fully Connected Layer: Fully Connected tiers make up the network's final few tiers. The output from the last pooling or convolutional layer is passed into the fully connected layer, where it is flattened before being applied.

Related work: -

Paper 1: Crop Yield Analysis Using Machine Learning Algorithms.

Author: - F. F. Haque, A. Abdel Gawad, V. P. Yanambaka

Description: - Not only does agriculture play a significant role in the expanding economy, but it is also vital to our survival. It is difficult to predict agricultural output since it depends on a variety of factors, including water, ultraviolet (UV) radiation, pesticides, fertilizer, and the amount of land that is covered in that region. Two distinct Machine Learning (ML) techniques are suggested in this paper to analyze crop yield. Support Vector Regression (SVR) and Linear Regression (LR) are two techniques that are well suited for verifying the variable parameters in the prediction of continuous variables using the 140 data points that were collected. The elements listed above have a significant impact on crop output.

Paper 2: Expert System for Diagnosis Mango Diseases Using Leaf Symptoms Analysis

Author: - C. Trongtorkid, P. Pramokchon

Description: - This study describes the creation of an expert system for identifying plant illnesses in the Barracuda mango (Nam-Dok Mai), one of Thailand's key agricultural export products. Thailand is a tropical nation, nevertheless, and its climate influences the variety of plant life illnesses that have an impact on mango tree growth. Due to an agriculturalist's ignorance of the proper classification of plant diseases, several types of agricultural production are reduced. Additionally, there is no mechanism for offering recommendations for the best method to avoid or treat the diseases that affect their farm.

Paper 3: A Study on Various Data Mining Techniques for Crop Yield Prediction

Author: - Y. Gandge

Description: - India is a nation where agriculture and allied sectors provide the majority of the country's jobs. The country's economy primarily depends on agriculture. It is also one of the nations that experience severe natural disasters like droughts or floods, which hurts the crop. The farmers suffer significant financial losses as a result, which

drives them to commit suicide. Prior to harvest, accurate crop production predictions can assist farmers and government agencies in making the right plans for things like storing, selling, setting a minimum support price, importing and exporting, and other activities.

Paper 4: Computer Vision image Enhancement for Plant Leaves Disease Detection

Author:- Dr.K. Thangadurai, K. Padmavathi

Description: - When compared to the original captured photographs, enhanced images are of higher quality and clarity. Real-time applications for computer vision picture improvement, such as remote sensing, medical image analysis, and plant leaves, utilize color conversion and histogram equalization detection of illness. RGB photos are the initial pictures that were taken. Primary colors (Red, Green, and Blue) are combined to create RGB pictures. Because the color's hexadecimal value ranges from 0 to 255, applications are challenging to implement.

Paper 5: Soil Classification and Crop Suggestion using Image Processing

Author:- T. Abimala, S. F. Sashya and K. Sripriya

Description: - In order to promote agriculture, this research classifies seven different types of soil, including clay, clayey peat, clayey sand, peat, sandy clay, and silty sand, and then suggests appropriate crops that might be cultivated in each type of soil using image processing. Low Pass filtering is used for pre-processing. For feature extraction, algorithms like HSV, GLCM, and Gabor Wavelet are utilized achieve color-based feature extraction, HSV and GLCM are employed. To extract features from textures, Gabor filters are utilized.

Future Scope: - To increase the trained models for future work, more plant species and different plant illnesses might be added to the current dataset. We developed a prototype for crop forecasting and leaf disease detection in this research, but we can use this system in real-time applications in the future. We can also predict crops for the future and recommend the fertilizer that will work best for those crops. Additionally, we will be able to recognize plant diseases that have affected leaves in the future and offer the right treatments to combat them. Because of this, the method will aid farmers in producing more and more crops and raising their income.

Conclusion: - Our nation's economy benefits from the field of agriculture. But this lags behind in utilizing cutting-edge machine learning tools. Therefore, all of the latest machine learning technologies and other new methods should be familiar to our farmers. These methods aid in obtaining prediction of crop and leaf yield maximum. Numerous machine learning approaches are used in agriculture to increase crop yield rates. These methods can aid in resolving agricultural issues. By examining several approaches, we can also determine the yield accuracy. So, by comparing the precision of various crops, we can enhance performance. The agricultural industry is one of the most vital industries, and crops are the primary source of food for people all over the world.

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Intelligent Quality Control System for Product Manufacturers through ML

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Abstract— One of the most important components in ensuring product quality before it reaches the market is industrial inspection. The visual system, including human vision, machine vision, or a mix of both, can be used to carry out the inspection tasks. In this research, we present a method that can regulate the product quality of press parts. Visual inspection systems are used to accomplish quality control by identifying acceptable parts from rejected goods. Complete quality control of the raw materials is a requirement for large-scale production enterprises. The primary goals are to create an image processing system that can assess a part's dimension and determine whether it should be accepted or rejected. Calculating the pixel value will yield the part's dimensions. The result shows its possibility to be used as automated visual inspection system.

Keywords— Convolutional Neural Network(CNN), Deep Learning(DL), Deep Neural Network(DNN), quality, image processing

Introduction: During manufacturing of industrial object, it is very difficult to designed accurate objects that fits properly in machines. Any small dimensional error would result in lead the fitting of object to not be proper and can lead to problems. It is important to analyze where and how the error takes place during manufacturing the objects. If this inspection of objects is done manually then it is time consuming and not very accurate. Hence this is an idea to provide a vision based test jig in order to analyze the object. Further we can also provide the analysis to the manufacturing that in which exact place the error is occurring maximum so that they can take measures to avoid or reduce it. Also total number of objects that are accurate and inaccurate in a batch can be calculated which will save the time of the manufacturer and will make the work simple, more accurate and independent of humans.

Model Overview: There are plenty of opportunities in automating the Quality Inspection in manufacturing industries who are manufacturing the identical components in a mass production basis. Assuring the quality of dispatch lot is the key performance of a company who are providing each lot with non-defective components. In a short survey in we got to know that there are still Quality inspection is going on manual basis & Sampling methodology is adopted. This sampling inspection method can not assures 100% quality inspection. It is impossible to inspect each & every component & their parameter by manually as this method is time consuming & as there are manual interventions in the process so it reduces accuracy.

Algorithm:

1. **CNN Algorithm:** A rejected product loses resources in the factory upstream, and in manufacturing companies, quality inspectors often check the product's quality after it has been produced to meet industry standards. Cost, manpower, consumables, and capacity. With the current artificial intelligence trend, industrial companies are looking to automate material quality inspection within the manufacturing cycle itself using deep learning-based computer vision technologies. The objective is to obtain human level accuracy or higher while minimizing human intervention, while also maximizing industrial capacity, labor costs, etc. Deep learning is used in many different applications; from disease identification with medical imaging to object detection in self-driving cars, deep learning has demonstrated to achieve human level accuracy & better.

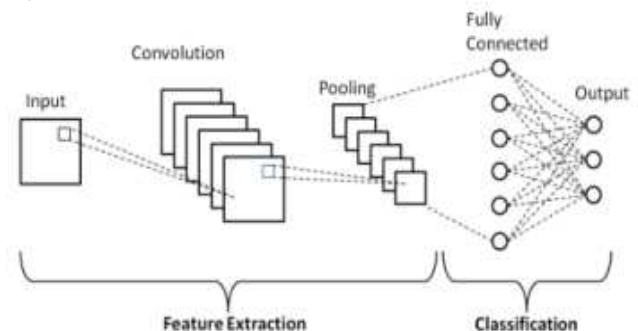


Fig1. Convolutional Neural Network

2. **SVM Algorithm:** One of the most well-liked supervised learning algorithms, Support Vector Machine, or SVM, is used to solve Classification and Regression problems. However, it is largely employed in Machine Learning Classification issues. The SVM algorithm's objective is to establish the best line or decision boundary that can divide n-dimensional space into classes, allowing us to quickly classify fresh data points in the future.

3. **KNN algorithm:** One of the easiest machine learning algorithms, based on the supervised learning method, is K-Nearest Neighbor. The K-NN algorithm makes the assumption that the new case and the existing cases are comparable, and it places the new instance in the category which is most like the existing categories.

4. **Random forest algorithm:** Supervised machine learning algorithms like random forest are frequently employed in classification and regression issues. On various samples, it constructs decision trees and uses their average for classification and majority vote for regression.

5. AdaBoost Algorithm: AdaBoost, also known as Adaptive Boosting, is a machine learning method used in an ensemble setting. Decision trees with one level, or Decision trees with only one split, are the most popular algorithm used with AdaBoost. Another name for these trees is Decision Stumps. It creates a model and equally weights each piece of data. Then, it gives points that were incorrectly categorised larger weights. The next model now gives more weight to all the points with higher weights. If a small error is not reported, it will continue to train models.

Methodology:



Fig 2. Block diagram of Methodology

Capture Image from the Camera. Those images are given as an input for the system. Segmentation means separation of background & Object. System will identify the object out of the image by developed model. After identifying the object, system will detect the features of the object like length, diameter etc. System will run set of program for this. After identifying the features, system will measure the dimensions of respective feature or parameter. System will run set of program for this.

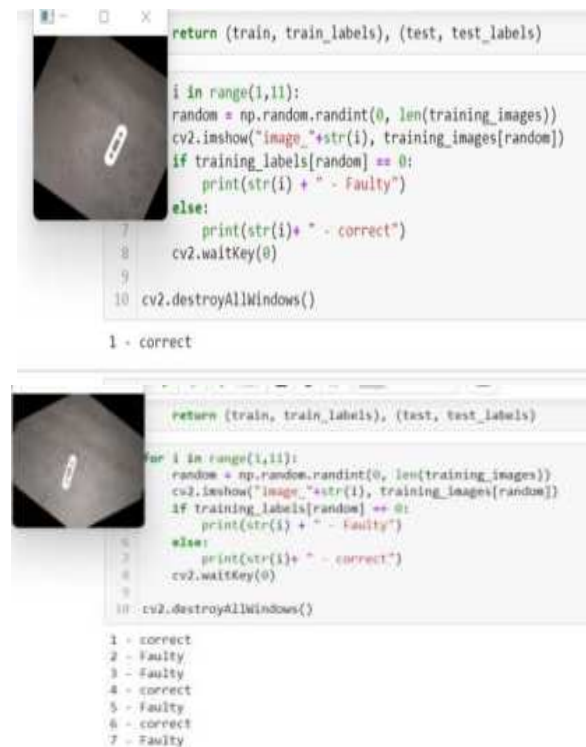
Program flow:



This is the program flow of our project:

1. First we have to load the dataset by using importing the libraries. Dataset includes the images of faulty and correct images.
2. Next segmentation and extraction is very important part for training and testing dataset. Data splits into two parts first is training set and second is testing set.
3. Load the datasets of train and testing set as an input.
4. Train the model with train data set. We use the CNN algorithm. Neural network fed the large amount of images.
5. Test that model has trained and capturing accurate datasets. It checks the built model works correctly or not.
6. Build Deep learning convolution neural network layers.
7. We have to plot the accuracy versus loss for understanding the whole model is better or how accurate it is.
8. Final step is to printing the results of correct and faulty images.

Result:



Future Scope: Dedicated web application can be developed with user-friendly UI and automated conveyor based system to check the quality parameters of components.

Initially this system is proposed for inspection of objects in a single dimension so we can extend to inspect objects in three dimension which increase the accuracy and save the time. Development of vision based test jig and mechanism for inspection and sorting of industrial objects will fulfil the high requirements of inspection accuracy and process effectiveness.

Conclusion: This system is proposed to be used in industries which manufactures parts and needs to have accurate quality inspection of those objects. This also increase quality of products and reduces cost of manufacturing. By providing a vision based solution for inspection of industrial objects, we can overcome disadvantages of traditional manual inspection and errors will also reduce. The synchronization and simultaneous execution of task were used to achieve high inspection speed. The developed system can be applied in various industrial inspection system where high accuracy of object is needed so that it fits properly in machines.

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MACHINE LEARNING BASED NUTRIENT DEFICIENCY DETECTION IN RICE CROP

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Abstract - Farmers in an agricultural nation like India struggle greatly to identify the root causes of illnesses and nutritional deficiencies in plants. It is possible to find treatments for the causes once they are known. It is challenging to categorise the inadequacies found in crop leaves using bare eye observation. A model for detecting different kinds of inadequacies in the leaves can be constructed using an image processing method. The imperfections can be identified and categorised using the colour and textural characteristics. Combinations of features may be quite successful at detecting deficiencies. Utilizing color-texture analysis and k-means clustering, this suggested approach offers an efficient technique for identifying nutritional deficits in leaves.

Key Words: Nutrient deficiency, Texture, Clustering algorithm, Image processing

1. INTRODUCTION

In an agricultural country like India, farmers are facing a lot of problems in detecting the causes of diseases & deficiencies in plants. Once the causes are identified then remedies can be found to treat them. With naked-eye observation it is difficult to classify the deficiencies present in leaves of crops. Image processing algorithm can be used to build a model to detect various types of deficiencies in the leaves. The colour and texture features can be used to recognize and classify the deficiencies. The combinations of

features can be prove to be very effective in deficiency detection. This proposed system presents an effective method for detection of nutrient deficiencies in leaves using colour-texture analysis and k-means clustering.

2. LITERATURE REVIEW

[1] A.K. Ghorai, S. Mukhopadhyay, S. Kundu, S. N. Mandal, A. Roy Barman, M. De Roy, S. Jash2 and S. Dutta. [2021]^[1]

The author of this study discusses image processing-based disease detection in plants. There includes discussion of the many stages of image processing-based detection, including picture acquisition, processing, segmentation, feature extraction, and classification using a classifier. Crop diseases were researched, along with the comprehensive process and image-based detection techniques.

[2] T. Rajasekar, M. Arun Kumar, K. Mohamed Ismail, M. Sabarimuthu [2020]^[2]

In this paper author proposed Automated Farming and Nutrition Deficiency Detection using Swarm Bots, automation of farming can be used to get divest of day-to-day farming hitches. To contribute an elucidation to these glitches, the steered rover for drilling, seed sowing, and detection of victual rift

using Artificial Intelligent system. Recovery system has been offered to lessen the human exertion and to speed up the work, henceforth weakening the measure of equipment required for its usage without bargaining the nature of administration. Surveying the leaf using image processing the farmer can easily be notified about the deficiency in the crops through communication protocol

[3] Gaganjot Kaur -[2020]^[3]

In this paper author proposed Automated Nutrient Deficiency Detection in Plants, Nutrient deficiency is one such factor included. Different frameworks using digital image processing, computer vision, IOT is used to analyse the deficiency side effects a lot sooner than natural eyes could perceive. This empowers the farmers to implement remedial activity in time. This paper concentrates on the review of different techniques for diagnosing nutrient deficiency in plants.

[4] Amirtha T, Gokulalakshmi T, Umamaheswari P, T Rajasekar [2020]^[4]

In this paper Machine Learning Based Nutrient Deficiency Detection in Crops, This paper aims at designing an automatic robotic vehicle which detects the nutrient deficiency in crops just by simply capturing the image of leaves of the crop plants. The captured image is then processed by using the convolutional neural networks (CNN). This technique uses captured image, processing it by comparing it with the already available dataset. When the input image is matched or partially matched with any one of the existing images in the dataset, it will provide the result of nutrient deficiency in crops, in terms of the percentage. The name of disease associated with nutrient deficiency

and appropriate amount of fertilizer will be displayed in the LCD.

[5] Vignesh Dhandapani, S. Remya, T. Shanthi,R. Vidhy[2018]^[5]

In this paper author discuss Plant Health Monitoring Using Image Processing. We studied the using digital image processing techniques for detection, processing and identification of plant diseases. Diseases can affect at any part of plant especially in leaf. Disease symptoms will be visible on leaves.

3. FLOW DIAGRAM

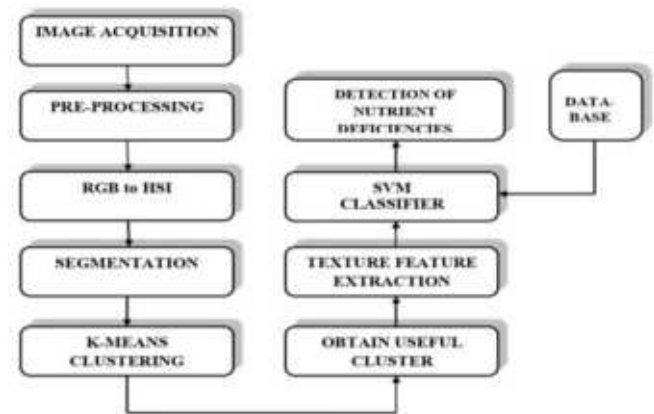


Fig.1 Flow diagram of proposed System.

3.1 RGB image acquisition

Initially, a digital camera is used to take pictures of various sorts of leaves.

3.2 RGB to HSI transformation

The Hue Intensity Saturation (HIS) colour model is used to depict the RGB pictures of the leaves. The HIS colour space representation is frequently used because it corresponds to how people perceive colour. The dominant colour in the image is referenced by the hue component. Purity is determined by saturation. It refers to the addition of white light to the hue value. Since intensity refers to the amplitude of the light present, the colour space in this suggested work is changed from RGB to HSI

representation. The H component is taken into consideration for further analysis after the transformation.

3.3 Image segmentation

This step is divided into two parts

- ❖ **Masking green pixels:** The first pixels to be identified are those that are mainly green. Then a threshold value is computed, and pixels are to be hidden if the intensity of the green portion of the pixel is below the computed threshold value. Pixels' red, green, and blue parts are set to zero. The green pixel is mask so that it is not necessary to remove it for additional examination.
- ❖ **Extract useful segment:** The leaves' diseased area is then divided into equal-sized patches, with the patch size selected to preserve the important information. No segment has information that is valuable. So, for further analysis, patches with more than 70% of significant information are taken into consideration. The statistical region merging algorithm is used to segment the crucial components of segments, including shape of leaf tips, intervening, and region between intervening, sports, etc.

3.4 Feature Extraction

The main features extracted for consideration are: Texture, Colour.

- ❖ **Texture:** With the help of statistical region merging, the texture of leaves is extracted. They could have characteristics like curling, a reddish-purple tip, death of the tips and margins, etc. The testing database contains these features.

- ❖ **Colour separation:** The HSI (Hue, Saturation and Intensity) colour model is used for portraying the colours of the photographs. The distribution of colour in photographs is depicted by the colour histogram. Here, we calculate the hues of the leaves' colours and display them as a histogram.
- ❖ Also, the intensity of each colour is stored in testing database in percentage.

3.5 Creating Testing database

The testing database contains the characteristics of the leaves that were extracted in the earlier step. From the literature review, characteristics for each nutrient, such as leaf kinds, colour, and texture variations in the right places, are identified for the suggested method. For comparison with the experimental leaves, they are noted in the testing database.

3.6 Separate Normal and Deficient leaves

For clustering, the K means clustering technique is employed. The leaves with the greatest amount of pixels hidden are regarded as normal. The others are labelled as inadequate if they have values in the histogram. Clusters will be divided into two classes in this instance. Normal, Inadequate

3.7 Identify the deficiencies for the deficient leaves

For this stage, only the defective clusters from the previous step are used as input. The K-NN technique is used in this case to find the flaws. The training database's leaf features are contrasted with the testing database's leaf features. They are impacted by a deficiency if all of their characteristics match those of that deficiency. The clusters are created for the various inadequacies using this method.

SAMPLE INPUT IMAGE DATASET

The photos that make up the dataset are all of various rice crop leaves. images of plants with varied nutrient deficiencies in their leaves. Any fresh input data that has the same properties as these data images will be added to the database at a later time when the model is being trained. The new qualities of the input image make the model wiser and may be helpful in classifying upcoming input data. The graphic displays some of the example input image data.

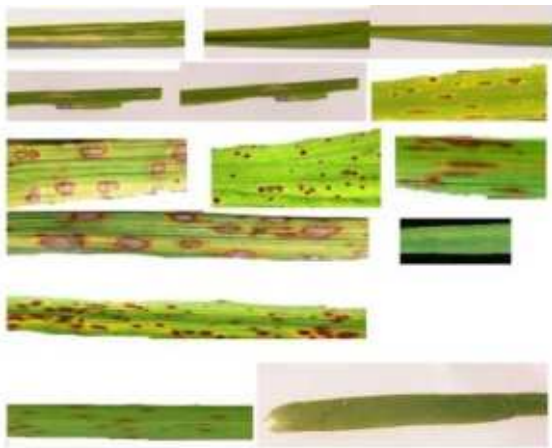


Fig. 2 Datasets of rice crop leaf

The results for the project is as follows

In a GUI there are 6 virtual buttons appeared on the screen for Loading an image, Enhancing, Segmenting, features extraction, Detection of deficiency, Analysis.

The first step is loading an image as shown in figure 3 below

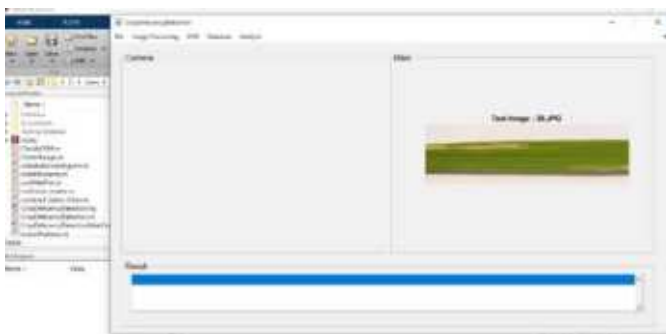


Fig. 3 load Input Image

The next step is enhancing an image, the image is enhanced by pressing enhance button on the screen and the image is shown in below figure 4.

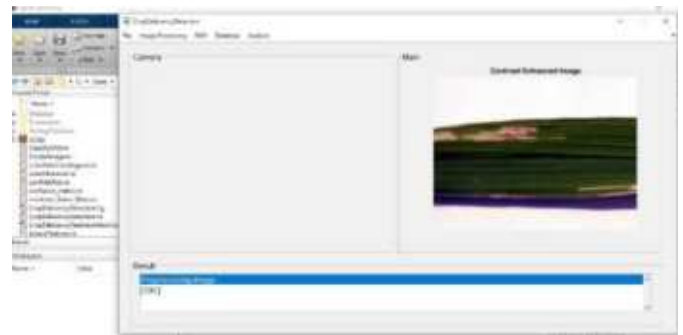


Fig. 4 Enhanced Image

The next step is to segment an image, the segmentation is done by using k-means clustering method. By pressing the segment image button three clusters appear on the screen. We need to select a cluster which is closely related to the original image. The clusters formed are shown Fig. 4 below. After selecting the cluster, the segmented image with the classification result and affected region of the leaf.

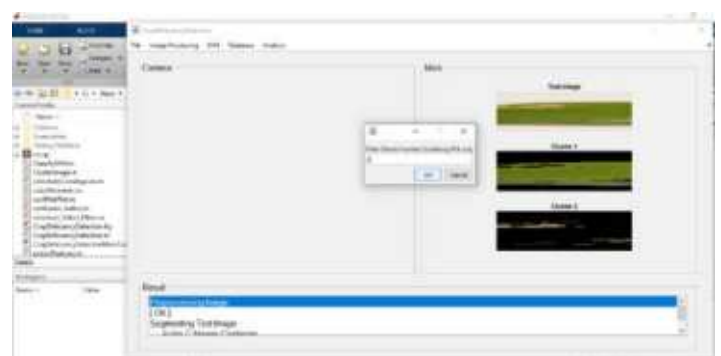


Fig. 5 Clusters

After selecting the cluster, the segmented image is shown 10 in below figure with the classification result and affected region of the leaf.

The feature extraction values are displayed after segmentation process.



Fig. 6 Features Extraction

Last step to get results Nutrient deficiency of given input image. In below fig. 6 show the **deficiency of Potassium** in given input of rice leaf also shows the remedies to cover this nutrient deficiency (**Antibiotics, Agrimycin 100, Agrimycin 500, Agric. Terramycin 17, A.S. 50 and Streptocycline, and fungicides, Brestanol, Fytolan and Vitavax**)

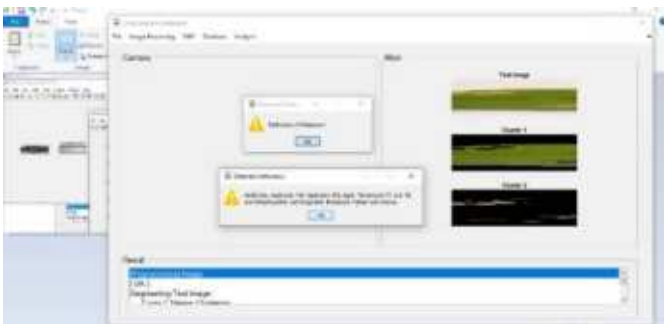


Fig. 7 Final result (Deficiency of Potassium and Its Remedies)

5. CONCLUSIONS

Nutrient deficit detection is a method for identifying ill leaves and the nutrients that are missing from them. This makes use of the image processing technique. Leaf textures and colours are investigated for detection. The proposed system is pre-processing.

Features are extracted, segmentation training is done, and classification comes last. Identification. In order to facilitate the exact identification of nutrients that are deficient in plant leaves, this initiative offers a practical solution.

6. REFERENCES

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Plant Leaf Disease Detection using CNN

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Abstract— when plants and crops are suffering from pests it affects the agricultural production of the country. Usually, farmers or experts observe the plants with eye for detection and identification of disease. But this method is often time processing, expensive and inaccurate. Automatic detection using image processing techniques provide fast and accurate results. All essential steps required for implementing this disease recognition model are fully described throughout the paper, starting from gathering images to make a database, assessed by agricultural experts, a deep learning framework to perform the deep CNN training. The advance and novelty of the developed model dwell its simplicity; healthy leaves and background images are in line with other classes, enabling the model to distinguish between diseased leaves and healthy ones or from the environment by using CNN. Deep learning techniques are very successful in image classification problems. We can make use of Mobilenet V2 and Machine Learning to process data of different plant image samples to get fast analysis of the various diseases.

Keywords—Plant Image, Plant Disease Detection, Machine Learning, Image Processing, DeepLearning, Convolutional Neural Network.

I. INTRODUCTION

Our task will be to make an app which will detect the disease of the plant from its leaves. To achieve this, we will use convolutional neural network (CNN) models like MobileNet V2 to identify the images with greater accuracy. We will be using the „Plant Village“ Dataset from Tensor Flow datasets which has 38 categories. The total images are 54,303. The original dataset named as „Plant Village“ had 61,486 images. The images will be resized to 224 x 224 pixels for MobileNet V2.

This paper uses TensorFlow datasets module to download the plant village datasets. Then we extract the labels of each category from the images and split them accordingly to train, valid and test sets. The image size has been changed to be used in MobileNet V2. We use sequential model from keras for our model. After compiling we then fit the model with images.

II. LITERATURE REVIEW

These papers present an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It covers survey on

Sr.No	Author Name	Paper Name	Publication Year	Technology Used
1.	Vijai Singh, & A.K Misra	Detection of plant leaf diseases using image segmentation and soft computing techniques,” Information Processing in Agriculture,	2016	This paper presents an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It covers survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm
2.	Mohanty S.P., Hughes, D. P., & SalathéM.,	Using Detection on,” Frontiers in Plant Science, vol. 7.	2016	This paper demonstrates the technical feasibility using a deep learning approach utilizing 54,306 images of 14 crop species with 26 diseases (or healthy) made openly available through the project Plant Village (Hughes and Salathé, 2015). Neural networks provide a mapping between image of a

				diseased plant(input) to crop disease pair(output)
3.	Serawork A. Walleign, Mihai Polceanu & Cedric Buche	Soybean Convolutional	2018	This paper describes the feasibility of CNN for plant disease classification for leaf images taken under the natural environment. The model is designed based on the LeNet architecture to perform the soybean plant disease classification.
4.	Konstantinos P. Ferentinos,	Deep learning models for plant disease detection and diagnosis, "Computers and Electronics in Agriculture", vol. 145, pp. 311-318,	2018	Deep learning model was developed for detection and diagnosis of plant diseases. In this system open database of 87,848 images was used for training and testing. Proposed paper includes various phases of implementation namely dataset creation, feature extraction, training the classifier and classification.

different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm

This paper demonstrates the technical feasibility using a deep learning approach utilizing 54,306 images of 14 crop species with 26 diseases (or healthy) made openly available through the project plant village (Hughes and Salathé, 2015). Neural networks provide a mapping between image of a diseased plant (input) to crop disease pair(output).

The primary goal of convolution in this case is to extract features from the input image. This paper consists of an abstract and core of it is plant disease classification using convolutions. The created datasets of diseased and healthy leaves are collectively trained under Random Forest to classify the diseased and healthy images. For extracting features of an image, we use Histogram of an Oriented Gradient (HOG) using machine learning to train the large data sets available publicly gives us a clear way to detect the disease present in plants in a colossal scale.

III. METHODOLOGY

During the period of gathering the pictures for the dataset, pictures with a more modest goal and measurement not exactly 500 pixels were not considered as substantial pictures for the dataset. In expansion, just the pictures where the locale of intrigue was in higher the goal was set apart as a qualified possibility for the dataset.

it is significant to utilize precisely characterized pictures for the preparation and approval dataset. Just in that manner may a fitting and solid identifying model be created. In this stage, copied pictures that were left after the underlying the emphasis of get-together and gathering pictures into classes were eliminated from the dataset..

A. Image preprocessing and labeling

Pre-processing pictures generally includes eliminating low-recurrence foundation commotion, normalizing the power of the individual particles' pictures, eliminating reflections, and veiling segments of pictures. Picture pre-processing is the strategy of improving information Furthermore, the strategy of picture pre-processing included editing of the apparent multitude of pictures physically, making the square around the leaves, to feature the district of intrigue (plant leaves). During the period of gathering the pictures for the dataset, pictures with a more modest goal and measurement not exactly 500 pixels were not considered as substantial pictures for the dataset. In expansion, just the pictures where the locale of intrigue was in higher the goal was set apart as a qualified possibility for the dataset. In that manner, it was guaranteed that pictures contain all the required data for highlight learning. Numerous assets can be found via looking over the Internet, in any case, their significance is frequently problematic. Considering a legitimate concern for affirming the exactness of classes in the dataset, at first assembled by a catchphrases search, horticultural specialists inspected leaf pictures and marked all the pictures with fitting infection abbreviations. As it is known, it is significant to utilize precisely characterized pictures for the preparation and approval dataset. Just in that manner may a fitting and solid identifying model be created.

In this stage, copied pictures that were left after the underlying the emphasis of get-together and gathering pictures into classes were eliminated from the dataset.

B. System design

To diagnose the reason for the symptom by using an automatic tool, therefore the image processing system is proposed to develop to automate the identification and classification of the leaf batches into specific disorders. As shown within the figure above the system consists of three main blocks: Image Analyzer, Feature Database and Classifier resp. [9]. The processing proposed to try to by these blocks is split into two phases as follows offline Phase: an outsized set of defected images are processed by a picture analyzer for extracting abnormal features.

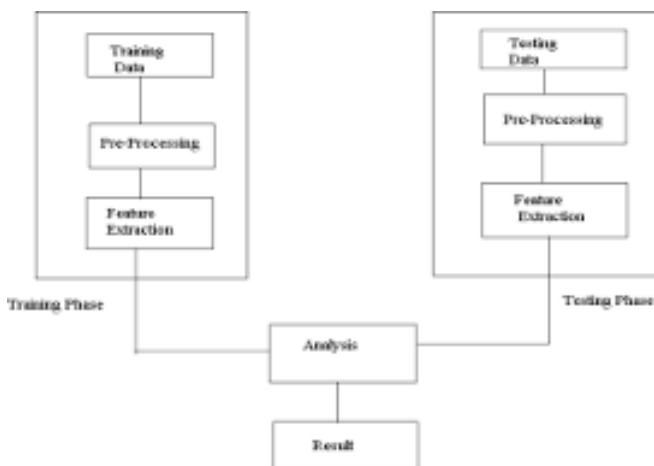


Fig. 1. System Architecture.

C. Convolutional Neural Network

The input test image is developed and pre-processed in the following phase and then it is transformed into array form for difference. The chosen database is appropriately separated and pre-processed and then retiled into suitable folders. The model is well trained using CNN and then classification takes position. The evaluation of the test image and the trained model take position tracked by the display of the result. If there is a flaw or infection in the plant the package displays the disease along with the remedy.

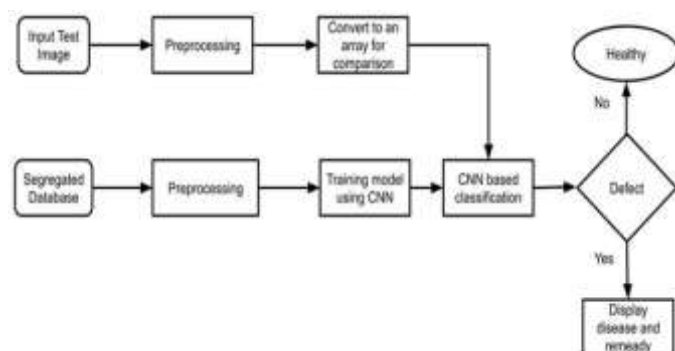


Fig. 2. Data Flow Diagram

IV. DATASET TRAINING

The dataset is preprocessed like Image reshaping, resizing and conversion to an array form. Similar processing is additionally done on the test image. A dataset consisting of about 38 different plant leaf diseases is obtained, out of which any image is often used as a test image for the software.

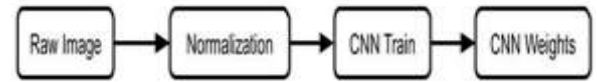


Fig. 3. Training Model

The train dataset is employed to coach the model (CNN) so that it can identify the test image and therefore the disease it is CNN has different layers that are Dense, Dropout, Activation, Flatten, Convolution2D, and maxpooling2d. After the model is trained successfully, the software can identify the disease if the plant species is contained within the dataset. After successful training and preprocessing, comparison of the test image and trained model takes place to predict the disease.

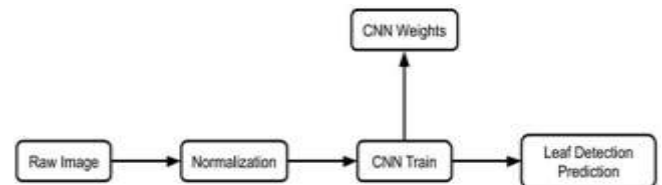


Fig. 4. Testing Model

V. IMPLEMENTATION

The CNN Model Steps

Conv2D: It is a 2D Convolution Layer, this layer creates a convolution kernel that's wind with layers input which helps produce a tensor of outputs.

```

keras.layers.Conv2D(filters, kernel_size, strides=(1,1),
padding='valid', data_format=None, dilation_rate=(1,
1),activation=None, use_bias=True,
kernel_initializer='glorot_uniform', bias_initializer='zeros',
kernel_regularizer=None, bias_regularizer=None,
activity_regularizer=None, kernel_constraint=None,
bias_constraint=None

```

A. Maxpooling:

Max pooling may be a pooling process that choose the very best element from the region of the feature map covered by the filter. Thus, the output after max-pooling level would be a feature map comprising the foremost important features of the previous feature map.

B. Flatten:

In between the convolutional layer and therefore the fully connected layer, there is a „Flatten“ layer. Flattening transforms a two-dimensional matrix of features into a vector which will be fed into a totally connected neural network classifier.

C. Image Data Generator:

Image Data Generator quickly found out Python generators which will automatically turn image files on disk into batches of preprocessed tensors.

D. Training Process:

Effective training begins well before a trainer delivers a private training session and continues then training session is complete. Training are often viewed as a process comprised of 5 related stages or activities: assessment, motivation, design, delivery, and evaluation.

E. Epochs:

An epoch may be a term utilized in machine learning and indicates the amount of passes of the whole training dataset the machine learning algorithm has completed. Datasets are usually grouped into batches (especially when the quantity of knowledge is extremely large).

F. Validation Process:

Validation is mentioned because the process where a trained model is evaluated with a testing data set. The testing data set may be a separate portion of an equivalent data set from which the training set springs . the most purpose of using the testing data set is to check the generalization ability of a trained model.

The normalization class comprises raw images and it is fed to the CNN model which comprises dense and weight. The CNN model categorizes and identifies by using the training model. The training model class contains the image dataset. Leaf recognition becomes utilized of the features.

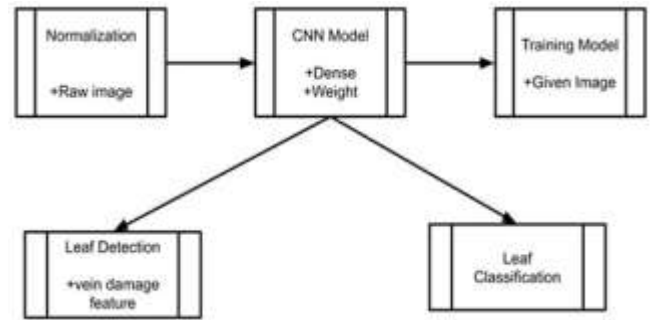


Fig. 5. Class Diagram

VI. RESULTS AND OTHER POSSIBLE APPLICATIONS

The Result Analysis

Our project gives the output of different Convolutional Neural Network modules (VGG 19 & MobileNet V2 as of now) being implemented successfully, there is also the uploading of plant village dataset which is uploaded successfully.

A. VGG 19:

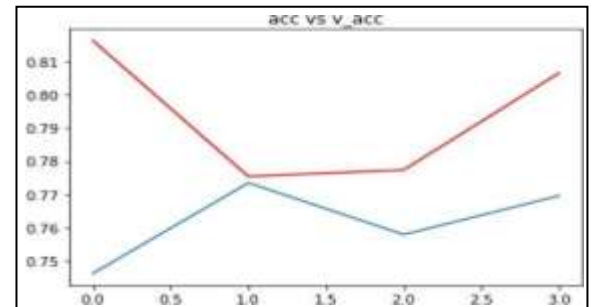


Fig. 6.1 Accuracy Vs Valid Accuracy (VGG19)

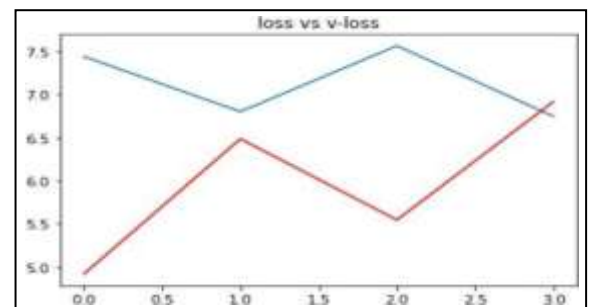


Fig 6.2 Loss Vs Valid Loss (VGG19)

VGG model gives you accuracy of 79,62130904197693%.

B. Mobilenet V2:

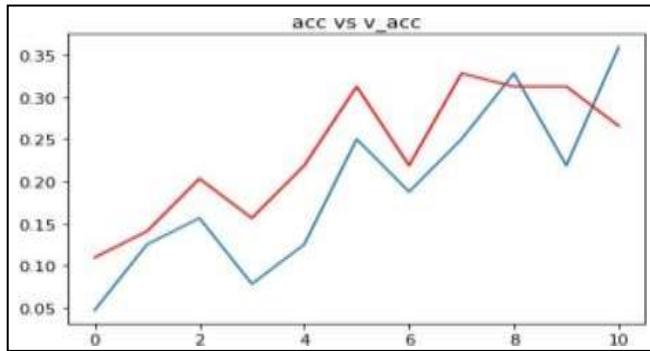


FIGURE 6.3: ACCURACY VS VALID ACCURACY (MN V2)

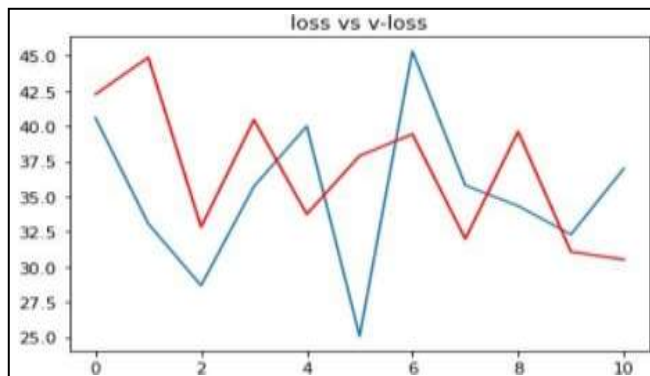


Figure 6.4: Loss Vs Valid Loss (MN V2)

Mobilnet V2 only accuracy of 29.21014428138733%.

Applications:

Plant diseases and pests detection is a very important research content in the field of machine vision. It is a technology that uses machine vision equipment to acquire

images to judge whether there are diseases and pests in the collected plant images.

VII. CONCLUSION

- This project will help gardeners and people in agriculture with identification of diseases of the plants.
- Identify as many varieties of diseases of plants as possible through their photograph, and there by share a piece of knowledge to the user of this application.
- The application is also supposed to be adaptable to download in a variety of research and forensic devices.
- Identify infected and healthy leaves as well as to detect illness in affected plants.

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Prediction of Waterborne Diseases Using Machine Learning Algorithms

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Abstract—On a worldwide scale, waterborne infections continue to be the main cause of human illness and mortality. Waterborne infections are similar to illnesses brought on by tainted food and can be brought on by bacteria that are frequently linked to food-borne transmission. Sometimes outbreaks connected to meals or instances where food was initially considered to be the cause can be brought on by a waterborne disease. You can prevent more than 95% of these. Assuring that everyone has access to water and sanitation is one of the Sustainable Development Goals the UN has set for 2030 because it is the primary preventive tool for preventing chronic diseases. Despite universal understanding of the basic principles of sanitation and water treatment, billions of people have been deprived of access due to a lack of capital resources, visionary leadership, and rational prioritizing. One or more of the challenges includes recognizing endemic and pandemic waterborne diseases, chemical contaminants, new infections resistant to traditional water filtering, and linkages to the environment. Satellite imagery and cutting-edge mathematical approaches are bringing new perspectives to the study of aquatic illnesses. Machine learning approaches such as decision trees, naive Bayes, and random forests were employed to create the waterborne disease prediction system used in this study. The study compares the results of the aforementioned strategies.

Keywords—Water-borne diseases, Machine Learning, Prediction, Chronic diseases

I. INTRODUCTION

"Waterborne illnesses" are diseases caused by viruses and bacteria that are absorbed through dirty water or by contact with human waste. These diseases would not exist if everyone had access to safe drinking water, proper sanitation, and excellent hygiene practises. Governments, non-governmental organisations, and local communities have made great headway in the battle against waterborne illnesses during the last 20 years. Much work remains to be done.

The majority of healthy people who consume water contaminated with these germs don't get sick. Older adults, present or former smokers, those with lung diseases, and people with compromised immune systems are some of the demographic categories that are more susceptible to illness.

Cholera is most commonly encountered in rural regions or during humanitarian situations where poverty and unsanitary circumstances predominate. Contaminated water is the primary mode of transmission for the sickness, which causes

severe diarrhoea and dehydration. Despite the fact that just one out of every ten people may have life-threatening symptoms, cholera can be lethal days or even hours after being exposed to the bacteria.

Prevention and Treatment Cholera is an easy-to-avoid watery sickness when traveling. Avoid consuming sushi that contains raw seafood. Obviously, drink a lot of fresh water. If there are no handwashing stations available, cholera can spread throughout a whole community. According to studies, 40% of houses in underdeveloped countries like Ethiopia do not have access to the facilities—safe water, soap, and a bathroom—necessary for effective hand washing. It is incredibly challenging for these groups to keep their environments healthy and to stay healthy. To aid in the fight against cholera, Life Water teaches families in remote places how to construct their own handwashing facilities.

The watery disease dysentery Dysentery, an intestinal illness, is characterised by severe diarrhoea and the presence of blood or mucus in the stool.

Dysentery Waterborne illness Dysentery, an intestinal illness, is characterised by severe diarrhoea and the presence of blood or mucus in the stool.

Because people who don't maintain good hygiene are more likely to contract the disease, dysentery is a good argument for frequently washing your hands. In addition to contaminated food, drink, or feces, it can also be brought on by bacteria, viruses, or parasites. Patients with dysentery risk losing their lives if they do not quickly replace lost fluids.

Transmission often occurs when a person consumes contaminated food, water, or feces. Aerosols are produced when people vomit frequently, and the spread of these aerosols has been linked to viral infection epidemics.

The most noticeable symptom is severe diarrhea, which is also accompanied by stomach pain, nausea, and vomiting. Dehydration that follows could, however, lead to encephalopathy, altered electrolytes, and sudden renal failure. Rare but more severe complications of waterborne illness include anemia, shock, hemolytic uremic syndrome, spontaneous abortion, convulsions, liver, heart, or lung disease.

Listeriosis, hepatitis A, and other diseases are examples of waterborne infections besides diarrhea. It is obvious that the entire body is affected by these disorders.

The more typical bacterial, viral, and parasite infections can result in fevers, nausea, vomiting, diarrhea, headaches, and

renal failure in addition to other symptoms. There may also be infectious disorders like hepatitis.

Disease early detection A kit to identify disease signs using machine learning was created in order to carry out our investigation. We quickly go over the theories supporting the use of machine learning algorithms to find aquatic diseases. Future study and its findings are presented in this document.

II. LITERATURE REVIEW

Due to its size, population density, and lack of development, India is vulnerable to a wide range of illnesses [1]. Early Predicting these diseases' declines in mortality rates and assisting in their spread are crucial to managing them. Diseases can warn the public about the risks by evaluating the likelihood that something will happen and motivate them to take the necessary precautions. People who require medical treatment can also get resources and assistance. Do it as quickly as you can. Machines will be used in this study. When learning forecasting algorithms like the support vector machine, the possibility that malaria would develop falls into one of two categories: yes or no.

54% of all diseases worldwide originate in Africa [2]. burden resulting from the difficulty of obtaining clean drinking water; in most endemic or rural locations, individuals obtain their water from potentially hazardous public water faucets. However, the pricey laboratory techniques and tools employed in water treatment facilities to find diseases spread by water Make sure that everyone has access to safe water whenever and wherever they need it, just as cholera cannot be widely spread through all of those faucets. Intelligence can be utilized to foresee water-borne cholera thanks to the integration of artificial intelligence (AI) and the internet of things (IoT). discovered by looking into the physicochemical properties of water. Modern IoT/AI systems, however, depend on a cloud-based infrastructure.

The forecast of numerous water-borne illnesses, including cholera and typhoid, forms the basis of the study [3]. To do this, we employ pH and temperature sensors. By doing this, we will be able to stop the spread of illnesses that are spread by water. We follow the sensor's suggestions and submit the information to the technology, which uses machine learning algorithms to analyze the water quality and predict the amount of people who may contract certain diseases.

Southern India is the region with the highest prevalence of the mosquito-borne disease dengue fever [4]. Women are the cause of it. The primary signs and symptoms of dengue are fever, bleeding, and pain behind the eyes. To save the patient's life, it is crucial to recognize signs such as abdominal pain, exhaustion, and appetite loss as soon as possible. a victim of this dreadful illness. Using classification algorithms, early sickness prediction is achievable. In this study, the Bayes belief network categorization method is utilized to forecast the likelihood of specific illness risks.

The development and widespread application of a number of well-known data mining techniques in a variety of real-world application contexts (such as business, healthcare, and

bioscience) has bolstered the use of such techniques in machine learning settings to extract important information from necessary data in fields such as biology and medicine [5]. The advantages of medical databases for patient care, early illness diagnosis, and social services are carefully considered. Machine learning techniques have been used successfully in a variety of applications, including illness detection.

The development of classifier systems helps to achieve this goal [6]. The use of machine learning techniques will significantly improve the doctors' capacity to support the resolution of health-related issues. early illness detection and diagnosis examples Records from those people revealed 41 diseases, which led to the choice of 4920 patients for assessment. There were 41 disease-related items in a dependent variable. There were 132 symptom criteria in total, and 95 of those that had been independently determined and were strongly linked to illnesses were picked. This study was conducted to demonstrate the operation of the disease prediction system Developed using machine learning techniques such as Tree Classifier, Random Forest, and Decision Naive Bayes. The essay contrasts the outcomes of the aforementioned algorithms.

Heart disease is one of the most common diseases [7]. We examined a number of characteristics that are closely related to cardiac diseases in order to identify which ones were the most accurate predictors of this condition because cardiac illnesses are now so common. We also employed algorithms to anticipate results. A dataset based on risk variables is used to evaluate the Naive Bayes method. Based on the aforementioned criteria, we also used decision trees and a mix of algorithms to anticipate cardiac disease. The results reveal that while the dataset is small, naive Bayes delivers accurate responses, whereas decision trees produce accurate results when the dataset is large.

A method for obtaining information from a lot of data is data mining technology [8]. Data mining is widely used in many facets of modern society. Applications for data mining are numerous and varied. Data mining is frequently used in the healthcare sector. Data mining has becoming more useful in the medical field. On a worldwide scale, heart disease is the most devastating chronic ailment that can lead to death. The goal of the study is to use the random forest approach to assess a patient's risk of developing heart disease. The dataset was obtained using the Kaggle website. The dataset has 303 samples, with 14 characteristics used to characterise its qualities. The data was then processed in a Jupyter notebook using open-source, free Python tools. The machine learning approach Random forest is used to categorise and handle the datasets. The dataset's results are expressed as percentages of accuracy, sensitivity, and specificity. We were able to predict heart disease with an accuracy of 86.9%, sensitivity of 90.6%, and specificity of 82.7% using the random forest method. Based on receiver operating conditions, the diagnostic rate for employing random forest to forecast cardiac disease is 93.3%. The random forest approach is employed in the proposed

system since research has shown that it is the best algorithm for diagnosing heart illness.

One of them is Khalid Salman [9]. This study focuses on thyroid illness, which is characterised as hypothyroidism, hyperthyroidism, or normal, and employs specialised implementations of Nave Bayes, SVM, Random Forest, Decision Tree, logistic regression, K-nearest neighbours, and a multi-layer perceptron approach. The dataset from Iraqis employed in this paper's techniques has a sample size of 1250 people, evenly divided between males and females. This work uses methodologies for data collection, data pre-processing, and data machine learning. The emphasis of the research gaps in the research manuscript is the single dataset. It can be expanded to incorporate different datasets from different sources. The dataset can be enlarged because it is scalable.

Nazmun Nahar et al. [10] With a sample size of 583 liver and non-liver instances, 167 negative tests for liver disease and 416 positive tests, this study focuses on the prediction of liver disease using machine learning algorithm with specific implementation of Random Forest, Decision Tree, and the data collected from UCI ML Repository. There are 11 features in the data set that can indicate liver disease. The use of a limited dataset is one of this paper's shortcomings. decision tree algorithm's accuracy is 70.67%.

III. MOTIVATION

Waterborne diseases are those that are spread by harmful bacteria through contaminated water. Children around the world are most susceptible to the majority of waterborne diseases due to poor sanitation and reduced immunity. It could lead to harmful diseases like cholera and typhoid. Other watery diseases include meningitis, polio, dysentery, diarrhoea, and dysentery. Washing with contaminated water can lead to trachoma and other skin and eye illnesses. Waterborne infections have become a major concern for global health, and it is crucial to quickly and accurately detect them. So today it's crucial to discover these diseases early and avoid them.

IV. METHODOLOGY

The sickness prediction system is built using three Machine Learning tools: Decision Tree Classifier, Random Forest Classifier, and Naive Bayes Classifier. The algorithms are described in full below.

1. Decision Tree Classifier

The decision tree approach produces classification models with a tree-like topology. In order to anticipate a goal value (disease), it separates the data into progressively smaller subgroups and then learns a sequence of explicit if-then rules on feature values, in this case, symptoms. A decision tree is made up of leaf nodes and decision nodes.

A decision node is made up of two or more branches. In the study that we have supplied, all of the symptoms are considered as decision nodes.

• Leaf node:

This node depicts the classification or selection of a branch. The leaf nodes in this instance stand in for the illnesses.

The ID3 method created by A. J. R. Quinlan was one of the crucial algorithms we employed in our research. ID3 performs a top-down, greedy search over the available columns after assessing each column (attribute or symptom) at each node to choose the characteristics (symptoms) that are most useful for categorising a particular collection. ID3 employs information gain and entropy to decide which symptoms are the greatest candidates for a decision tree.

A. Entropy $E(C)$ calculated using a frequency table of one attribute, where $P(h)$ is the probability that event h would occur in the setting of condition C and C is the present state (previous result).

Entropy $E(C, A)$ is determined by utilising the frequency table of the two qualities C and A , where C represents the current state with attribute A , A represents the characteristic under consideration, and $P(h)$ represents the probability of an event H with attribute A .

B. Information Gain: Kullback-Leibler divergence, also known as information gain. occurs after the finalization of an attribute A and is represented by the notation $IG(C, A)$ for a state C .

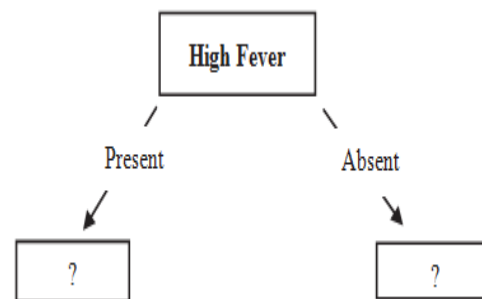


Fig 1. Decision Tree Flow Chart

After utilising High fever, three more symptoms remain: vomiting, shaking, and muscle wasting. The High fever subtrees have two extra values: Present and Absent. Beginning of the current subtree:

Dengue and malaria are the outcomes of four out of the seven circumstances when the attribute value of high fever is present.

2. Random Forest Classifier

A user-friendly machine learning approach that gives excellent results even when not hyper-tuned. As stated in the decision tree, overfitting is a significant flaw in the decision tree method. It appears that the information was maintained by the tree.

This issue is avoided by the group learning technique known as Random Forest. Ensemble learning is the process of using different algorithms or the same technique repeatedly A random forest is a cluster of decision trees. The more of these decision trees there are, the more accurate Random Forest's generalization is.

3. Naive Bayes Classifier

The Naive Bayes classifier's key assumption is that each feature contributes equally and independently to the final outcome. Because it requires less computer resources, it can operate fast even on large datasets.

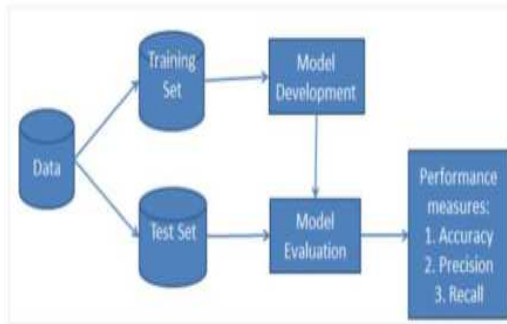


Fig.2 Naïve Bayes Classifier

The Naive Bayes classifier computes the likelihood of an occurrence as follows:

Step 1: For each categorization label, compute the prior probability.

Step 2: Determine the probable probability for each class based on each attribute.

Step 3: Using these numbers, compute the posterior probability using the Bayes technique.

Step 4: Determine whether the higher probability class has a higher likelihood based on the input.

Mathematical Model

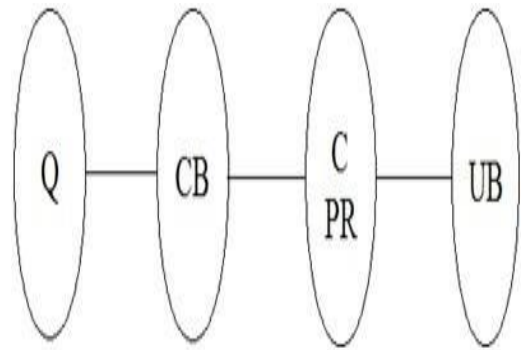


Fig.4 Mathematical Model

Where Q = the user-entertainment query, or URL

CB = prepare C PR = feature selection preprocessing request evaluation

UB = predict the outcome

Let S serve as the system for news entry detection in the context of system theory. S, P, and Op

Input should be set to In = Q.

Where Q is the user-entered query (a URL).

3) Establish Process P as P = CB, C, and PR.

Where CB denotes the system check for anticipated fake news in the entered list.

PR = Preprocess the request assessment, C = Copy the URL

Op = UB denotes the output operation.

In which UB = forecast the result Space Complexity: The presentation and visualization of found patterns determine the space complexity. The complexity of the space increases as more data is stored there.

Time Complexity: Verify if there are n patterns in the datasets. If (n:1)

III. IMPLEMENTATION AND RESULTS

We proposed a machine learning-based approach for forecasting waterborne illnesses. The data was categorized using machine learning techniques. Applying machine learning algorithms to forecast diseases and all sub-diseases improves accuracy. Processing information to produce accurate forecasts regarding waterborne disease based on test results. By supplying the input, we were able to make a precise prognosis of a waterborne illness. This technique made it possible to predict aquatic illnesses rapidly and economically.

The algorithm was trained using the medical records of 4920 individuals who were sensitive to 42 illnesses due to the comorbidity of various symptoms. A. Training data algorithm performance. In order to prevent overfitting, 95 out of 132 symptoms have been taken into account.

We assessed the effectiveness of each strategy against the dataset using the K fold cross validation methodology (K=5).

Following training, the accuracy rating for each algorithm was:

TABLE I The training accuracy table

Algorithm used	Accuracy score
Naïve Bayes	0.94
Random Forest	0.99
Decision Tree	0.99

Test data algorithm performance

The system was tested after training using the records of 42 new patients and 95 symptoms. Following is the accuracy score:

TABLE II The test accuracy table

Algorithm used	Accuracy score
Naïve Bayes	0.89
Random Forest	0.86
Decision Tree	0.72



Fig.5 GUI empty waterborne disease prediction

The built graphical user interface (GUI) collects 5 symptoms from the user. When the user clicks on the "empty" option, a list of symptoms displays, from which the user may select the symptoms. The user may list up to five symptoms that he or she is experiencing.



Fig.6 The user's results after listing his five symptoms

Click the "check" button after the symptoms have been listed. Based on the formula set that has been described in the methodology section, the symptoms are processed and the disease is looked up.

V. CONCLUSION

The system that is suggested has demonstrated that the Bayesian belief network classification technique with probability distribution table will aid in forecasting the likelihood of a number of characteristics with respect to the presence of the related sickness. This study compares three algorithms' performance on a medical record in detail. The accuracy of the naive bayes algorithm, the decision tree classifier, and the random forest classifier range from 68% to 89%, 87%, and 89%, respectively. Future use of more sophisticated methods is advised to improve accuracy.

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Pharmacology

Argumentative comparison of cancer treatment methods based on medicinal plants and not related to medicinal plants according to recent research and developments

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Abstract:

As we know, the use of plants in cancer treatment has a long history. There are more than 3000 species of herbs that are effective in cancer treatment. A successful anticancer drug must be able to kill or disable cancer cells without harming normal cells in the body, but patients who have undergone chemotherapy frequently suffer from side effects. Researchers are looking for herbs that have anti-cancer effects and are effective in cancer treatment. In a healthy organism, there is always a balance between the rate of cell division, natural cell death, and differentiation, while cancer cells are separated from the normal mechanisms of cell division and growth, and the appearance and function of these cells are similar to normal cells. They also find a difference things between them. Medical science often considers the main cause of cancer to be changes in DNA that reduce or destroy the natural control of cell growth, maturation and death. The main form of cancer treatment among humans is often surgery, radiotherapy and drugs. It is chemically based, a large number of drug treatment agents against cancer have been identified and developed, but there are many side effects. Herbs have the ability to disable or destroy cancer cells without harming normal cells. Medicinal plants cure diseases like cancer without causing poisoning mostly. In recent years,

a lot of research has been done on plant-based medicinal products, which has led to the production of several anti-cancer substances, the most important of which include: Taxol from Yew plant, camptocin is from ornamental tree and epipodophyllotoxin is from barberry. In this article, an attempt has been made to present new information in this field along with the collection of recent and more up-to-date articles and materials from reliable databases, by introducing and comparing the progress and treatment of cancer in recent years.

Keywords: Cancer, Herbs, Taxol, Health, Treatment, Drugs

Introduction:

Cancer, which is the rapid and abnormal growth of body cells, is one of the problems that threatens today's society. Nowadays, many efforts are being made to deal with this disease, but it is still the second cause of global death after disease. cardiovascular diseases, cancer is a very complex disease and has a lot of diversity in the tissue, tumor and cellular levels, which complicates its treatment and the discovery of anticancer drugs with low toxicity and high effectiveness that can selectively affect cells effect, is one of the concerns of the pharmaceutical community. As it was said, the main form of cancer treatment is based on chemical methods, due to its side effects, researchers are looking for plants that can kill cancer cells without harming the normal cells of the body. In this article, we explain the effect of several medicinal plants in the treatment of some cancers.

Nettles and Saw Palmeto in the treatment of prostate cancer: The prostate is a gland in the male sexual organ that helps produce semen. It is located at the bottom of the male bladder. is controlled, prostate cancer, which is often fatal if it spreads behind the prostate gland, although its cause is not known definitively, but they believe that the conversion of testosterone to dihydrotestosterone can be considered one of its important factors. Saw Palmeto is a fat-soluble fraction from a tree The name is cernarpensis, an extract from it has been found that can inhibit the activity of the 2-cyclooxygenase enzyme and thus prevent the development of prostate cancer. Nettles plant is similar to saw palmetto plant, but its main work is to disrupt the binding of dihydrotestosterone to cytosol and nuclear receptors.

Milk thistle plant in the treatment of liver cancer: Milk thistle plant from the Astraceae family has many therapeutic and medicinal properties, the root and aerial parts of this plant have a bitter taste and are used to treat spleen and liver diseases, silymarin is one of the fruits of this plant. which protects the liver against substances such as alcohol and galactosamine, silymarin is effective in treating diseases such as liver cancer, viral hepatitis, fatty liver due to its antioxidant properties, the effect of regenerating liver cells, and reducing calcium metabolism.

Drugs used in chemotherapy:

drugs that are used in chemotherapy and are divided into several groups of alkylating agents, antimetabolites and antitumor antibiotics, etc., alkylating agents prevent cells from overcopying through It prevents the destruction of their DNA, drugs such as Altrephine, Busulfan, Cisplatin are from this group, antimetabolites act as a substitute for the natural structures of DNA and RNA by interfering with the role of DNA and RNA. When this happens, DNA cannot copy itself. slow and the cell cannot reproduce, Desitabine, Floxuridin, Nelarabine drugs belong to this group. Anti-tumor antibiotics: These drugs prevent the growth and proliferation of cancer cells by changing and disrupting the DNA. Mitoxantrone and Dactinomycin drugs are anti-tumor antibiotics.

Conclusion:

Laboratory studies show that there are many plants that can be useful in the treatment of diseases, especially cancer, and have anti-cancer effects. It is hoped that these plants can destroy cancer cells without harming the normal cells of the body and side effects. have less than chemical treatment methods.

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Childhood Obesity and Prevention Strategies

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Obesity is defined as the accumulation of excess fat in the body. It has reached pandemic proportions in both adults and children. Non-communicable diseases (NCDs) are among the major public health problems associated with obesity. Hyperlipidemia, hypertension, hyperglycemia, and overweight are all fundamental risk factors for these diseases and are all linked to obesity. Therefore, prevention of obesity is crucial in preventing NCDs.

Childhood obesity begins early in life and affects various stages of life. It has negative effects on health in both the short and long term. It is known that children with obesity are more prone to diseases such as asthma and type 2 diabetes mellitus, and in adulthood, they are associated with a higher risk of cardiovascular disease and cancer. This study compiles the possible causes of obesity, its effects on health, and prevention strategies starting from early childhood.

"Exploring Phage Therapy as an Alternative Treatment for *Helicobacter pylori* Infections: A Review of Current Research"

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Abstract— (*Helicobacter pylori* is a bacterium that can cause a range of gastrointestinal diseases, including gastritis, peptic ulcers, and stomach cancer. Traditional treatments for *H. pylori* infections involve the use of antibiotics, but the increasing prevalence of antibiotic resistance has led to the exploration of alternative therapies, including phage therapy. Phage therapy is a treatment approach that involves the use of bacteriophages, viruses that infect and kill bacteria, to target specific strains of bacteria. In this paper, we review the current understanding of the use of phage therapy in the treatment of *H. pylori* infections. We discuss the methods used for identifying and isolating phages that target *H. pylori* and the testing and validation of phages for their effectiveness in vitro. Although phage therapy shows promise as a potential treatment for *H. pylori* infections, further research is needed to evaluate the safety and efficacy of this approach.)

Keywords— (phage therapy, *Helicobacter pylori*, bacterial infections, alternative treatment, antibiotic resistance, bacteriophages)

I. INTRODUCTION

Helicobacter pylori (*H. pylori*) is a gram-negative pathogen that infects more than 50% of the world's population and has a higher prevalence in developing countries, reaching up to 80% compared to industrialized ones. *H. pylori* is known to cause chronic gastritis, peptic ulcer disease, and has been classified as a type I carcinogen since 1994. Additionally, it has been associated with an increased risk of developing gastric cancer, which is the second most common cause of cancer-related death. *H. pylori*-related gastritis has significant effects on gastric physiology, including the impairment of iron absorption and the potential for vitamin B12 deficiency. The infection has also been linked to impaired energy homeostasis, lipid metabolism, and elevated fasting insulin levels and insulin sensitivity[1].

Antibiotic resistance is a significant threat to global health, food security, and development, with the potential to usher in a post-antibiotic era where even minor injuries and common infections can prove fatal. The rapid emergence of antibiotic-resistant bacteria worldwide poses a serious danger to the effectiveness of antibiotics, which have transformed medicine and saved millions of lives. To combat this issue, the World Health Organization has prioritized addressing antibiotic resistance and endorsed a global action plan on antimicrobial resistance, including antibiotic resistance, in 2015. In addition, federal agencies have taken steps to address the issue by developing national action plans and funding research.

However, the antibiotic resistance crisis has been attributed to the pharmaceutical industry's lack of new drug development, which is partly due to reduced economic incentives and challenging regulatory requirements. The treatment of antibiotic-resistant infections can involve a combination of medications, with the specific treatment plan varying based on individual cases [2].

The discovery of penicillin in the 20th century marked a significant milestone in the fight against bacterial infections. However, the emergence of antibiotic resistance due to non-judicious use of antibiotics, the need for high antibiotic doses to penetrate bacterial biofilms, and bacterial evolution have limited the efficacy of current antibiotic-based therapies. This has resulted in the alarming rise of antibiotic-resistant strains of bacteria, which are responsible for numerous global fatalities each year. Furthermore, the difficulty in eradicating bacterial biofilms, which shield bacteria from antibiotics and immune cells, has posed a significant challenge in the treatment of bacterial infections. In light of these challenges, there has been growing interest in exploring alternative therapies, such as bacteriophages, antimicrobial peptides, and antimicrobial enzymes, as potential alternatives or adjuncts to antibiotic therapy. These alternative therapies have shown promise in the treatment of antibiotic-resistant infections and could potentially address some of the limitations of current antibiotic-based therapies [3].

Bacteriophages are viruses that infect and kill bacteria, and they have been used for decades in some countries as a therapy for bacterial infections [4]. Antimicrobial peptides are naturally occurring molecules that can kill bacteria, and they have shown promise in preclinical studies [5]. Antimicrobial enzymes, such as lysozyme and lactoferrin, can also kill bacteria and are being investigated as potential therapies [6]. These alternative therapies have the potential to overcome some of the limitations of antibiotics, such as the development of resistance, and could be used in combination with antibiotics to enhance their effectiveness [4][5]. However, more research is needed to determine their safety and efficacy in humans [4][5][6].

As antibiotic resistance continues to be a threat, the need for alternative treatments has become increasingly urgent. One such alternative is the use of bacteriophages, or phages, which are viruses that can infect and kill specific bacteria. The term "bacteriophage" was introduced by Felix D'Herelle in 1917 to describe a hypothetical viral agent that could rapidly

kill bacteria. Despite attempts to use bacteriophages to treat infections early on, their viral nature was not widely accepted until the 1940s. Although phage therapy raised hopes in the interwar years, it had largely been abandoned in the West by 1945, up until recently, when the crisis of antibiotic resistance caused interest to rise again. Phage therapy has been used as an alternative therapy for bacterial infections in some countries for decades, with documented adoption and survival in the USSR from 1922 to 1955. While more research is needed to assess the safety and efficacy of phage therapy in humans, recent studies have shown promising results in treating antibiotic-resistant infections. Thus, bacteriophages hold the potential to offer a solution to the pressing problem of antibiotic resistance [7]. However, more research is required, phages may offer a potential solution to the growing problem of antibiotic resistance.

II. PHAGE THERAPY

A. Definition and mechanism of action

Phage therapy, a medical treatment that uses bacteriophages to treat bacterial infections, has gained renewed attention in the West due to advances in high-throughput sequencing, metagenomics, genetic engineering, and synthetic biology. Bacteriophages are viruses that infect and kill bacteria by attaching to specific receptors on the surface of bacterial cells and injecting their genetic material into the cell. Once inside, the phage replicates and produces more phages, which eventually cause the bacterial cell to burst and release new phages into the surrounding environment. This process, known as the lytic cycle, results in the destruction of the bacterial cell. Phage therapy aims to use specific phages that target and kill the bacteria causing the infection, while leaving other bacteria and host cells unharmed. Phages can also be engineered to carry genes that enhance their ability to kill bacteria or to target specific bacterial strains. Phage therapy has the potential to treat multidrug-resistant bacterial infections in different patient populations and reduce antibiotic use in agriculture, aquaculture, animal husbandry, and veterinary medicine [8].

The mode of action of lytic phages in phage therapy allows for the consideration of the history of infection and the development of a therapeutic approach that takes into account its particularities. During the adsorption phase, the phage attaches itself to the bacterial membrane in a highly specific manner, meaning that a given phage can generally only attach itself to a given bacterial species, and sometimes only to specific strains of that species. It then injects its genetic material into the bacterium, which will be replicated via bacterial enzymes, which will also synthesize the proteins and lipids needed to form capsids. After assembling the different components to form virions, the bacterium will be lysed, releasing between 50 and 200 new phages, which can attach themselves to new bacteria and start the cycle over again. Phage therapy involves the use of specific phages that target and eliminate specific bacterial strains, leaving other bacteria and host cells unharmed. Thus, it offers a promising alternative to antibiotics for the treatment of bacterial infections, particularly those caused by multidrug-resistant bacteria [9].

B. Advantages and disadvantages of phage therapy

Phage therapy is a potential alternative to traditional antibiotics for the treatment of bacterial infections. One of the main advantages of phages is their high specificity, which

allows them to target only the bacteria they are designed to attack. This makes them potentially effective in treating infections caused by drug-resistant bacteria, which can be difficult to treat with traditional antibiotics. Phages can also replicate within the host, increasing their numbers and effectiveness, and they can be easily isolated and produced in large quantities. Furthermore, phages have unique properties that make them highly competitive as a supplement to chemical antibiotics, and they can be used in a variety of applications, including agriculture and industry [10][11].

Despite these advantages, there are also several disadvantages associated with phage therapy. For example, the cleavage spectrum of bacteriophages is often too narrow, making it difficult for specific phages to have a desired therapeutic effect. Additionally, bacteriophages in the lysogenic state can transmit toxins and antibiotic resistance genes to bacteria, which can be problematic in clinical settings. Furthermore, bacteriophages release bacterial toxins, such as endotoxins, when lysing bacteria, which can worsen bacterial infections. There are also still some controversial issues that need to be resolved before phages can move to the clinical frontline, including ideal phage screening, effective dosage forms, and clinical practice. Lastly, no data from double-blind randomized controlled clinical trials are available, which limits the ability to assess the safety and effectiveness of phage therapy in comparison to traditional antibiotics [10][11].

C. Previous applications of phage therapy in other bacterial infections

According to previous studies, phage therapy has been applied to treat various bacterial infections, including pneumonia, burns, urinary tract infections, atopic dermatitis, implanted prosthetic devices, otitis, and gastrointestinal infections [12]. Personalized phage therapy has also been shown to be effective in treating serious bacterial infections, as highlighted by three seminal case reports conducted under the US Food and Drug Administration (FDA) emergency Investigational New Drug (eIND) mechanism [13].

In addition, the use of phage therapy in treating other bacterial infections has been documented. For example, anti-cholera phage has been shown to selectively reduce the majority of vibrios without interfering with other intestinal microorganisms and without any noticeable toxic effect on the patient, as demonstrated in experiments conducted in Pakistan in the 1970s [12]. The use of phage therapy to treat wounds was also documented during World War II in the Soviet Union and Germany. Furthermore, potential use of phage therapy in treating *Clostridium perfringens* infections and as a novel promising antivenom therapy has also been suggested [12][13].

III. IDENTIFYING AND ISOLATING PHAGES TARGETING H. PYLORI

A. Methods for identifying and isolating phages

There are several techniques for identifying and isolating phages. Despite the fact that more research is required, phages may offer a potential solution to the growing problem of antibiotic resistance. The golden standard for phage enumeration is plaque counting, which involves using the

double agar overlay assay (DLA) to allow localized phage-host contact in a confined environment. Transmission electron microscopy (TEM) can also be used to visualize and quantify viral particles, but the sample needs to be highly concentrated. For quantification in complex samples, such as clinical specimens or food, specific treatments are needed due to the presence of chemical compounds that may impact the results. Physical separation should be applied before viral nucleic acid isolation to minimize the carryover of PCR inhibitors. Next-generation sequencing can also be used for enumeration of phages in complex samples, but filtering of reads to remove non-viral sequences is necessary. Overall, selecting the proper pretreatment and downstream methods is important to obtain comprehensive results about phage concentration when dealing with complex samples[14].

B. Criteria for selecting phages targeting *H. pylori*

When selecting phages for targeting *H. pylori*, it is important to consider their specificity, effectiveness, and safety for use in humans. One criterion for selecting phages targeting *H. pylori* involves identifying phages that are highly specific and effective in eliminating *H. pylori*. Additionally, the phages must target the bacteria responsible for the infection and be effective against a broad range of *H. pylori* strains. Finally, the selected phages must not harm other beneficial bacteria in the gut and be safe for use in humans. Studies also suggest that phage therapy is not suitable for polymicrobial infections, emphasizing the importance of identifying phages that are highly specific to *H. pylori*. Therefore, careful consideration of these criteria is necessary when selecting phages for targeting *H. pylori* [15][16][17].

C. Challenges in the identification and isolation of *H. pylori* phages

The use of phages as a promising approach for future therapies against *H. pylori* infection is hindered by the challenges in identifying and isolating *H. pylori* phages. Despite the potential of phage therapy, the understanding of *H. pylori* phage biology is still in its infancy. Studies highlight the need for further research to improve the understanding of phage and *H. pylori* interactions, and to identify more lytic phages of *H. pylori* that can be used for phage therapy. Moreover, the document suggests that the methods used for phage induction in some studies may not be optimal, and other strategies may be more effective in inducing phages. Therefore, addressing these challenges is critical to consider phage therapy as an alternative approach for eradicating *H. pylori*, especially in cases of low eradication rates and antibiotic resistance [19].

IV. TESTING AND VALIDATION OF *H. PYLORI* PHAGES

A. In vitro testing of phages

The testing and validation of a new phage, HPy1R, against *H. pylori* in vitro showed promising results. The phage remained stable over a wide range of pH levels and temperatures and was effective in reducing the growth of *H. pylori* in vitro. The study provides evidence for the potential of phage therapy as a treatment for *H. pylori* infections, but further research is needed to evaluate its safety and efficacy in vivo [20][21].

B. The isolation of a new phage and its efficacy

The new phage, HPy1R, was isolated by exposing the clinical *H. pylori* strain 11057A to UV radiation for 60 seconds. The isolation protocol used by the researchers was similar to that reported by Lehours et al. who also used UV light to isolate phages. However, spontaneous induction of phages was also observed in other *H. pylori* strains, as well as induction of prophages after subsequent exposure to citrate-phosphate buffer at pH 6 and 3. The researchers used a panel of 75 random *H. pylori* human clinical isolates from gastric biopsies of Portuguese patients with different gastric diseases and reference strain SS1 to determine the phage lytic range and its relative efficiency of plating. HPy1R displayed a broad spectrum of action, causing visible haloes of inhibition in 78.9% (60/76) of the tested strains (21) (22).

Ferreira et al., describe the isolation and characterization of a new phage, HPy1R, and its efficacy against *H. pylori* in vitro. The phage was isolated from a clinical *H. pylori* strain using UV radiation treatment. The phage was found to have a linear double-stranded DNA molecule of 31,162 bp with 37.1% GC content. The phage genome encodes 36 coding sequences (CDSs), of which 19 could not be functionally assigned, whereas the other 17 were similar to known *H. pylori* phage proteins. The phage was found to be temperate in nature and was confirmed by the detection of integrase in the host genome. The phage was also found to have a broad spectrum of action, causing visible haloes of inhibition in 78.9% of the tested *H. pylori* strains. The phage was effective against *H. pylori* in vitro, and no tRNAs or antibiotic resistance genes were identified in the phage genome. The study suggests that phage therapy may be a potential treatment option for *H. pylori* infections (21).

The efficacy of HPy1R against *H. pylori* was tested in vitro. The results showed that the phage was less effective 6 hours after infection, as no statistical differences in the number of bacterial cells between control and phage-treated cells could be observed. However, HPy1R was able to maintain the *H. pylori* population at low levels for up to 24 hours post-infection, with multiplicities of infection (MOIs) of 0.01, 0.1, and 1. Interestingly, similar growth inhibition in the bacterial cell population was observed using all tested MOIs. The study also explored the gastric behavior of HPy1R using a harmonized static in vitro digestion model comprising oral and gastric phases. The results showed that HPy1R was stable in the 2 minutes of the oral phase, and in the gastric phase, the phage concentration decreased by 2.24 and 2.27 orders of magnitude after 1 and 2 hours, respectively, relative to the control. The study suggests that HPy1R may be a potential treatment option for *H. pylori* infections, and further studies are needed to determine its efficacy in vivo (21).

V. SAFETY AND EFFICACY OF PHAGE THERAPY FOR *H. PYLORI* INFECTIONS

A. Current state of research

The potential of phage therapy as an alternative treatment for *H. pylori* infections, which are becoming increasingly resistant to antibiotics, has been a topic of interest in the current state of research. The results indicate that phages may be a realistic alternative to combat *H. pylori* infections, but additional studies are required to evaluate safety, toxicity, and

the absence of transmission of virulence genes. Studies suggest that genetic engineering and the use of phage cocktails may enhance the efficacy and safety of phages. Despite the promising results, further research is required to fully assess the safety and efficacy of phage therapy as a treatment for *H. pylori* infections [23].

B. Future directions and potential challenges

In the future, more research is needed to address the challenges associated with the use of phage therapy as a treatment for *H. pylori* infections. One of the main challenges is the limited understanding of *H. pylori* phage biology, which hinders the development of effective phage therapy strategies. Further research is also necessary to assess the safety and toxicity of phages, as well as their potential to transmit virulence genes. Additionally, the development of lytic and customized variants of temperate phages, as well as the use of phage cocktails, could broaden the spectrum of action against *H. pylori* infections. In summary, further research is required to fully understand the potential of phage therapy for the treatment of *H. pylori* infections and overcome the challenges associated with its use [23][19].

C. Ethical considerations

ethical considerations should be taken into account when considering the use of phage therapy. These may include issues related to informed consent, patient autonomy, and the potential for unintended consequences or harm. Additionally, the use of phage therapy may raise questions about the regulation and oversight of such treatments, particularly in countries where phage therapy is not yet widely used or regulated. It is important for researchers and healthcare providers to carefully consider these ethical considerations and ensure that patients are fully informed about the potential risks and benefits of phage therapy before undergoing treatment [22][23][24].

VI. CONCLUSION

The overall assessment of phage therapy as an alternative treatment for *H. pylori* infections is promising, but further research and development are needed to fully evaluate its safety and efficacy. While studies suggest that phages may be effective and safe, there are still several challenges that need to be addressed, including limited understanding of *H. pylori* phage biology and the need for further research to assess the safety and toxicity of phages. However, the development of lytic and customized variants of temperate phages, as well as the use of phage cocktails, could help broaden the spectrum of action against *H. pylori* infections. Overall, the potential of phage therapy as a treatment for *H. pylori* infections is significant, but additional research is needed to fully realize its potential and address the challenges associated with its use.

In terms of clinical practice, future research should focus on conducting double-blind randomized controlled clinical trials to provide further evidence of the safety and efficacy of phage therapy compared to traditional antibiotics. This research should also address the challenges associated with identifying and isolating *H. pylori* phages, and aim to develop effective phage therapy strategies that take into account the specificity, effectiveness, and safety of phages for use in humans. Furthermore, regulatory oversight should be considered in countries where phage therapy is not yet widely used or regulated [18][25].

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Performance evaluation of sports prostheses and adaptations for lower limb amputees in District Rahimyar Khan, Pakistan

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Abstract

A person's mobility, social life, and mental and physical health can all be significantly impacted by the amputation of a lower leg. Sports engagement and regular exercise have a positive impact on the situations mentioned in healthy adults. Removal of an appendage might bring about deep rooted impedance and an impermanent or extremely durable misfortune in portability. Amputated individuals typically need technological assistance, such as prostheses, wheelchairs, or crutches, when participating in sports. For sports like active jogging and others that always call for a proper dynamic upright stance, lower limb prosthetics are necessary. The following study was based upon the cross-sectional research processed by taking observations of routine activities of lower limb amputees while recognizing their sport prosthesis and their adaptation with reference to the time and intensity of sports activity. Four focus groups were attended by 45 people. The current study concluded that the incidence rate of amputation due to trauma is high 77.8%, and congenital is 11.1%. The current study also says that amputation rate is high in 2015-2022 according to the percentage is 44.4% then in 2007-2014 the percentage is 33.3% and the percentage of trans-tibial amputation is 44.4%, trans-femoral is 33.3%, Syme foot is 11.1%. Majority of people have no complain while using prosthetic leg but in some case people having complaint about using prosthetic. Participants with lower limb amputations who use prosthesis recognized mobility features that affected their capacity to do high-level tasks, such as posture shifts, topography, and impediments.

Keywords: amputation, lower limb, cross sectional study, prostheses

***In vitro* assessment of the plant-based formulation containing combination of *Cistus x incanus* L. and *Scutellaria lateriflora* L. for their antimicrobial and antibiofilm properties**

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The increasing microbial resistance calls for a decrease in the use of chlorhexidine and the discovery of new supplements based on the combinations of botanical of extracts, acting synergistically, with potent antibacterial and antibiofilm potential [1,2]. The current study aimed to evaluate the two chemically characterized commercial extracts obtained from *Cistus x incanus* L. and *Scutellaria lateriflora* L. for their *in vitro* antimicrobial properties against *Porphyromonas gingivalis* (expressed as growth inhibitory percentage), protective effect against invasion by *P. gingivalis* (expressed as CFU/mL relative to the bacteria that can invade the cell monolayer), and the antibiofilm activity (expressed as absorbance values recorded at 570 nm). A mild inhibitory activity for both extracts was observed against *P. gingivalis* growth in a dose-dependent manner i.e., 5 – 45 % inhibition for *C. incanus* and 1 – 47 % inhibition for *S. lateriflora*. A greater bacterial growth inhibition was noted with the combination of the two extracts (in the concentration ratios of 1:3, 1:2 and 1:1) than the theoretical sum of the bacterial growth inhibition percentages for either extract tested alone at the same concentrations. Thus, as the combination of these two extracts was more active than the extracts alone, we performed the subsequent experiments only on the combination of *C. incanus* and *S. lateriflora*. The reduction in the invasiveness of *P. gingivalis* in cells treated with the combination of these extracts compared to untreated cells was slightly greater at the highest concentration of the tested extracts (Cells + *P. gingivalis*: CFU/mL 6.4 x 10⁷; Cells + *P. gingivalis* + *Cistus* + *Scutellaria* 30 mg/mL each: CFU/mL 6.4 x 10⁵). Biofilm reduction resulted to be around 80% after *Cistus* + *Scutellaria* treatment. In conclusion, this study suggests an alternative plant-based formulation (based on the combination of *C. incanus* and *S. lateriflora*) intended to be used in the prevention of gingivitis.

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Traditional and Complementary Medicine

"Evaluating the effect of air gap between the skin and bolus on flatness and dose distribution of electron beams using Monte Carlo simulation"

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Abstract-The aim of radiotherapy is to deliver the maximum dose to the tumor and cause the least complications in healthy tissues. In order to perform radiotherapy, it is sometimes necessary to use peripheral tools. One of the widely used tools is bolus, which is a substance equivalent to soft tissue, and its function is to deliver the dose from the depth to the surface. This device is used in the treatment of lesions located on the surface or at shallow depths of the body. But since the surface of the body is not uniform, placing the bolus layer on the surface of the body creates an air cavity between this device and the tissue. This problem can cause changes in the distribution of sufficient dose to these superficial lesions. It is necessary to carry out a successful

treatment, all the changes in the distribution of the dose should be carefully examined. First, the head of the linear accelerator to produce electron beams with different energies will be simulated by the MCNP Monte Carlo code. In the next step, the validation of the simulation will be done by measuring the depth dose and the transverse dose by the ionization chamber and comparing with the simulation results. After ensuring the correctness of the simulation result, soft tissue-equivalent blots with thicknesses of 0.5 and 1 cm tangent to the phantom were defined and again the transverse dose as well as the flatness of the field resulting from such an arrangement were estimated by the MCNP code in the next step. Air layers with thicknesses of 1 to 5 mm were considered between the bolus and the surface of the

phantom, and again the transverse dose as well as the flatness of the field will be checked and compared with the previous state. This process was done for two different electron energies of 6 and 9 MeV.

Keywords: *Radiotherapy, Bolus, MCNP, Air gap, Process*

I. INTRODUCTION

There are successive methods for cancer treatment, one of these methods is the treatment using radiotherapy, which aims to deliver the right dose to the tumor in order to destroy it so as not to damage the healthy tissue. Several factors cause the inconsistency of the dose distribution on something that are targeted and one of these factors is the presence of air. The inconsistency of dose distribution leads to a decrease or increase in its amount, so that a low dose may cause cancer recurrence and a high dose may cause tissue destruction [1]. In order to distribute the dose uniformly, it is necessary to think of measures, one of the solutions is to use a bolus. In general, a bolus is a tissue-equivalent substance that is used to bring the dose distribution closer to the skin surface. For example, the chest wall near the skin is located, which makes it a surface target, that is why low photon energies are used for its treatment. The isodose line should not exceed the chest and lead to damage to healthy tissue. Adding a bolus makes it possible to the isodose line should be closer to the surface of the skin. In general, the surface of the patient's body is not smooth and has bumps. In other words, there are small gaps between the bolus and the skin, which are called air gaps. The presence of an air gap in radiation therapy will affect its effectiveness [2]. In general, the denser the environment, the harder it is for radiation to penetrate deep, and conversely, the less dense the environment, the easier it is for radiation to penetrate. For example, the movement of rays in the air environment is easier than denser environments such as tissues, muscles and bones of the body. It should be noted that the rays do not interact in the air

environment but move freely in it. In other words, by scattering in the air gradually loses its energy and finally stops. The presence of air gaps, although small during the treatment, may cause a slight decrease in the dose [3]. As mentioned earlier, high-energy photons usually result in a lower dose to the skin than the maximum amount

The dose that remains at greater depths will remain. This phenomenon, which is known as skin preservation, is estimated that sometimes the dose in DSurf can reach 25% of its value in DMax. In order to increase DSurf in Treatment of tumors near the surface, bolus is always placed on the surface [4]. It should be noted that DSurf and DMax depend on several factors such as incident photon energy, field size, beam modification devices and radiation angle. As per considerations, these are related to other factors such as electron pollution, beam compensator and etc. are related. In radiation therapy, accurate measurement of the doses caused by DSurf contains valuable information so as to limit severe skin toxicity and prevent recurrences close to the surface [5]. As we mentioned before, air cavities cause changes in radiotherapy dose distribution and consequently in treatment calculations in the area. Considering the increasing number of cancer patients and the effect of air cavities in dose distribution, it has helped to plan optimal treatment and better care of organs at risk close to the tumor. Simulation using MCNP Monte Carlo code is one of the most accurate methods. The results indicate that the effect of increasing or decreasing the dose depends on the size of the field and the energy of radiation rays, and it is generally seen more for fields with smaller sizes and higher energies. Apparently, the amount of dose change at the air-tissue junction depends on the geometry and size of the cavity. In other words, it depends on the electronic imbalance. However, due to the presence of air voids in the treatment volume, especially at the air-tissue junction (when the tumor is adjacent to it), the changes

in the radiation dose are still not properly and the aim of this study is to quantitatively investigate the effect of the presence of air between the bolus and the body surface on the flatness of the electron beam and on the dose distribution of electron beams [6]. The body of all living organisms is made up of individual components called cells. Cells grow and divide, and new cells are produced that the body needs. When the cell is damaged or old, it dies, and when the cells die, a new one takes their place. In some cases, the cell's DNA is damaged and mutated. Cancerous cells can no longer control the process of cell growth, division, and differentiation, and they constantly multiply, and when there are too many cells, Cancers accumulate and form a mass of tissue, which we call a tumor. Tumors are of two types, benign and malignant. Benign tumors grow slowly and may stop after some time. These types of tumors remain in the place of production and do not attack the adjacent tissue, mostly after the removal of these tumors. They don't relapse anymore. But malignant tumors grow and multiply very fast and attack their adjacent tissue. They can attack healthy tissues and create secondary tumors when cancer cells are separated from the original tumor and spread through the blood or lymph. Other parts of the body go and it is possible to create a new tumor, which is called metastasis. Radiation therapy is the treatment of diseases using penetrating rays such as X-rays, alpha waves, beta and gamma waves, which are either radiated from a device or emitted from drugs containing labeled substances. Radiation therapy is used to destroy or shrink cancerous tissue using ionizing radiation. In this method, as a result of DNA damage, the cells in the treatment area are destroyed and prevent growth and division. Of course, in addition to cancer cells, the radiation also damages healthy cells, but most of the healthy cells regain their recovery. Radiation therapy is performed in three ways: external radiotherapy, internal radiotherapy and systemic radiotherapy. The type of radiation depends

on the type of tumor, the tolerance of healthy tissues around its location, the distance that the radiation must travel inside the body, as well as the general health of the patient, the history of the disease and whether the patient will use other methods of treatment or not, and a set of factors. In most patients, external radiation therapy is used, and in a number of patients, three methods of external, internal, and systemic radiation therapy are used together or separately [7]. Bolus is one of the treatment methods in radiotherapy. Bolus is a substance of the tissue equation and its job is to bring the dose from the depth to the surface. But as we know that the surface of the body is not uniform, by placing a bolus, an air cavity is created between this device and the tissue, and this issue causes changes in the dose distribution. In general, the presence of air cavities causes changes in radiotherapy dose distribution and consequently in treatment calculations in the area. How to inject a bolus Bolus injection, despite its advantages and applications, includes various side effects, some of which include:

1. High probability of infection
2. Possibility of cutting a vein
3. Early effect of the drug

When the body is fully hydrated, blood is pumped more easily into the veins, as a result, the veins become larger and they are easier to see. On the other hand, it will be very difficult to determine the location of the vein in a person who is severely dehydrated. Therefore, intravenous injection is difficult and should not be done without the guidance of an expert. During intravenous injection, access to the vein should be increased by making it more visible. Also, sterile equipment should be used and the drug should be injected with blood flow [8].

In order to inject a bolus into the patient's body, measures must be taken, if they are not followed,

irreparable effects may be brought to the patient's body. The measures that must be taken are as follows: In the first step, the patient should be given a lot of water. The person receiving the intravenous injection should drink 1 to 4 glasses or 250 ml of water approximately one hour before the injection. When the body is fully hydrated, blood is pumped into the vein more easily, as a result, the veins become larger and easier to see. On the other hand, it will be much more difficult to locate the vein in a person who is severely dehydrated.

The vein should be touched with the hand. In other words, the skin above the vein should be gently pressed because the pressure will bring the vein closer to the surface of the skin.

First, we find the vein and then we place one of our fingers on it. For 20 to 30 seconds, make slow strokes with your finger on the vein because this causes the vein to expand and makes it easier to see. Contrary to popular beliefs, tapping with the palm does not bring the vein closer to the surface of the skin. The nerves connected to the vein are constricted with the feeling of pain, as a result, the vein will be smaller and it will be more difficult to see.

Warming causes the vein to expand, making it easier to find. For best results, warm the injection site and the patient's entire body before the injection.

Do not give the injection on a cold day immediately after the patient arrives. Give the patient time to warm up. Provide blankets or extra clothing. Other ways to warm the whole body include drinking a warm beverage such as tea or coffee or taking a hot shower. When the patient comes out of the shower is the best time to inject, of course, allow the patient to dry his body completely. If you need to heat the injection site, put a wet towel in the microwave for 15-30 seconds and wrap a warm towel around the vein. You can also

wet the injection site directly with warm water or heat it with a hair dryer for a few seconds.

It is good to mention that gravity can be used. Ask the patient to lie on the bed or sofa and hang his arm. Earth's gravity increases the speed of blood towards the hand, and as a result, the vein appears larger and darker.

Also, the patient can stretch his hand or rotate it for about 20-30 seconds. Centrifugal force increases the speed of blood in the hand, and if this is done a few minutes before the injection, the appearance of the vein becomes more visible and the injection is easier.

In the next step, it is better to press a stretching ball. Before the injection, ask the patient to hold a stress ball and squeeze it as much as possible. Another method is to open and close it quickly for 30 seconds. Both methods increase the speed of venous blood flow and make vision easier. Check the medicine bottle carefully to make sure it is healthy. The medicine must be free of particles and not discolored. In addition, the glass must have no leaks or signs of damage. Inject only the dose prescribed by your doctor. Do not increase or decrease the dose of the medicine and follow only the doctor's instructions. Identify the vein clearly. Do the injection only when you can clearly see the vein. Intravenous injection can be dangerous and even fatal. Insert the needle at a 45-degree angle. Remove the prepared needle from its sterile storage place and carefully insert it into the vein. The angle of the needle entering the vein should be 45 degrees. You should insert the needle so that the medicine is injected in the direction of the blood flow. Because veins carry blood to the heart, the drug must be injected so that it flows to the heart [9]. Considering the increasing number of cancer patients and the effect of air cavities in dose distribution, it has helped to plan optimal treatment and better care of organs at risk (OAR) close to the tumor. During the past years, evaluating the effect of air inhomogeneities on absorbed dose has

been the subject of many experimental studies using Monte Carlo simulation.

II. MATERIALS AND METHODS

In fact, Monte Carlo simulation is one of the most accurate methods of radiation therapy dose calculation. By measuring depth dose and transverse dose by ion chamber detector, simulation validation will be done and compared with simulation results. In this simulation, first, a 2-inch ionization chamber detector made of air is defined. In order to transport the particles and also to prevent the particle from getting lost in the vacuum, an intra-sphere detector with a radius of 10 cm is defined. Also, the importance of particles outside the global volume is considered to be zero. In order to simulate the accelerator head to produce electron beams, the mode of the source is set in photon and electron mode, then by defining the source as a gamma emitting source, it is placed in coordinates and we have put (-3 0 3). It should be noted that the energy of the spring is equal to 6 megaelectron volts for the first state and 9 megaelectron volts for the second state [8][9].

III. RESULTS AND DISCUSSION

The purpose of this research is to improve the electron dose distribution in a bolus state where the material is equivalent to tissue and because the whole-body surface is not uniform, we assume that the air cavity is located between the skin and the bolus and this air cavity causes changes in the electron dose distribution. For this reason, in this research, we use the Monte Carlo simulator for accurate calculations and to do the best in the research, so that we can reach more accurate results, as mentioned, we use two bolus materials with a thickness of 0.5 and 1 cm. The tangent will be defined with the phantom and again the transverse dose as well as the flatness of the field resulting from such an arrangement will be estimated by the MCNP code. In the next step, layers of air with thicknesses of

1 to 5 mm will be considered between the bolus and the surface of the phantom, and again the transverse dose and in general, the purpose of investigating the dosimetry effect in the presence of air holes on radiotherapy dose absorption. In this article, the simulation is done using Monte Carlo tool. The results indicate that the dose distribution caused by air holes is related to parameters such as inconsistency. The dose distribution in the cavities depends on the inhomogeneity of the dose at the edges of the air cavity and the scattering of radiation after the air cavity. Also, the results showed that the dose drop occurs before the air cavities and in the air region due to the absence of scattered radiation. In addition, the dose increase was due to more radiation passing through the air cavity and dose deposition after the air cavity.

Totally, the flatness of the field will be checked and compared with the previous state. This process will be done for two different electron energies of 6 and 9 megaelectron volts and finally the results will be analyzed.

IV. CONCLUSION

It includes that changes in dose distribution depend on the cavity size and depth. For field sizes larger than $10 \times 10 \text{ cm}^2$, DSurf is approximately the same for air gaps of 0 to 0.5 cm. For small fields and MeV6 photon beam, dmax increases with increasing air gap, while for MeV9 beam and smaller field size i.e., $10 \times 10 \text{ cm}^2$, dmax first decreases and then increases with air gaps. And it is suggested that more research and more accurate calculations be done in this regard so that the treatment process is better and better, so that the patients can save their time and money, and their recovery is faster and more effective, and the harmful effects are less on the patient.

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A healthy herbal tea with biological activities: Mulberry leaves

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ABSTRACT

Mulberry dry powder and leaf extract are having abundance and diversity of bioactive components, like flavonoids, phenolic acids, alkaloids, chlorogenic acid. The hairy surface on the surface of intestinal epithelial tissues have alpha-glucosidase enzyme which play a key part in the digestion of oligosaccharides starch which are carbohydrate. Human diet is composed of phenylpropanoids components was observed to modify glucose and lipid metabolism in efficacy trials, and in patients with situation related to genetic metabolic maladies and healthy individuals. A flavonoid compound, extract of mulberry leaves contains antioxidant and anti-inflammatory properties and lowers insulin resistance. Also, mulberry leaf extracts have been discovered to have anti-atherogenic and hypoglycemic effects in human and animal models. Conclusively, this presentation demonstrates that mulberry leaves possess various antioxidants and phenolic contents which discloses its curative function with its biological potentials.

Key words: Mulberry, Tea, Phenolics, Antioxidant.

Introduction

It has been observed in a study that various polyphenols are present in mulberry leaf extract, amongst all chlorogenic acid imitative is the present abundantly. Chlorogenic acid complement to reduce over weight and obesity and insulin confrontation due to rich fat fed of male mice. It was observed variations in serum glucose levels were potentially lowered through intake of mulberry. The intake of mulberry reduce the serum glucose level apparently shows the potential of mulberry to reduce intestinal sucrose. It is indicated that in the control of diabetes, because of higher amounts of components of biomarkers i.e., trans-caffeic acid and syringaldehyde Mulberry leaves possess various antioxidants and phenolic contents which discloses its curative function against hyperlipidemia and hyperglycemia. MLHT controls total cholesterol, total triglyceride, LDL, HDL, insulin and glucose levels (1,2).

Regarding hypoglycemic effect of mulberry, the main anti-diabetic fraction in white mulberry leaves is 1-deoxynojirimycin (DNJ), which is a glucose analogue which impedes the enzymes of intestinal i.e. α -glucosidase by synthesis active site in the enzyme. The most important enzyme for starch digestion is α -glucosidase in the small intestine and DNJ is considered to be important for lowering the NFBG (non-fasting blood glucose level) and hyperglycemia by reduction of amount of carbohydrate and lipid digestion. It was perceived that a minimum amount of DNJ component in mulberry is needed to lower the amounts of NFBG and insulin in human. It was studied 35 tea varieties of mulberry in Thailand to analyze and prepare a blend of mulberry tea with the different DNJ concentration. Similarly, much literature indicates the hypoglycemic effects of white mulberry leaf tea and extracts (3-6).

Mulberry leaves also found to lower hypertriglyceridemia, which reflect a special reducing potential of mulberry in synthesis of fatty acids. This effect has been confirmed in research by the use of mulberry root bark or fruit. In a study carried out by Wilson and Islam observed that reducing TC and reducing LDL-cholesterol and triglycerides in diabetic patients proposed the hypolipidemic potential of tea of mulberry leaves where DNJ component could be the reason since it was studied beneficial in lowering lipid buildup not by cumulative β -oxidation and improving amounts of adiponectin and trigger the AMP stimulation of protein-kinase (AMPK) in rat liver (5-8).

Antioxidant effect was also seen of mulberry leaf and against overweight obese. In earlier findings, anti-inflammatory potential was also observed of mulberry leaf and antioxidant curative remedy for obesity (9-12). In regulation and maintenance of defensive system by antioxidants and explored the in both (in vivo and in vitro) studies showed antihyperlipidemic

potential by mulberry leaves. Moreover, various potentialities of mulberry leaf have been discussed like scavenging free radicals, oxidation reduced and inhibiting atherogenic risk (10-14).

Curative potential of Mulberry leaves has been popular for lipid metabolism in lipogenesis, lipolysis and hyperlipidemia. In lipolysis, Triglycerides are depleted into glycerol and fatty acid in lipid drops of fatty tissue. Neurotransmitters, various hormones and other features may regulate by this cycle. The cAMP-dependent protein kinase A (PKA) passage that is the significantly determined the lipolysis mode of action which is associated in the translocation and phosphorylation of hormone sensitive lipase. Moreover, various stimulants of lipolysis involving natural bioactive components and herbal extracts were determined in adipocytes and *in vivo* studies. Various portions of mulberry (*Morus alba*) containing the leaves, bark and branches were used for many years in herbal system of Chinese medicine for curative purpose of many chronic maladies (15-17).

Conclusion

Mulberry can be cultivated is widespread in topographical, environmental and various soil situations, which effect the nutritional status and chemical composition of plants. The differences in concentration could be attributed to genotype, maturation of leaves, and adulteration by harvest, processing or transport. The studies have presented that mulberry leaves contain high level of phenolic and flavonoid contents, showed strong anti-oxidative properties. This might be due to strong association in between antioxidant concentration and their efficacy.

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A natural anticancer Agent: Caryophyllene

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ABSTRACT

β -Caryophyllene, a bicyclic sesquiterpene found in all plant kingdom as a constituent of essential oils with varying concentrations. β -caryophyllene owning the potential health benefits, is widely used as seasoning mixtures in different food products. In-vitro investigations have evidenced caryophyllene as a lucrative therapeutical resource for most of human disorders, like cancer, solid tumor growth. This compound also carries anti-oxidant as well as antiproliferative activities. Hence owing to these characteristics it is concluded that caryophyllene is biologically active composite. The anti-cancer, anti-inflammatory, anti-arthritis, anti-analgesic, anti-fungal, anti-bacterial and anti-oxidant properties make the caryophyllene as a leading future drug in the pharmaceutical world. Isolation of caryophyllene and its derivatives from a vast variety of medicinal plants is still under progress to explore it as a cancer therapeutic and treatment commodity.

Keywords: Caryophyllene; Pharmaceutics; Therapeutics; Sesquiterpene; Anti-cancer

Introduction

Caryophyllene, a sesquiterpene having several derivatives, found in many plants, having different characteristics due which they are utilized in diverse fields of medicine/pharmaceutical. Therapeutical properties of caryophyllene have been studied experimentally which provide evidence that this compound is potentially anti-inflammatory, anti-tumor, analgesic, anti-bacterial and anti-fungal agent. This compound also carries anti-oxidant as well as antiproliferative activities. Hence owing to these characteristics it is concluded that caryophyllene is biologically active composite. Along with these possessions, caryophyllene also have few toxic acridial activities for the reduction of the growth of house dust mite. Chemical structure of caryophyllene became very beneficial to withstand that how this compound works exhibiting its fundamental properties. Furthermore, caryophyllene is also used in food industry as well as in perfume industries because of its odorous properties. Caryophyllene is the most commonly distributed sesquiterpene as compared to the all other sesquiterpene hydrocarbons of vegetable kingdom. Clove tree *Eugenia caryophyllata* (*syzygium caromaticum*) contains significant amount of caryophyllene so it acts as the major source to extract caryophyllene. Caryophyllene is present in oleoresins of large part of conifers in family Pinaceae that grow in the USSR area. It is also found in most of resins and in different extracts of plants (1).

By which mechanism caryophyllene and its derivatives exhibit their anticancer, anti-inflammatory, anti-oxidant, antiviral, antibacterial and antifungal activities? What are the chemical or functional groups responsible for these crucial activities? Moreover, what are the principle signs of plants containing caryophyllene and its related compounds? What is the actual or absolute chemistry of caryophyllene behind its action as therapeutic? What is the accurate mechanism of action of caryophyllene and its derivatives in the eradication of human tumor cell growth and its functionalization against skin diseases such as dermatitis caused by viral or bacterial attack? How caryophyllene activates cannabinoid receptors for the inhibition of the proliferation of tumor cell lines? In future we may become able to give answers of these questions. May its activity enhance by the introducing new functional group or in the structure of caryophyllene or by using its blend with some other compound. The action mechanism of caryophyllene depends on stimulation of apoptosis, intrusion of cell cycle, and

inhibition of proangiogenic, invasive and proliferative markers as these effects of caryophyllene has been confirmed in various cancer cells initially consequent from leukemia, colorectal cancer, or breast cancer (2-4). STAT3 activated by cytokines and growth factors i.e, interleukin-6 (IL-6) and epidermal growth factor (EGF) as well as oncogenic proteins Src and Ras and their binding to cell surface receptors causes receptor auto-phosphorylation at a tyrosine residue these proteins hold an SH2 domain identifying the receptor phosphotyrosine, subordinate with the stimulated receptor. They become phosphorylated at carboxy-terminal of tyrosine at position 705, either directly by the receptor or by receptor-associated JAK kinases (JAK2-major mediators of STAT3 phosphorylation). If once stimulated, STAT3 endures phosphorylation favors homo-dimerization which cause nuclear translocation, DNA binding, and gene transcription (5-8).

It is experimentally evaluated that BCPO is a compound with more potent anticancer characteristics, illustrated by studying its chemical configuration. BCPO attach with proteins and DNA bases, by development of covalent bond, with sulfhydryl and amino groups, using its own methylene and epoxide exocyclic functional groups for stronger bonding, thus, BCPO explains its elevated prospective as signaling modulator in tumor cancer cells. It was demonstrated that by utilization of regular doses of BCPO, prostate cancer cell and breast cancer cell proliferation was suppressed. Likewise, reactive oxygen species production Mitogen-Activated Protein Kinase, and PI3K/AKT/mTOR/S6K1 signaling pathway inhibition in these cells, is induced by BCPO. Additionally, BCPO notably suppressed the stages of procancer proteins, present in proliferation-cyclin D1, metastasis-cyclooxygenase 2, angiogenesis-vascular endothelial growth factor, and apoptosis Inhibitors-B-cell lymphoma 2, B-cell lymphoma extra-large, inhibitor of apoptosis 1 and 2, and surviving. On the contrary, the appearance of tumor suppressors-p53 and p21-in PC-3 cells is supplemented while using BCPO as therapeutic. BCPO repressed the AKT/mTOR/S6K1 signaling in PC-3 cells was accounted by utilizing its hexane fraction. STAT3 (Signal Transducer and Activator of Transcription3) signaling pathway, engaged in proliferation, survival, invasion, angiogenesis, and metastasis of cancer was targeted by BCPO and was observed as extremely active in several human tumors. A condensed action of STAT-3 transcription aspect, in multiple melanoma, breast, and prostate cancer cell lines is also illustrated while using BCPO for therapy (9-11).

Recently it is studied that CPO can perfectly attribute its anticancer effects by inhibiting initiation of PI3K/AKT/mTOR/S6K1 signaling cascade; also encourages the triggering of ERK, JNK, and p38 MAPK in tumor cells. CPO encouraged enhancement of reactive oxygen species (ROS) generation from mitochondria, belongs to the stimulation of apoptosis, categorized by positive Annexin V binding and TUNEL staining, activation of caspase-3, loss of mitochondrial membrane potential, release of cytochrome c, and breakdown of PARP. In-vivo studies of CPO, explain the anti-inflammatory impact, proved by the destruction of carrageenan-induced paw edema, the study has shown that CPO is a beneficial anti-cancer agent, even the molecular mechanism of action has not been explained. These studies help to hypothesize the consequences of CPO on proliferation phenotype in tumor cells by retarding STAT3 initiation. A considerable reduction in VEGFA, PLAU, IL-8, MET, and Cathepsin B show the impacts of CPO to retard metastasis phenotype in tumor cells. Modulation of STAT3 but not of STAT5 initiation is considered for pleiotropic anticancer activity of CPO in varied tumor cells. As the active dimer of STAT3 has capability to translocate the nucleus and even induce transcription of explicit target genes, so CPO destroys the nuclear translocation of STAT3. Immunocytochemistry explains that CPO reduces the translocation of STAT3 in cancer cells, because tyrosine phosphorylation starts the dimerization of STATs as well as their translocation to the nucleus to bind with DNA and regulate gene transcription, so CPO reduces the DNA binding actions of STAT3. CPO slows down or retard activation of JAK2, IL-6 Induced STAT3 and Src Phosphorylation and also IL-6-Induced STAT3-Dependent gene (5,9,12,13).

The analysis of late apoptosis by breaking DNA strand shows the increase in apoptotic cells by treating with CPO as CPO causes loss of mitochondrial membrane potential. β -caryophyllene increased the anticancer activity of paclitaxel on MCF7, DLD-1 and L-929 cell lines. β -caryophyllene oxide (CPO) amplified DOX growth in intestinal CaCo2 cancer cell line and also in breast cancer cells. CPO along with DOX proved a strong antagonism as well as synergism in MCF7 cells. The differences in concurrent effects of DOX and caryophyllene in breast cancer cell lines could be controlled via estrogen receptor pathway. Caryophyllene also enhanced the rapamycin effects in thyroid cancer cells as it retards mTOR, it also enhanced the activity in lung carcinoma cells by stimulating apoptosis and cell cycle arrest. DOX with CPO, also results in cell structural changes immediately after exposition. CPO although found in human diet, but chiefly

taken as dietary supplement. The presence of sesquiterpene α -humulene, in our food, it shows a quick onset and moderately good captivation by oral intake (14-18).

In cancer cells, the reduced activation of NF-Kb (nuclear factor kappa-light-chain-enhancer of activated B cells) is coupled with pro-apoptotic activity of BCPO. NF-Kb is chief transcription features in the expansion of tumor, which direct such routes as proliferation of cancer cell, tumorigenesis, angiogenesis, and metastasis. In addition, the TNF α -caused apoptosis has been enhanced by BCPO, as it inhibits the NF- κ B activation. The levels of cyclin D1, cyclooxygenase 2 and c-Myc, whose phrase was synchronized by TNF α , was lowered by treating with BCPO. A control of BCP and BCPO divisions, extracted from *Aegle marmelos*, on IMR-32 human neuroblastoma and Jurkat cell lines was also illustrated. Reduction of messenger RNA levels of antiapoptotic genes, such as B-cell lymphoma 2, cyclo-oxygenase 2 as well as upregulation of proapoptotic gene expression, namely those encoding p53, bax, bak1, caspase 8, caspase 9, and ATM has been accompanied into cell death (19-21).

Conclusion

BCPO exhibits the anticancer behavior towards several cancer cell lines, but potency of the cellular response, stimulated by therapy with BCP and BCPO varies significantly between cancer cells. Likewise, in vivo systems, it is still demanded to evaluate the antitumor character of BCPO. Interestingly, by enhancing the classical drug's concentration, within the cells, as BCPO increased the efficacy of these drugs. The mechanism fundamental the antineoplastic effects exhibited by these BCP and BCPO sesquiterpenes are inadequately known, as it is presumed that BCP exhibits its anticancer effect in the course of binding to CB2.

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Ketogenic Medical Nutrition Therapies and Their Use in Diseases

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The Ketogenic diet (KD), fundamentally a high-fat, low-carbohydrate dietary approach, has been used for many years, particularly in treating pediatric patients with epilepsy, owing to its significant efficacy in reducing the frequency and severity of epileptic seizures. Its effectiveness has been observed in various metabolic diseases such as drug-resistant epilepsy, multiple sclerosis, Alzheimer's, Parkinson's, Autism Spectrum Disorder, pyruvate dehydrogenase deficiency, GLUT1 deficiency syndromes, cardiovascular diseases, obesity treatment, diabetes, regulation of some lipid parameters, polycystic ovary syndrome, and various types of cancer.

The ketogenic medical nutrition therapies commonly used in various diseases are the classical KD (90% fat, 10% carbohydrate, and protein), Medium Chain Triglyceride (MCT) Diet (60% fat, 40% carbohydrate, and protein), Modified MCT Diet (30% MCT, 30% Long Chain Triglycerides (LCT)), Low Glycemic Index Treatment (LGIT) (foods with a GI value of less than 50), and Modified Atkins Diet (60-65% fat, 30% protein, 10% carbohydrate). The main differences between these medical nutrition approaches stem from the macronutrient distribution and preferred fatty acids. Under normal conditions, the brain primarily utilizes glucose derived from the breakdown of carbohydrates as its primary energy substrate. KD initiates ketogenesis as an alternative energy source.

Even a short-term application of KD can lead to a rapid metabolic transition towards ketone body production and utilization (resulting in reduced seizure frequency and severity), improved insulin and triglyceride levels, and increased metabolites contributing to anti-inflammation and mitochondrial protection. However, there can also be challenges, such as difficulty adhering to the diet, nausea, constipation, fluid-electrolyte imbalances, and fatigue. Concerns exist regarding increased cardiovascular mortality in ketogenic medical nutrition therapies. The individual's clinical condition should be carefully evaluated before starting such medical nutrition therapies. This study examines the effectiveness of different types of ketogenic diets in treating various diseases, as well as their impact on metabolism.

Keywords: Ketogenic medical nutrition therapy; Ketone bodies; Nutrition; Epilepsy.

Anatomy, Biochemistry, Physiology

Biological Potential of Cress plant, known for its nutritional properties

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Abstract

Plants are the constant elements of ecosystems. In their natural environment, people are constantly intertwined with plants. In different communities, plants have been used by people for many purposes. In this study, the biological activities of *Lepidium sativum* reported in the literature were compiled. According to the findings, it has been reported that it has antioxidant, antimicrobial, antigerminative, antidiabetic, anti-inflammatory, phytotoxicity, allelopathic, hepatoprotective, anticancer effects. In this context, it has been seen that *Lepidium sativum* can be an important source in terms of biological activity.

Keywords: *Antimicrobial, Antioxidant, Anticancer, Cress, Traditional medicine*

1. INTRODUCTION

Medicinal plants have been used by humans in the treatment of diseases since ancient times (Mohammed et al., 2022). Because plants are exposed to many factors in their natural ecosystems, they synthesize biologically active compounds as a result of their defense system (Sevindik et al., 2017; Mohammed et al., 2020a). Medicinal plants are widely used, especially in underdeveloped and developing societies, due to their easy and cheap availability (Korkmaz et al., 2021). Medicinal uses

of plants, which are invariable elements of human meals due to their nutritional properties, are increasing (Mohammed et al., 2020b; Mohammed et al., 2021a). As a result of studies, it has been reported that plants have many biological activities such as anticancer, antidiabetic, anti-inflammatory, antioxidant, antiproliferative, antiallergic, hepatoprotective and DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, it is very important to investigate the biological activities of plants in terms of determining their medicinal potential. In this study, the biological activities of *Lepidium sativum* reported in the literature were compiled.

Cress (*Lepidium sativum*) is an edible plant species known as garden cress or curly cress. They are annual plants that can rise to 60 cm with many branches at the top. Cress is an important source of vitamins A, C and K and dietary minerals (Wadhwa et al., 2012).

2. BIOLOGICAL ACTIVITY

In in vitro and in vivo biological activity studies on *Lepidium sativum*, it has been observed that extracts such as essential oil, methanol, ethyl acetate,

petroleum ether, ethanol, aqueous, n-hexane, dichloromethane, chloroform and crude extract have been used. The biological activity study of *Lepidium sativum* is shown in Table 1.

Table 1. Biological activity of *Lepidium sativum*

Plant species	Extraction	Biological activity	References
<i>Lepidium sativum</i>	Essential oil, metanol, etilasetat, petroleum ether, ethanol, aqueous, n-hekzan, diklorometan, kloroform, crude extract	Antioxidant, antimicrobial, antigerminative, anti-diabetic, anti-inflammatory, phytotoxicity, allelopathic, hepatoprotective, anticancer	(Ay and Yavaşoğlu, 2001; Martino et al., 2010; Adam et al., 2011; De Martino et al., 2012; Iqbal and Fry, 2012; AlObaidi, 2014; Chatoui et al., 2016; Raish et al., 2016; Mishra et al., 2017; Besufekad et al., 2018; Alqahtani et al., 2019; B Omer et al., 2020)

Antioxidant activity

Antioxidants act in reducing the effects of free radicals produced as a result of metabolic activities (Bal et al., 2019). As the levels of oxidant compounds, which do not cause harmful effects at low levels, increase, they can cause cellular damage (Selamoglu et al., 2020). In this case, antioxidants come into play and play a role in reducing the effects of oxidant compounds (Saridogan et al., 2021). In cases where the antioxidant system is insufficient, oxidative stress occurs. As a result of oxidative

stress, many serious diseases such as cancer, Alzheimer's, Parkinson's, cardiological disorders, and multiple sclerosis can be seen in humans (Krupodorova and Sevindik, 2020; Uysal et al., 2021). Supplementary antioxidants serve in the prevention of these diseases (Eraslan et al., 2021). In this study, supplemental antioxidant status of *Lepidium sativum* was compiled based on literature data (Table 1). The phytotoxic status of phenolic compounds obtained from the essential oil of *Lepidium sativum* was examined. As a result of the study, it was reported that luteolin> quercetin> catechol> morin> rutin> catechin as the most active compounds among the flavonoids tested for the DPPH test (De Martino et al., 2012). Antioxidant properties of methanol, petroleum ether and ethyl acetate extract of *Lepidium sativum* were investigated by using DPPH test. As a result of the research, the best result of the DPPH test was reported to be 925.22±0.02 ppm in methanol extract (Chatoui et al., 2016). The antioxidant status of the essential oil of *Lepidium sativum* was investigated using the DPPH test. As a result of the research, it has been reported that the percentage of effect is between 22-50% (Alqahtani et al., 2019). DPPH, CUPRAC and TEAC status of n-hexane, dichloromethane, ethyl acetate and methanol extract of *Lepidium sativum* were examined. As a result of the research, it was reported that IC₅₀= 570 µg/mL and IC₅₀= 759 µg/mL for MeOH (stepped) and MeOH (direct) extracts, respectively, as a result of DPPH analysis. In addition, TEAC analysis of 8.2 mM trolox/g extract and 8.24 mM trolox/g extract were reported to be QREFC= 0.55 and 0.72 by CUPRAC method (Ay and Yavaşoğlu, 2001).

Antimicrobial activity

Microorganisms are among the main agents of many diseases (Baba et al., 2020). Antimicrobial drugs used in the fight against microorganisms have

become increasingly inadequate in recent years. Among the main factors of this is the resistance of microorganisms due to unconsciously used drugs (Bal et al, 2017; Islek et al., 2021). For this reason, researchers have turned to the discovery of alternative antimicrobial drugs. Due to the possible side effects of synthetic drugs, people have increased the use of natural antimicrobial sources (Mohammed et al., 2023). In this context, it is very important to investigate the effects of plants against microorganisms in order to determine new antimicrobial drugs. In this study, the effects of *Lepidium sativum* reported in the literature on microorganisms were compiled (Table 1). The antimicrobial status of methanol, petroleum ether and ethyl acetate extract of *Lepidium sativum* on *Rhodococcus equi* was investigated. As a result of the study, it was reported that ethyl acetate has 15.55 mm, methanol extracts 13.15 mm and petroleum ether extracts 10.35 mm (Chatoui et al., 2016). The antimicrobial status of the essential oil of *Lepidium sativum* was investigated. As a result of the study, it was reported that the MIC value was 47.5-95 mg/ml and the MBC value was 190 mg/mL against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella enterica*, *Klebsiella pneumoniae* and *Candida albicans* strains (Alqahtani et al., 2019). The antimicrobial status of *Lepidium sativum* seed extracts, petroleum ether, methanol and water extracts against *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa* and *Candida albicans* were analyzed. As a result of the study, it was reported that petroleum ether extract, one of the extracts used, showed a strong effect at 2.5% and 10% concentrations (Adam et al., 2011). It has been reported that the best results of chloroform, crude extract, ethyl acetate and aqueous extracts of *Lepidium sativum* were observed in 20 mm

Aspergillus niger at 100 mg/mL crude extract concentration (B Omer et al., 2020). The effects of ethanol, methanol and chloroform extract of *Lepidium sativum* on *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Shigella sonnie* were investigated. As a result of the study, it was reported that ethanol among the extracts and the highest minimum inhibitory concentration (MIC) with inhibition value ranges between 6.25 and 12.5 mg/mL from other solvent extracts (Besufekad et al., 2018).

Other activities

The antigerminative effect of monoterpenes obtained from the essential oil of *Lepidium sativum* was examined. As a result of the study, it was reported that geraniol and carvone compounds significantly inhibited the germination of garden cress at the highest concentration tested (Martino et al., 2010). It has been reported that phenolic compounds obtained from the essential oil of *Lepidium sativum* have phytotoxic states (De Martino et al., 2012). The allelopathic status of *Lepidium sativum* on seedling growth in *Amaranthus caudatus* and *Lactuca sativa* was investigated. As a result of the study, it was reported that in the presence of cress seedlings, both species developed longer hypocotyls and shorter roots than cressless controls (Iqbal and Fry, 2012). The status of ethanol extract of *Lepidium sativum* seeds against D-galactosamine/lipopolysaccharide-induced hepatotoxicity in an animal model was investigated. As a result of the study, it was reported that a significant improvement in hepatic damage was observed with the weakening of serum and lipid peroxidation, comparable to silymarin (25 mg/kg p.o) (Raish et al., 2016). It has been reported that *Lepidium sativum* seeds reduce diabetes complications by regulating plasma redox (Mishra et

al., 2017). It has been reported that the essential oil of *Lepidium sativum* has an anti-inflammatory effect of 21% at a concentration of 300µg/mL (Alqahtani et al., 2019). *Lepidium sativum* leaf aqueous extracts have been investigated for anticancer status on human tongue squamous. As a result of the study, it was reported that it had an effect of 70, 100 and 150 ug/mL, respectively, depending on the dose (AlObaidi, 2014).

3. CONCLUSION

In this study, studies on the biological activities of *Lepidium sativum* in the literature were compiled. According to the findings, it was seen that *Lepidium sativum* has antioxidant, antimicrobial, antigerminative, anti-diabetic, anti-inflammatory, phytotoxicity, allelopathic, hepatoprotective, anticancer properties. In this context, it has been seen that the plant can be a natural agent in pharmacological designs.

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A Study on the Biological Activities of Pomegranate

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Abstract

Plants have been used by humans throughout human history to treat diseases. In this study, the biological activities of *Punica granatum* reported in the literature were compiled. According to the findings, it was determined that *Punica granatum* has antioxidant, antimicrobial, anticancer, cytotoxic, anti-inflammatory, anti-cholinesterase, antidiabetic effects. In this context, it is thought that *Punica granatum* may be a natural source in pharmacological designs.

Keywords: *Antimicrobial, Antioxidant, Punica, Pomegranate, Traditional medicine*

1. INTRODUCTION

Traditional medicine applications based on different treatment methods and the use of different natural products are highly preferred today (Mohammed et al., 2022). Herbal treatment methods are the most commonly used methods of traditional medicine. Plants have been the most important materials obtained from nature by human beings since ancient times (Sevindik et al., 2017; Mohammed et al., 2020a). Sometimes it was used for food, sometimes for shelter, sometimes for heating, and sometimes for the fight against diseases (Korkmaz et al., 2021). They are seen as basic food due to the

nutritional elements such as vitamins and minerals. In addition to their nutritional properties, plants are medicinally important natural products (Mohammed et al., 2020b; Mohammed et al., 2021a). Many studies have reported that plants have many biological activities such as anticancer, antidiabetic, anti-inflammatory, antiproliferative, antiaging, antioxidant, antimicrobial, DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, it is very important to determine the biological activities of plants. In this study, the biological activities of *Punica granatum* were compiled. *Punica granatum* (Lythraceae) is a type of fruit that grows in temperate climates, with small seeds and hundreds of particles forming the fruit body, with a slightly sour and sometimes sweet taste. It is a drought resistant plant. It is consumed raw. It can also be used in salads and meals by removing the water.

2. BIOLOGICAL ACTIVITY

Extracts such as ethyl acetate, acetone, methanol, water, aqueous, ether, ethanol, hexane and dichloromethane were used in in vitro and in vivo

biological activity studies on *Punica granatum*. The biological activity study of *Punica granatum* is shown in table 1.

Table 1. Biological activity of *Punica granatum*

Plant species	Extraction	Biological activity	References
<i>Punica granatum</i>	Ethyl acetate, acetone, methanol, water, aqueous, ether, ethanol, heksan, diklorometan	Antioxidant, antimicrobial, anticancer, cytotoxic, anti-inflammatory, anticholinesterase, antidiabetic	(Singh et al., 2002; Negi and Jayaprakasha, 2003; Ricci et al., 2006; Al-Zoreky, 2009; Bagri et al., 2009; Duman et al., 2009; Tehranifar et al., 2010; Mutahar et al., 2012; Bekir et al., 2013; Kaur et al., 2016; Yusefi et al., 2020)

Antioxidant activity

Free radicals are oxidant compounds produced as a result of metabolic processes (Bal et al., 2019). The increase in the levels of free radicals can have quite harmful effects. Antioxidants play a role in reducing the effects of free radicals (Selamoglu et al., 2020). If the balance between oxidant compounds and

antioxidants is disturbed, oxidative stress occurs (Saridogan et al., 2021). As a result of oxidative stress, people may experience many serious diseases such as Alzheimer's, Parkinson's, cancer, cardiological disorders, multiple sclerosis (Krupodorova and Sevindik, 2020; Uysal et al., 2021). Supplementary antioxidants can play an important role in preventing the formation of these diseases (Eraslan et al., 2021). In this context, the antioxidant activities of *Punica granatum* reported in the literature were compiled (Table 1). Antioxidant status of ethyl acetate, acetone, methanol and water extract of *Punica granatum* was investigated using DPPH. As a result of the study, it was reported that the extracts had a value between 71.33% and 86.33% at 50 ppm concentration (Negi and Jayaprakasha, 2003). The antioxidant status of the ethyl acetate and aqueous extract of *Punica granatum* was investigated using DPPH, lipid peroxidation and superoxide tests. As a result of the study, it was reported that the DPPH LC50 value was 0.069-15.100 mg DW/ml, the lipid peroxidation LC50 value was 0.0787-19.013 mg DW/mL, and the superoxide LC50 value was 0.944-32.7 mg DW/mL (Ricci et al., 2006). It has been reported that the antioxidant activity of *Punica granatum* is between 15.59% and 40.72% (Tehranifar et al., 2010). The antioxidant status of the ethyl acetate, methanol and water extract of *Punica granatum* was investigated using the β -carotene-linoleate and DPPH test. As a result of the study, it was reported that it showed 83% and 81% antioxidant activity using β -carotene-linoleate and DPPH model systems at 50 ppm, and 22.6% and 23.2% antioxidant activity, respectively, using β -carotene-linoleate and DPPH model systems at 100 ppm (Singh et al., 2002). It has been reported that methanolic extracts (ME) of *Punica granatum* show stronger activity than water (WE) or ether extracts (EE) in DPPH activity (Mutahar et al., 2012).

Antimicrobial activity

In recent years, diseases caused by microorganisms have been increasing (Baba et al., 2020). The emergence of resistant microorganisms due to unconscious antibiotic use has reduced the effects of antimicrobial drugs used today. Researchers have turned to the discovery of new antimicrobial drugs (Bal et al., 2017; Islek et al., 2021). Possible side effects of synthetic drugs have led people to use natural antimicrobial drugs. Natural products have been very important antimicrobial sources (Mohammed et al., 2023). In this study, antimicrobial activity studies of *Punica granatum* reported in the literature were compiled (Table 1). The antimicrobial status of acetone, methanol and water extract of *Punica granatum* was investigated. As a result of the study, it was reported that the MIC values of *Bacillus cereus*, *Bacillus coagulens*, *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* were between 187.5-200 ppm for acetone, 250-500 ppm for methanol, and 400-700 ppm for water (Negative and Jaya, 2003). The status of the methanol extract of *Punica granatum* on *Listeria monocytogenes*, *Staphylococcus aureus*, *Salmonella enteritidis*, *Escherichia coli* and *Yersinia enterocolitica* was investigated. As a result of the study, it was reported that the minimum inhibitory concentration and the highest MIC value against *Salmonella enteritidis* was 4 mg/ml (Al-Zoreky, 2009). It has been reported that *Punica granatum* is effective on *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Salmonella enterica* and *Enterobacter aerogenes* (Kaur et al., 2016). *Punica granatum* has been reported to have inhibition sites ranging from 13 to 26 mm on *Bacillus megaterium*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Corynebacterium xerosis*, *Escherichia coli*, *Enterococcus faecalis*, *Micrococcus luteus*, *Kluyveromyces marxianus*,

Rhodotorula rubra and *Candida albicans*. In addition, MIC values were reported to be between 30 and >90 µg/ml (Duman et al., 2009).

Other activities

Four different weight percentages of fruit peel extract were used for the anticancer and cytotoxicity status of Magnetic iron oxide nanoparticles (IONPs) of *Punica granatum*. As a result of the study, it was reported that IONPs were non-reactive (IC₅₀ > 250 µg/mL) against colon (HCT116), breast (MCF7), cervical (HeLa) and lung (A549) cancer cell lines and two normal cell lines derived from human colon. In addition, IONPs containing 2% and 4% bark extract by weight have been reported to exhibit potent anticancer activities with LC₅₀ values of 85.06 and 197.46 µg/mL against the nasopharyngeal carcinoma (NPC) cell line HONE1 (Yusefi et al., 2020). The anti-inflammatory, cytotoxicity and anti-cholinesterase status of the hexane, dichloromethane, ethyl acetate, ethanol and methanol extracts of *Punica granatum* were investigated. As a result of the study, it was reported that the strongest 5-lipoxygenase (5-LOX), acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE) inhibition activities were obtained in ethanol extract, with LC₅₀ values of 6.20, 14.83 and 2.65 mg/L, respectively, and the best cytotoxic activity against MCF (Bekir et al., 2013). The effects of *Punica granatum* aqueous extract on streptozotocin (STZ)-induced diabetic rats were investigated by measuring fasting blood glucose, lipid profiles (atherogenic index), lipid peroxidation (LPO), and the activities of both enzymatic and enzymatic antioxidants. As a result of the study, it was reported that oral administration of 250 mg/kg and 500 mg/kg doses to albino Wistar rats for 21 days resulted in a significant reduction in

fasting blood glucose, TC, TG, LDL-C, VLDL-C and tissue LPO levels (Bagri et al., 2009).

3. CONCLUSION

In this study, the biological activity studies of *Punica granatum* reported in the literature were compiled. According to the findings, it was seen that *Punica granatum* has antioxidant, antimicrobial, anticancer, cytotoxic, anti-inflammatory, anti-cholinesterase, antidiabetic activities. In this context, it has been seen that *Punica granatum* has very important biological activities and therefore may be important natural agents.

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Biological Potential of Lettuce

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Abstract

Many natural products are used in the fight against diseases within the scope of traditional medicine. People especially used plants for different purposes. Plants have been very useful in the fight against diseases. In this study, the biological activities of *Lactuca sativa* reported in the literature were compiled. According to the findings, it has been reported that it has antioxidant, antimicrobial, allelopathic, anti-inflammatory, antiviral and cytotoxic effects. In this context, it has been observed that *Lactuca sativa* has biological potentials in addition to its nutritional properties.

Keywords: *Antimicrobial, Antioxidant, Lactuca, Lettuce, Traditional medicine*

1. INTRODUCTION

Plants are used by the people for many purposes such as tea, spice and medicine (Mohammed et al., 2022). Contrary to modern medicine, it has been used in plants like many natural products since ancient times within the scope of complementary or alternative medicine (Sevindik et al., 2017; Mohammed et al., 2020a). Plants are natural products that many people can easily access and experience. It is at the head of diet lists at many points in human nutrition (Korkmaz et al., 2021). Their nutritional properties, containing vitamins,

minerals and essential nutrients have made plants indispensable products. In addition to their nutritional properties, medicinal uses of plants are also common (Mohammed et al., 2020b; Mohammed et al., 2021a). Many studies have shown that plants have many effects such as anticancer, anti-inflammatory, antiaging, antiproliferative, hepatoprotective, antioxidant, antimicrobial, DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, investigating the biological activities of plants is important for their use in complementary medicine. In this study, the biological activities of *Lactuca sativa* were compiled.

Lettuce (Asteraceae) is an annual or six-month temperate climate vegetable with broad green leaves. The leaves are generally consumed raw. In addition, the leaves and roots are consumed by cooking. There are many varieties. Lettuce contains vitamins A and C.

2. BIOLOGICAL ACTIVITY

In vitro and in vivo biological activity studies on *Lactuca sativa* showed that extracts such as methanol, aqueous, water, ethylacetate, butanol, crude extract and petroleum ether were used. The biological activity study of *Lactuca sativa* is shown in table 1.

Table 1. Biological activity of *Lactuca sativa*

Plant species	Extraction	Biological activity	References
<i>Lactuca sativa</i>	Methanol, aqueous, water, ethylacetate, butanol, crude extract, petroleum ether	Antioxidant, antimicrobial, allelopathic, anti-inflammatory, antiviral, cytotoxic	(Chon et al., 2005; Edziri et al., 2011; Kanchana et al., 2011; Pavlović et al., 2011; Al Nomaani et al., 2013; Pepe et al., 2015; Rasheed and Al-khazraji, 2019; Jayapala et al., 2020; Wonglom et al., 2020; Abdalla et al., 2021; Mohamed et al., 2021)

Antioxidant activity

Oxidative stress can be defined as an imbalance between antioxidants and oxidants (Bal et al., 2019). Oxidizing compounds are routinely produced as a result of metabolic activities. As the levels of these compounds increase, cellular damage may occur (Selamoglu et al., 2020). Antioxidant compounds serve to reduce the effects of oxidant compounds. In

cases where it is insufficient, oxidative stress occurs (Saridogan et al., 2021). As a result of oxidative stress, many diseases such as cancer, Alzheimer's, DNA damages, cardiological disorders, Parkinson's, multiple sclerosis can be seen (Krupodorova and Sevindik, 2020; Uysal et al., 2021). Supplemental antioxidants are important in reducing the effects of oxidative stress (Eraslan et al., 2021). In this study, antioxidant activity studies of *Lactuca sativa* reported in the literature were compiled (Table 1). The antioxidant status of the methanol extract of *Lactuca sativa* was investigated using the DPPH test. As a result of the research, it was reported that V3 lettuce plants showed activity against DPPH radical with IC₅₀ values of 60.5 µg/mL (under +S) and 62.8 µg/mL (below -S), respectively (Abdalla et al., 2021). It has been reported that *Lactuca sativa* has an antioxidant effect using the DPPH test (Al Nomaani et al., 2013). It has been reported that *Lactuca sativa* has a significantly ($p < 0.05$) higher hydroxyl radical capture value of 4.1 µg/mL than the aqueous extract, with an IC₅₀=3.5 µg/mL (Edziri et al., 2011). The DPPH scavenging activity of different extracts of *Lactuca sativa* and the antioxidant status were investigated by ferric reducing tests. As a result of the study, it was reported that it showed antioxidant activity (Arroussi et al., 2022). It has been reported that *Lactuca sativa* showed a very significant ($p=0$) difference in the antioxidant activity of lettuce (as µmol FeSO₄ L⁻¹) when the intensity of the lights decreased to 60 µmol m⁻² s⁻¹ and was at the highest level in LED applications (Mohamed et al., 2021).

Antimicrobial activity

Natural products are used by people to fight many microbial diseases (Baba et al., 2020). Unlike synthetic drugs, natural products have very few harmful side effects. In addition, the proliferation of resistant microorganisms due to unconscious antimicrobial drug use in recent years has

necessitated the discovery of new antimicrobial drugs (Bal et al, 2017; Islek et al., 2021). Plants are known to be very important natural products in terms of these antimicrobial drug potentials (Mohammed et al., 2023). In this study, the effects of *Lactuca sativa* against microorganisms in the literature were compiled. A study was conducted on the antimicrobial effect of *Lactuca sativa* methanol extract on *Staphylococcus aureus*. As a result of the study, it was reported that *Lactuca sativa* grown under both +S and -S conditions showed an effect of 44.34% and 43.55% (Abdalla et al., 2021). It has been reported that *Lactuca sativa* has an effect on *Trichoderma asperellum* (Wonglom et al., 2020). It has been reported that the lowest MIC value of *Lactuca sativa* against gram-negative and gram-positive bacteria is 2.5 mg/mL (Edziri et al., 2011). It has been reported that the inhibition zones of *Lactuca sativa* against *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* are 10 mm, 12 mm, 12 mm and 12 mm, respectively (Kanchana et al., 2011). The antimicrobial status of *Lactuca sativa* on *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Escherichia coli*, *Proteus vulgaris*, *Proteus mirabilis*, *Bacillus subtilis*, *Candida albicans* and *Aspergillus niger* was investigated. As a result of the study, it was reported that the best antimicrobial activity was 19.53 µg/mL on *Aspergillus niger* and *Bacillus subtilis* strains (Pavlović et al., 2011). Petroleum ether extracts of *Lactuca sativa* leaves have been reported to exhibit good activity against *Escherichia coli*, *Staphylococcus aureus* and *Yersinia enterocolitica*. It was also reported that the ethyl acetate+water extract of the plant showed good activity against *Geotrichum candidum* and *Botrytis cinerea* (Rasheed and Al-khazraji, 2019).

Other activity

Aqueous extracts of *Lactuca sativa* applied to filter paper have been reported to significantly inhibit the germination of alfalfa seeds with increasing extract concentration, methanol extracts obtained from the hexane fraction of lettuce plants show the most inhibition on alfalfa root growth, followed by ethylacetate, butanol, and water fractions. In addition, it has been reported that the addition of 100 g kg⁻¹ leaf residues to the soil reduces the shoot and root fresh weights of barn grasses by 79% and 88%, respectively (Chon et al., 2005). It has been reported that polyphenols extracted from *Lactuca sativa* have anti-inflammatory effects in J774A.1 macrophages stimulated with *Escherichia coli* lipopolysaccharide (LPS) (Pepe et al., 2015). It has been reported that methanol and aqueous extracts of *Lactuca sativa* are antiviral effective against HCMV and Cox-B3 viruses when the IC₅₀ value is 200 µg/mL (Edziri et al., 2011). It has been reported that *Lactuca sativa* exerts cytotoxic effects on 3T3-L1 cells (Jayapala et al., 2020).

3. CONCLUSION

In this study, the biological activities of *Lactuca sativa* reported in the literature were compiled. In this context, it has been observed that *Lactuca sativa* has antioxidant, antimicrobial, allelopathic, anti-inflammatory, antiviral and cytotoxic effects. It has been seen that *Lactuca sativa*, which stands out with its nutritional properties, can be an important natural resource in pharmacological designs.

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A review of the methods of increasing the production of medicinal metabolites of plants

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Abstract— Secondary metabolites are small organic molecules that originate from primary plant metabolites. The amount of their production in plants is low, and on the other hand, these compounds are effective in treating a wide range of diseases, especially cancer. To solve this problem, elicitors are used in tissue culture conditions and these compounds stimulate plants to produce secondary metabolites. Elicitors can cause physiological changes in the plant. The use of these compounds causes false stress in the plant and stimulates its defense reactions. In response to the created oxidative stress, the plant increases the expression level of antioxidant genes, and as a result, the activity of enzymatic and non-enzymatic antioxidants (often medicinal) increases.

Keywords— Secondary metabolites, medicinal plants, elicitors

Introduction

Secondary metabolites are small organic molecules that originate from primary metabolites during plant embolism. They basically have a molecular mass of less than 3000 daltons. The chemical nature and composition of metabolites in plants varies among species. There is no clear distinction between primary and secondary metabolites, and the definition is quite confusing, since most metabolites found in natural plant products are secondary metabolites. Secondary metabolites are interesting for several reasons, as they have been of interest in the literature due to their structural diversity and potency as drug candidates and/or antioxidants. There are few examples of the chemical diversity of plant metabolites, so they are complexes that cannot be synthesized by industry (Twaij et al., 2022, Hajipour et al., 2022 and Selamoglu., et al., 2022).

The purpose of this study is to provide solutions to improve the production of valuable plant compounds.

Material and method

We reviewed a lot of research and presented various strategies that increase the production of valuable plant compounds in the results section.

Results

Elicitors are small molecules that can induce immune responses in plants. Elicitors stimulate defense responses by entering the plant signaling pathway (Bektas and Eulgem. 2015). Elicitors are efficiently used to increase the production of secondary metabolites in medicinal plants. The external use of compounds such as jasmonic acid, salicylic acid and nanoparticles, which are examples of elicitors, induces false stress in the plant and provokes plant defense responses. Basically, the output of elicitors initiates a complex signaling pathway and leads to the activation of defense responses (Alinia-Ahandani et al., 2023).

So far, there have been several reports about the effect of elicitors on increasing the production of chicory acid in Sarhargol and other native species. In 2019, Ramezannezhad et al. showed that treatment with elicitors increased the production of shicuric acid in cell culture conditions, in this study, the treatment of 2 mg/L of silver nanoparticles for 48 hours caused an increase in the production of shicuric acid in the root cell suspension from 4 mg/L g DW became 9.54 mg/g DW (Ramezannezhad et al. 2019).

Plant tissue culture systems are an attractive alternative source for the production of high-value secondary metabolites such as chicory acid, and also targeted manipulation of the culture medium, such as the use of various elicitors, can multiply the production of these valuable compounds in plants. Specifically, in a research, the application of Mg/L concentration of 7.5 methyl jasmonate for 7 days in cell culture increased the production of polyphenols and chicory acid from 250 Mg/L to 2000 Mg/L, and the concentration of Mg/L 7.5 methyl jasmonate to The optimal concentration in the production of chicory acid in cell culture conditions was considered. The study of the gene expression pattern of chicory acid biosynthetic pathway also proved this change in the way that the expression of 4CL, C3H and HTT genes

increased at the optimal concentration of methyl jasmonate (Ravazzolo et al. 2022).

Chitosan biopolymer, which is found in the cell wall of fungi, as an elicitor can stimulate the production of secondary metabolites. Increasing the activity of antioxidant enzymes, the accumulation of phenolic compounds and the release of flavonoids and the production of chicory acid were the responses of *Lactuca undulata* plant to chitosan treatment in cell culture conditions (Mofid Bojnoordi et al. 2022).

In 2022, Elshahawy et al. used yeast, *Aspergillus niger*, and *Fusarium oxysporum* extracts to improve callus biomass productivity, total phenolics, and total flavonoids in callus derived from *E. purpurea* leaves. The highest amount of total phenol production was observed in the treatment of 4 g/l of yeast, 1 g/l of *A. niger* and 0.25 g/l of *F. oxysporum*, and the treatment of 4 g/l of yeast extract resulted in the highest activity of catalase and peroxidase enzymes (Elshahawy et al. 2022).

Discussion and conclusion

Considering the importance of plant production compounds, it is very important to find a way to increase these effective substances. Studies show that the use of elicitors in plant tissue culture conditions can increase the production of these useful compounds. Elicitors can induce physiological changes in the plant. The use of these compounds induces false stress in the plant and provokes its defense responses. In response to the created oxidative stress, the plant increases the expression level of antioxidant genes, and as a result, the activity of enzymatic and non-enzymatic antioxidants (often with medicinal aspects) increases.

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INTAKE OF ULTRA-PROCESSED FOOD IS ASSOCIATED WITH OXIDATIVE STRESS AND INFLAMMATORY BIOMARKERS IN METABOLIC SYNDROME PATIENTS

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The consumption of ultra-processed foods (UPF) worldwide is progressively increasing. Increasing evidence suggested that high intake of UPF is associated with an increase in non-communicable diseases, overweight, and obesity. The aim was to assess the oxidant and inflammatory state in plasma, neutrophils, and urine of patients with metabolic syndrome depending on the UPF consumption. Antioxidant and inflammatory biomarkers were measured in the plasma, and urine of a total of 92 adults between 40- and 60 years old suffering from metabolic syndrome living in the Balearic Islands, Spain. Patients were classified into two groups according to the intake of ultra-processed foods in their diet. Dietary intakes were measured by a validated semi-quantitative 143-item food frequency questionnaire, distribution of the intake of UPF was classified according to the degree of their processing established by NOVA. Participants with low intake of UPF showed a higher score of adherence to the Mediterranean diet, and showing differences with participants with higher UPF consumption. A higher intake of fiber and a higher concentration of polyphenols in urine were also observed in subjects with lower intake of UPF. Catalase and superoxide dismutase activities were lower in participants with high intake of UPF, whereas myeloperoxidase activity was higher. Inflammatory biomarkers such as xanthine oxidase, interleukin (IL)-6, and IL-15 levels were higher in participants with high intake of UPF. No differences were found in malondialdehyde and other inflammatory cytokines. In conclusion, metabolic syndrome participants with high UPF consumption have a more pro-oxidant and inflammatory profile than those with low UPF consumption, despite they showed similar blood biochemical profile.

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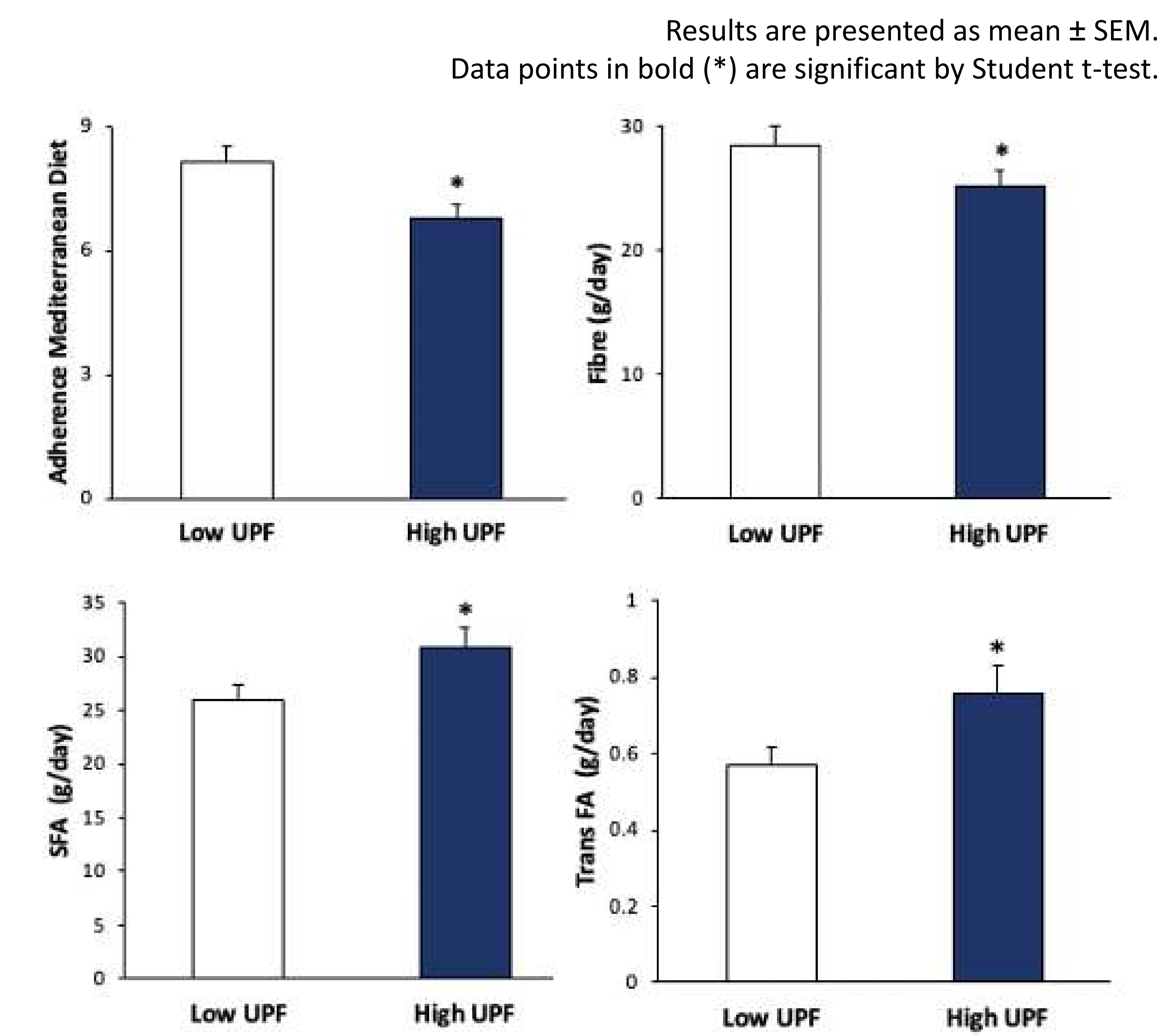
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INTRODUCTION

During last decades the consumption of ultra-processed foods (UPF) worldwide has increased. UPF are defined as multi-ingredient industrial formulations several of exclusive industrial use, that result from a sequence of physical and chemical processes applied to foods and their constituents. They often have a higher content of total fat, saturated fat, added sugar, energy density, and salt, along with a lower fiber and vitamin density. UPF examples may be sugar-sweetened beverages, packaged bread, cookies, savory snacks, candy, ice cream, breakfast cereal, and pre-prepared frozen meals. Increasing evidence suggested that high intake of UPF is associated with an increase in non-communicable diseases, overweight, and obesity. The aim was to assess the oxidant and inflammatory state in plasma, neutrophils, and urine of patients with metabolic syndrome depending on the UPF consumption.

EXPERIMENTAL PROCEDURE

Antioxidant and inflammatory biomarkers were measured in the plasma, neutrophils, and urine of a total of 92 adults between 40- and 60 years old suffering from metabolic syndrome living in the Balearic Islands, Spain. Patients were classified into two groups according to the intake of ultra-processed foods in their diet. Dietary intakes were measured by a validated semi-quantitative 143-item food frequency questionnaire, distribution of the intake of UPF was classified according to the degree of their processing established by NOVA.



CONCLUSIONS

The current study shows how MetS participants with high UPF consumption have a more pro-oxidant and inflammatory profile than those with low UPF consumption, despite they showed similar blood biochemical profile.

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	Low intake of UPF (n=46)	High intake of UPF (n=46)	p-value
Age (years)	65.5 ± 0.7	63.2 ± 0.8	0.015
Weight (kg)	84.6 ± 1.8	90.6 ± 1.9	0.012
Height (cm)	160.6 ± 1.3	166.1 ± 1.1	< 0.001
BMI (kg/m ²)	32.7 ± 0.5	32.8 ± 0.6	0.462
WHtR	0.687 ± 0.008	0.678 ± 0.009	0.214
Abdominal obesity (cm)	110.3 ± 1.4	112.5 ± 1.5	0.143
Systolic blood pressure (mmHg)	144.2 ± 2.8	140.6 ± 2.6	0.174
Diastolic blood pressure (mmHg)	81.6 ± 1.7	82.0 ± 1.5	0.429
Glucose (mg/dL)	114.9 ± 3.5	120.5 ± 7.3	0.245
HbA1c (%)	6.14 ± 0.11	6.28 ± 0.22	0.289
Triglycerides (mg/dL)	152.9 ± 10.0	162.3 ± 12.4	0.278
HDL-Cholesterol (mg/dL)	45.5 ± 1.7	44.0 ± 1.8	0.276
LDL-Cholesterol (mg/dL)	116.4 ± 5.4	109.3 ± 4.7	0.164
Cholesterol total (mg/dL)	191.4 ± 5.9	184.5 ± 4.9	0.185
Uric acid (mg/dL)	6.12 ± 0.22	6.23 ± 0.20	0.353

RESULTS

Participants with low intake of UPF showed a higher score of adherence to the Mediterranean diet, and showing differences with participants with higher UPF consumption. A higher intake of fiber and a higher concentration of polyphenols in urine were also observed in subjects with lower intake of UPF. Despite not seeing differences in the biochemical profile, oxidative and inflammatory biomarkers showed significant changes. CAT and SOD activities were lower in participants with high intake of UPF, whereas MPO activity was higher. ROS production in neutrophils was mostly activated when stimulated with zymosan in the participants with high intake of UPF compared to those with lower intake. Some inflammatory biomarkers such as XOD, IL-6, and IL-15 levels were higher in participants with high intake of UPF. No differences were found in MDA and other inflammatory cytokines.

	Low intake of UPF (n=46)	High intake of UPF (n=46)	p-value
Plasma markers			
CAT (k/L blood)	56.4 ± 5.13	46.5 ± 2.8	0.047
SOD (pkat/L blood)	180.1 ± 15.6	136.6 ± 12.8	0.018
MPO (μkat/mL blood)	53.3 ± 4.3	67.6 ± 4.6	0.012
XOD (ng/mL)	0.395 ± 0.031	0.535 ± 0.066	0.030
MDA (nM)	1.06 ± 0.09	1.15 ± 0.10	0.253
TNFα (pg/mL)	3.62 ± 0.52	4.11 ± 0.53	0.263
IL-1β (pg/mL)	19.1 ± 6.4	22.5 ± 7.3	0.366
IL-6 (pg/mL)	4.23 ± 0.49	5.78 ± 0.56	0.022
IL-15 (pg/mL)	7.39 ± 0.74	10.2 ± 1.68	0.048
INF-γ (pg/mL)	5.92 ± 0.43	6.22 ± 0.53	0.330
MCP-1 (pg/mL)	234.5 ± 13.7	232.8 ± 12.5	0.462
ROS production			
Neutrophils zymosan (RLU/min·10 ³ cells)	10719 ± 602	13475 ± 1230	0.025
Urine markers			
MDA/creatinine (mM/mM)	85.0 ± 10.6	108.9 ± 17.5	0.133
Polyphenols /creatinine (g/L/mM)	13.0 ± 0.8	10.9 ± 0.6	0.027

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Advantages and disadvantages of use LC MS MS in clinic

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Aim: In LC-MS/MS technique, molecules separated according to their physicochemical properties in high pressure liquid chromatography are analyzed with a mass detector. In the study, information about the working principle of the LC MS MS device and its use in clinical laboratories and scientific studies were compiled.

Method: The working principle of the device, its methodology, detailed analysis of the parts that make up the device, and the technical parameters of the device were discussed. Determining the advantages and disadvantages of using the device in the clinical laboratory. Studies on the clinical use of the device were reviewed.

Results: Short analysis times of approximately 1 minute, being a highly sensitive and reliable method, being suitable for automation and performing a large number of analyzes in a short time, testing in very low volumes (2-10 ml), low rate of false positive and false negative results. It stands out among analytical techniques in terms of being cost effective, being able to screen many substances at the same time with a single analysis, enabling scientific studies (cellular metabolic events, disease metabolism, finding biomarkers, validation of existing biomarkers), being cost effective.

Discussion: Compared to other methods, LC-MS/MS in the clinical laboratory does not require derivatization (short time in pretreatment compared to GC), is not affected by interferences (advantage over immunoassay methods), low detection limit and wide detection range, many metabolites can be detected at the same time. stands out with its advantages. Disadvantages and limitations such as complexity of the analysis, user training, experience requirement, installation cost, maintenance and sustainability of the device come to the fore.

Conclusion: The device offers a wide range of uses at low cost when used routinely.

Keywords: LC MS MS, chromatography, laboratory, analysis, technique

RELIABLE TREATMENT of OXIDATIVE STRESS INDUCED BY SARS-CoV-2

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Abstract.

Coronavirus infection is the most common form of pandemic with high mortality in recent decades, and the recent form of coronavirus has resulted in severe acute respiratory syndrome (SARS-CoV). Prophylaxis & treatment of SARS-CoV to avoid future fatal cases is the most urgent problem of medicine. It is impossible to prevent death cases without knowledge of the subtle mechanisms of the virus entry into the body, stimulating organ damage and the spread of the disease. The spike protein of the recent SARS-CoV-2 virus binds to target cells through the angiotensin-converting enzyme-2 (ACE2) & CD147 cell receptor. They are mainly located on the surface of respiratory and gastrointestinal epithelial cells and play role of the entry routes of infection. After the attachment of the virus to the cell, the spike protein is cleaved into subunits S1 and S2 as a result of proteolysis through a transmembrane serine protease type 2. SARS-CoV-2 is capable of damaging alveocytes type I and II, as well as endothelial cells. The virus induces oxidative stress and cytokine storm, which are considered the main cause of disease complications and death. This process leads to the expression and secretion of anti-inflammatory cytokines, detailed in this paper. Antioxidant preparations preventing the development of these mechanisms of SARS virulence form the basis of today's official protocols.

Key words: antioxidants, SARS-CoV-2, cytokine storm, reactive oxygen species

Introduction

The coronavirus following types HCoV-229E, HCoV-OC43, HCoV-NL63, HCoV-HKU1, SARS-CoV-1, MERS-Cov, and finally, SARS-CoV-2 are known [1]. The

recent SARS-CoV-2 strain is characterized by the highest virulence and susceptibility. The SARS-CoV-2 genome repeats the MERS-CoV genome by 50%, the SARSCoV-1 genome by 79%, and the BtRsCoV genome by 88% [2].

This pathology characterized by an increase in reactive oxygen species (ROS) and a violation of the immune system. The reactive oxygen species (ROS) formed during metabolism are in great need as they play the role of signal messengers [3]. It is known that ROS-dependent kinases stimulate inflammatory signals in addition to increasing the transcription & expression of inflammatory genes [4, 5]. Optimal levels of ROS in the body are maintained by the enzymatic and non-enzymatic antioxidant system. When the antioxidant defenses are weakened, a condition called oxidative stress occurs. Numerous studies have shown that an increase in ROS accompanies all infectious respiratory viral infections. The virus is a lipid-coated circular pathogen measuring 80-229 nm [6]. There are three pathogenic structural proteins on its surface. On the outer side of the virus are crown-shaped glycoprotein protrusions (spike S-protein) that bind to the surface of the target cell [7]. It has been found that spike proteins have the ability to hide from innate immunity by undergoing conformational changes [8]. The spike protein of the SARS-CoV-2 virus binds to the target cells via angiotensin converting enzyme-2 (ACE2). The possible route of infection for SARS is ACE2 protein present in various human organs, such as oral and nasal mucosa, nasopharynx, skin, lymph nodes, thymus, bone marrow, spleen, liver, and brain[9]. ACE2 is mainly expressed in cells of the gastrointestinal tract, kidneys, blood vessels, heart and lungs. The SARS-CoV-2 virus can also bind to the CD147 cell receptor [10]. As a result of the virus attaching to the cell, the spike protein is broken down into S1 and S2 subunits by TMPRSS2 (transmembrane serine protease-2)[11]. The S1 then combines with the subunit ACE2, then the S1-ACE2 complex dissociates. The hydrophobic S2-FP peptide (fusion peptide) is released from S2 and allows the virus to enter the target cell by activating endocytosis [12]. Then the permanent mechanism of the virus is activated: viral RNA is transcribed at the expense of the target cell's organelles, resulting in the formation of structural proteins necessary for the development of the virus, they also form a new generation of SARS-CoV-2 virions, and continue to damage new target cells. The metabolic products of the virus produce ROS, which damage mitochondria and stimulate the removal of DNA from them. Unlike strains with low virulence, passing into the lower respiratory tract, SARS-CoV-2 damages type I and II alveocytes, as well as endothelial cells. This process results in the expression and secretion of anti-inflammatory cytokines [13]. In this case, neutrophils and cytotoxic T cells, along with the formed cyto- and chemokines, join the process of protecting lung tissue from the virus. At this stage at the site of damage (lung) edema, severe pneumonia develops, causing severe acute respiratory distress-stress syndrome and fibrosis [14]. The age factor aggravates the pathological process, i.e. the changes listed in the elderly are more pronounced. When SARS-CoV-2 cannot be blocked

and/or eliminated from the respiratory tract, the virus enters the bloodstream and can damage other organs and cells that have receptors on their surface: intestines, kidneys, esophagus, heart, blood vessels, brain, bladder, and so on. Levels of inflammatory cytokines and chemoattractants continue to rise dramatically [15]. In the early stages of the disease, the nsp1 and rp6 proteins of the virus inhibit the formation of interferon [16]. Evidence from the literature suggests that single antioxidant therapy is less effective in SARS-CoV-2 infection [17]. therefore, it is advisable to combine antioxidants with drugs used in the treatment of previous respiratory infections, including SARS-CoV-1 infection.

One of the factors, that increase the body's non-enzymatic antioxidant defenses is vitamin C, which can have an anti-inflammatory effect by rapidly reducing the formation of ROS [18, 19]. Since vitamin C also stops development of the "cytokine storm", in SARS-CoV-2 treatment it is more active than interferon. Vitamin C with sulforaphane has a positive effect in the treatment of acute inflammatory diseases that require artificial ventilation of the lungs [20]. Sulforaphane is an anticancer & antibacterial compound within the isothiocyanate group of organosulfur compounds. It is obtained from cruciferous vegetables such as broccoli, Brussels sprouts, and cabbages. Vitamin C is currently actively used in the treatment of SARS-CoV-2 in China, and even this antioxidant has been included in the ClinicalTrials.gov protocols [21]. Thiol antioxidants, such as glutathione along with selenium *weaken apoptosis by breaking down peroxide radicals* in viral respiratory diseases and inhibit viral replication [22]. *In vitro* analysis of the antiviral effects of vitamins and antioxidant components such as tocopherol, thiamine, pantothenic acid, pyridoxine, biotin, and glutathione showed that most glutathione and vitamin B family were active [23].

Thiamine, biotin and tocopherol also showed a fairly high inhibitory effect. Since unsaturated fatty acids omega-3 and omega-6, as well as vitamins E, A and D, and various valence metal ions have significant antioxidant and anti-inflammatory effects, they are recommended for use in the treatment of SARS-CoV patients. In addition, the mucolytic N-acetyl-L-cysteine, that can prevent the induction of apoptosis and anti-inflammatory IL-6, IL-8 cytokines, has a strong antiviral effect [24]. At present, vitamin C and N-acetyl-cysteine are the most widely used antioxidants in lung damage.

The antiviral effect of some *flavonoids* on SARS-CoV: quercetin from the natural flavonoid group has been shown to adversely affect the synthesis of viral RNA and the level of cytokines in the blood [25]. Studies have also shown significant antiviral activity of resveratrol, a natural polyphenol [26]. This compound has been shown to be active against viral replication and expression of viral proteins. Sources of animal origin: taurine, carnosine and 4-hydroxyproline have an anti-oxidative and anti-inflammatory impact on the body, as well as on neurological, muscular, retinal,

immunological and cardiovascular function [27]. the anti-inflammatory and antioxidant, anti-coronaviral effects have been found in taurine, carnosine and 4-hydroxyproline [28]. Studies have shown that melatonin and α -lipoic acid can significantly reduce the damaging effects of antiviral drugs [29]. The antioxidant properties of melatonin allow increase the organism defenses. Another antioxidant, astaxanthin, has high anti-inflammatory activity because it reduces the effects of C-reactive protein, interleukin-1, and a number of other inflammatory mediators of the respiratory tract [30]. Leukomethylene (reduced form of methylene acid) widely used in diseases, in combination with vitamin C, N-acetylcysteine, α -lipoic acid, has a noticeable antioxidant effect, prevents the spread of viral RNA, leads to a weakening of inflammation and hypoxia [31]. Thus, according to the adopted protocol, a "vitamin cocktail" is used for prevention and treatment of SARS-CoV-2 patients: Vitamin D and Vitamin C, methionine, zink, quercetin. Such a combination of these components is expedient from both a prophylactic and therapeutic point of view. The combined forms of these drugs are more pronounced, and this fact is reflected in the treatment protocols of patients with SARS-CoV-2.

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Fecal calprotectin elimination level in colorectal carcinoma

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Colorectal cancer (CRC) is one of the oncological problems seen at different rates in different countries of the world. Under the term colorectal cancer, two nosologies such as colon and rectal cancer are jointly interpreted. Colorectal cancer incidence increases in people over the age of 50 and peaks in people over the age of 80. According to statistics, colorectal cancer ranks second after lung cancer among cancer-related deaths. The aim of this study was to compare the sensitivity and specificity of faecal calprotectin and faecal occult blood in patients with colorectal cancer and colonic polyps. Faecal calprotectin and occult blood were assessed in 62 patients with colorectal carcinoma and 133 patients referred for colonoscopy. The range of normality for faecal calprotectin (0.5–50 mg/l) was determined from 96 healthy subjects. Calprotectin was measured in a single stool sample before and three months after the operation using an enzyme-linked immunosorbent assay (ELISA). Calprotectin levels greater than or equal to 50 mg/l were considered positive. Median faecal calprotectin concentration in the 62 patients (38 men and 24 women, with mean age of 61 ± 11.7 years old) with colorectal carcinoma (101 mg/l, 95% confidence interval (CI) 57–133) diverged significantly from normal (2.3 mg/l, 95% CI 1.6–5.0) with 90% of patients having elevated levels (normal <10 mg/l) whereas only 36/62 (58%) had positive faecal occult bloods. Controls were predominantly healthcare workers of biochemistry department and their relatives, who had no symptoms of gastrointestinal or other diseases. There was no significant difference in faecal calprotectin levels when considering location or Dukes staging of tumour. Percentage positivity of faecal occult bloods was significantly higher for Dukes stage C and D cancers compared with Dukes A and B. In the colonoscopy group, 29 patients with adenomatous polyps were detected in whom the median faecal calprotectin was 12 mg/l (95% CI 2.9–32). Sensitivity for detection of adenomatous polyps was 55% using the calprotectin method and 10% using faecal occult blood testing. The overall sensitivity and specificity of calprotectin for colorectal cancer and adenomatous polyps as a combined group was 79% and 72% respectively, compared with a sensitivity and specificity of faecal occult blood of 43% and 92%. Faecal calprotectin is a simple and sensitive non-invasive marker of colorectal cancer and adenomatous polyps. It is more sensitive than faecal occult blood tests for detection of colorectal neoplasia at the cost of a somewhat lower specificity.

META-ANALYSIS ON SOME PLANT EXTRACTS BENEFITS ON NEUROPSYCHIATRIC DISORDERS MODELS STUDIED IN ZEBRAFISH

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Abstract. Nowadays' society becomes increasingly interested in plant-based alternatives in order to treat various diseases. Humans worldwide are diagnosed with neuropsychiatric disorders like epilepsy, autism, Alzheimer's disease, Parkinson's disease, or ADHD (attention deficit hyperactivity disorder) and, consequently, research has been done in order to analyse different plant extracts' effects in their treatment, considering the various side effects conventional drugs could have. Judging by the neuroanatomical similarities to the human body and due to the advantages it has as experimental purpose animal, zebrafish (*Danio rerio*) has been preferred throughout the past years in the detriment of mammalian animal models. Objectives. This study aims to analyse the specialized literature regarding the benefits of phytotherapy in neuropsychiatric disorders treatment, using the zebrafish as animal model. Methods. This systematic analysis involved search engines like PubMed, Zfin, Semantic Scholar, Microsoft Academic, Scite and BASE (Bielefeld Academic Search Engine). Publications from 1960-2021 were used only, and reviews, conference articles or video/audio information were not selected in order to avoid redundancy, while journal articles were preferred. Different key words combinations were used to collect the articles related to the subject of interest. Results. Analysing the collected data, it can be concluded that zebrafish is increasingly used in behavioural, toxicological, or genetical research as descriptive or experimental model. Also, there is an expanding interest in using this species to investigate phytotherapy's benefits in neuropsychiatric disorders treatment.

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Microbiology, Molecular Biology, and Cancer Biology

***Curcuma longa*: Biological activities**

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Abstract

Plants contain many biologically active compounds. With these features, they show many biological activities. Determining the biological activities of plants is very important in terms of their use. In this study, the biological activities of *Curcuma longa* plant reported in the literature were compiled. According to the findings, it has been reported that it has antioxidant, antiproliferative, antimicrobial, anti-inflammatory, anticancer, cytotoxic, anticholinesterase, antidiabetic, antidepressant effects. In this context, it is thought that *Curcuma longa* plant may be a natural pharmacological agent according to literature data.

Keywords: *Antimicrobial, Antioxidant, Curcuma, Turmeric, Traditional medicine*

1. INTRODUCTION

Herbal treatment has been preferred by people since ancient times (Mohammed et al., 2022). In ancient times, it was common to use the whole of the plants. Certain parts of plants are used today. There are even different uses of plant parts (Sevindik et al., 2017; Mohammed et al., 2020a). Plants attract attention with their nutritional properties. It contains many nutrients such as minerals, vitamins, and essential nutrients (Korkmaz et al., 2021). In addition to their nutritional properties, it is known that plants are very important natural resources in terms of medicine (Mohammed et al., 2020b; Mohammed et al.,

2021a). Studies have reported that plants have many biological activities such as antioxidant, anticancer, antimicrobial, antiaging, antiallergic, and DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, it is very important to determine the biological activities of plants. In this study, the biological activities of *Curcuma longa* plant reported in the literature were compiled.

Turmeric (Zingiberaceae) is a perennial herbaceous plant with yellow flowers and large leaves. Its homeland is South Asia. It grows in tropical regions of Asia, especially Pakistan, India, China and Bangladesh. The main roots of the plant under the ground are in the form of eggs or pear. Its lateral roots are finger-shaped. The upper surface of the rhizomes is yellowish, and the inner surface is yellow. It has a bitter taste (Vaughn et al., 2016).

2. BIOLOGICAL ACTIVITY

In vitro and in vivo biological activity studies on *Curcuma longa* showed that extracts such as aqueous, essential oil, crude extract, ethanol, methanol, water, ethyl acetate, and n-hexane were used. The biological activity study of *Curcuma longa* is shown in table 1.

Table 1. Biological activity of *Curcuma longa*

Plant species	Extract ion	Biological activity	References
<i>Curcuma longa</i>	Aqueous, essential oil, crude extract, ethanol, methanol, water, ethylacetate, n-hexane	Antioxidant, antiproliferative, antimicrobial, anti-inflammatory, anticancer, cytotoxic, anticholinesterase, antidiabetic, antidepressant	(Ramsewak et al., 2000; Yu et al., 2002; Braga et al., 2003; An et al., 2006; Choi et al., 2009; Niamsa and Sittiwet, 2009; Naz et al., 2010; Chandrasekaran et al., 2013; Essien et al., 2015; Kalaycıoğlu et al., 2017; Na'was et al., 2018; Lateh et al., 2019; Yang et al., 2020)

Antioxidant activity

Antioxidants play an important role in reducing the effects of free radicals (Bal et al., 2019). While free radicals do not show harmful effects at low levels, they can be harmful at high levels (Selamoglu et al., 2020). In cases where antioxidants are insufficient, oxidative stress occurs (Saridogan et al., 2021). It

has been observed that oxidative stress supports the formation of many serious diseases in humans such as cancer, cardiological and neurodegenerative diseases, multiple sclerosis, Alzheimer's, Parkinson's (Krupodorova and Sevindik, 2020; Uysal et al., 2021). Supplemental antioxidants are beneficial in reducing the effects of oxidative stress (Eraslan et al., 2021). In this study, the antioxidant activities of *Curcuma longa* reported in the literature were compiled (Table 1). The antioxidant effect of the extract obtained from *C. longa* was examined using DPPH and FRAP tests. As a result of the study, it was reported that the DPPH LC50 value was 0.72-80.2 µM, and the FRAP LC50 value was 667-1884 µM Fe(II)/g (Kalaycıoğlu et al., 2017). The antioxidant effect of the extract obtained from *C. longa* was examined using DPPH, ABTS and FRAP tests. As a result of the study, it was reported that my best effect was 13.1-22.3 µmol Fe (II)/g DW in the FRAP test (Yang et al., 2020). The antioxidant status of Curcumin I, curcumin II (monodemethoxycurcumin) and curcumin III (bisdemethoxycurcumin) obtained from the extract of *C. longa* was investigated. As a result of the study, inhibition of liposome peroxidation by curcumin I-III at 100 µg/mL was reported to be 58%, 40% and 22%, respectively (Ramsawak et al., 2000). It has been reported that Soxhlet and low pressure extract of *C. longa* show the strongest antioxidant activities (Braga et al., 2003). The antioxidant properties of different extracts obtained from *C. longa* were examined using the DPPH test. As a result of the study, it was reported that the LC50 value of the ethylacetate extract was 9.86 µg/mL (Choi et al., 2009).

Antimicrobial activity

Antimicrobial drugs are weapons used to combat microorganisms (Baba et al., 2020). Many studies have shown that many natural products have

antimicrobial properties. Possible side effects of synthetic drugs have led people to natural products (Bal et al., 2017; Mohammed et al., 2023). In addition, unconscious use of antimicrobial drugs has led to the emergence of resistant microorganisms (Islek et al., 2021). This result has led researchers to the discovery of new antimicrobial drugs. In this study, the antimicrobial activities of *Curcuma longa* reported in the literature were compiled (Table 1). The effects of *C. longa* extracts such as crude, ethanol, essential oil and methanol on *Bacillus subtilis*, *Bacillus macerans*, *Bacillus licheniformis* and *Azotobacter* were investigated. As a result of the study, it was reported that the most sensitive bacterial strain to the extracts used was *Bacillus subtilis*, and the MIC values were between 3.0 and 20.6 mm in diameter (Naz et al., 2010). The antimicrobial properties of the essential oil extracted from the leaves of *C. longa* were investigated. It was reported that the best results against the strains used in the study showed antibacterial activity against *Bacillus cereus* and *Staphylococcus aureus*, and antifungal activity against *Aspergillus niger* (Essien et al., 2015). It has been reported that the aqueous extract of *C. longa* has a MIC value of 4-16 g L⁻¹ and an MBC value of 16-32 g L⁻¹ against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Staphylococcus epidermidis* (Niamsa and Sittiwet, 2009). It has been reported that crude, aqueous and methanolic extracts of *C. longa* are effective against *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* (Na'was et al., 2018).

Other activity

The antidepressant effect of the aqueous extract of *C. longa* was investigated by oral administration of 140 to 560 mg/kg to mice for 14 days. As a result of the study, it was reported that the effects of the extracts at a dose of 560 mg/kg were stronger than

those of the reference antidepressant fluoxetine (Yu et al., 2002). The anti-inflammatory status of the extract from *C. longa* was examined. As a result of the research, it was reported that by inhibiting the secretion of IL-12 and PGE2 in vitro, it revealed the anti-inflammatory properties of NR-INF-02 and its polysaccharide fraction (Chandrasekaran et al., 2013). The cytotoxic properties of the essential oil extracted from the leaves of *C. longa* were investigated (Essien et al., 2015). The anticholinesterase and antidiabetic effects of the extract obtained from *C. longa* were examined. As a result of the study, Bisdemethoxycurcumin (BDMC) was followed by Demethoxycurcumin (DMC) activity, while curcumin showed very little acetylcholinesterase inhibition activity. It has been reported that curcuminoids inhibit α -glucosidase in its antidiabetic activity (Kalaycıoğlu et al., 2017). The anticancer effect of the ethanol extract of *C. longa* was examined. As a result of the research, it was reported that A549, MCF-7, HeLa and HT-29 cells were 5.2, 4.5, 7.5 and 8.3 μ g/mL with 50% inhibitor, respectively (Lateh et al., 2019). The antiproliferative effects of the extract from *C. longa* on MDA-MB-231, HCT116, HT29, HepG2 and HeLa were evaluated. As a result of the study, it was reported that the LC50 value was between 2.31 and 12.7 μ g (Yang et al., 2020). Curcumin I, curcumin II (monodemethoxycurcumin) and curcumin III (bisdemethoxycurcumin) obtained from the extract of *C. longa* have been reported to have cytotoxic and anti-inflammatory effects against leukemia, colon, CNS, melanoma, renal and breast cancer cell lines (Ramsawak et al., 2000).

3. CONCLUSION

In this study, the biological activities of *Curcuma longa* reported in the literature were compiled. As a result of the literature research, it has been seen that *Curcuma longa* has antioxidant, antiproliferative, antimicrobial, anti-inflammatory, anticancer,

cytotoxic, anticholinesterase, antidiabetic, antidepressant effects. In this context, it is thought that *Curcuma longa* may be a natural source in pharmacological designs.

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Chestnut (*Castanea sativa*): Evaluation of Biological Activity

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Abstract

Many natural products are used in traditional medicine. Plants are the most important materials among these natural products. In this study, biological activity studies of *Castanea sativa* reported in the literature were compiled. As a result of literature research, it has been seen that *Castanea sativa* has antimicrobial, allelopathic, antiviral, antidiabetic, cytotoxic, antihyaluronidase, antiurease, antioxidant, anti-neuroinflammatory, anti-inflammatory, anticancer activities. In this context, it has been seen that *Castanea sativa* may be important natural materials in pharmacological designs as well as food properties.

Keywords: *Antimicrobial, Antioxidant, Anticancer, Chestnut, Traditional medicine*

1. INTRODUCTION

Plants have been the most commonly used materials among natural products that have been widely used since ancient times (Mohammed et al., 2022). People have used plants and the products made from them in the fight against diseases. Plants synthesize many biologically active compounds in their bodies (Sevindik et al., 2017; Mohammed et al., 2020a). Biological activities also vary depending on the plant and parts used (Korkmaz et al., 2021). Studies have shown that the use of plants is gradually increasing due to the possible side effects of synthetic drugs. In this context, plants have become important materials

due to their effects on different diseases (Mohammed et al., 2020b; Mohammed et al., 2021a). In studies conducted by different researchers, it has been reported that plants and herbal products have many biological activities such as anti-inflammatory, antiproliferative, antiaging, antiallergic, anticancer, antidiabetic, antioxidant, antimicrobial, DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, it is very important to determine the biological activities of plants. In this study, the biological activities of *Castanea sativa* were compiled.

Castanea sativa (Fagaceae), known as the Anatolian chestnut, is a chestnut species that is widely found in Europe and Asia, with a length of 20-35 m and a diameter of 2 m. Its fruits are edible. The tree leaves a deep and widespread root system. It is an important source of timber.

2. BIOLOGICAL ACTIVITY

Extracts such as aqueous, ethyl acetate, crude extract, honey, alkaline extraction, water, methanol, ethanol and hexane were used in in vitro and in vivo biological activity studies on *Castanea sativa*. The biological activity study of *Castanea sativa* is shown in table 1.

Table 1. Biological activity of *Castanea sativa*

Plant species	Extraction	Biological activity	References
<i>Castanea sativa</i>	Aqueous, ethyl acetate, crude extract, honey, alkaline extraction, water, methanol, ethanol, hexane	Antimicrobial, allelopathic, antiviral, antidiabetic, cytotoxic, antihyaluronidase, antiurease, antioxidant, anti-neuroinflammatory, anti-inflammatory, anticancer	(Basile et al., 2000; Mujić et al., 2011; Lupini et al., 2009; Renault et al., 2014; Avşar et al., 2016; Kolaylı et al., 2016; Sorice et al., 2016; Chiocchio et al., 2020; Ekşi et al., 2020; Cerulli et al., 2021)

Antioxidant activity

Antioxidant compounds play a role in the suppression of free radicals (Bal et al., 2019). Free radicals are oxidant compounds produced as a result of metabolic processes (Selamoglu et al., 2020). While these compounds do not show harmful effects at low levels, harmful effects can be seen at high levels (Saridogan et al., 2021). The imbalance between oxidant compounds and antioxidant compounds creates oxidative stress (Eraslan et al., 2021). As a result of oxidative stress, serious diseases such as multiple sclerosis, cancer, diabetes, cardiological disorders, Parkinson's and Alzheimer's can be seen (Krupodorova and Sevindik, 2020; Uysal et al., 2021). Supplementary antioxidants play

an important role in reducing the effect of oxidative stress. In this context, the biological activities of *Castanea sativa* reported in the literature were compiled (Table 1). Antioxidant status of honey extract obtained from *Castanea sativa* was investigated by using FRAP, DPPH and ABTS Tests. As a result of the study, it was reported that the FRAP value was 355-462 $\mu\text{molFeSO}_4 \cdot 7\text{H}_2\text{O}/100\text{ g}$, the DPPH value was 21.20-38.20 mg/mL, and the ABTS value was 14.241-34.761 mg/mL (Kolaylı et al., 2016). The antioxidant properties of the crude extract of *Castanea sativa* were examined by using the DPPH test. As a result of the study, it was reported that the DPPH LC50 value was 0.093-19.5 mg/mL (Avşar et al., 2016). The antioxidant status of alkali and water extraction from *Castanea sativa* on DPPH was investigated. As a result of the study, it was reported that the IC50 of water-extracted MGX was lower than 225 $\mu\text{g mL}^{-1}$, in contrast to alkali-extracted MGX, where no radical capture was observed (Renault et al., 2014). The antioxidant status of the methanol extract of *Castanea sativa* was examined by DPPH, TEAC and FRAP tests. As a result of the study, it was reported that it reduced intracellular ROS levels by $58.84\% \pm 2.86\%$ (Cerulli et al., 2021). Different extracts of *Castanea sativa* have been reported to be effective on the DPPH test, especially at 172 $\mu\text{g/mL}$ (Genovese et al., 2021).

Antimicrobial activity

Microorganisms are the most important agents of many serious diseases (Baba et al., 2020). In recent years, there has been a significant increase in the number of resistant microorganisms due to the unconscious use of antimicrobial drugs. In this context, researchers have turned to the discovery of new antimicrobial drugs (Bal et al., 2017; Islek et al., 2021). Possible side effects of synthetic drugs have increased people's use of natural antimicrobial drugs.

Natural products are widely used due to their antimicrobial potential (Mohammed et al., 2023). In this study, antimicrobial activity studies of *Castanea sativa* reported in the literature were compiled (Table 1). The antimicrobial status of the aqueous and ethyl acetate extracts of *Castanea sativa* was investigated. As a result of the study, it was reported that *Staphylococcus aureus*, *Proteus vulgaris*, *Klebsiella pneumoniae*, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella typhi* and *Enterobacter aerogens* have MIC values in the range of 64–256 µg/mL and MBC values in the range of 256–512 µg/mL (Basile et al., 2000). The antimicrobial properties of the crude extract of *Castanea sativa* were examined. As a result of the study, it was reported that the inhibition zone against *Candida krusei*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Micrococcus luteus*, *Bacillus cereus*, Vancomycin Resistant *Enterococcus*, Methicillin Resistant *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, *Candida albicans* and *Candida parapsilosis* strains was 14-20 mm, 9-13 mm, 15-22 mm, 9-14 mm, 9 mm, 18-23 mm, 9 mm, 10-15 mm, 10-18 mm and 12-18 mm, respectively (Avşar et al., 2016). It has been reported that the MIC value of different extracts of *Castanea sativa* on *Enterobacter aerogenes*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Staphylococcus saprophyticus*, *Enterococcus faecium*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and *Proteus mirabilis* is 13.43-107.5 µg/mL (Genovese et al., 2021). The antimicrobial properties of methanol, ethyl acetate, ethanol and hexane extracts of *Castanea sativa* against some gram-positive and gram-negative bacterial species and yeasts (*Candida albicans* and *Candida parapsilosis*) were investigated by agar well diffusion method. As a result of the study, it was reported that *Staphylococcus aureus* was found to be

the most sensitive strain with a 23 mm inhibition zone, and the methanol extract of *Castanea sativa* flowers showed high antifungal activity with inhibition zones ranging from 24 mm to 27.3 mm (Ekşi et al., 2020).

Other activity

The allelopathic status of the aqueous and ethyl acetate extract of *Castanea sativa* was investigated. As a result of the research, it was reported that quercetin, rutin and apigenin in the extract against seed germination of *Raphanus sativus* caused a decrease in seed germination percentage and root and epicotyl growth (Basile et al., 2000). It has been reported that *Castanea sativa* has an antiviral effect on avian reovirus and avian metapneumovirus (Lupini et al., 2009). It has been reported that *Castanea sativa* is antidiabetic, treated with chestnut extract of rat pancreatic β -cells with STZ (a diabetogenic agent) (Mujić et al., 2011). It has been reported that *Castanea sativa* has cytotoxic effects on HCT15 (colon carcinoma) and HepG2 (hepatocellular carcinoma) cancer cell lines (Sorice et al., 2016). It has been reported that the antihyaluronidase and antiurease LC50 values of the honey extract obtained from *Castanea sativa* are 76.10-129.30 mg/mL and 12.36 -34.20 mg/mL, respectively (Kolayli et al., 2016). Extract from the leaves and spiny ridges of *Castanea sativa* has been reported to show cytoprotective activity (at 0.1 and 0.5 mg/mL) after inducing inflammation with 5 ug/mL lipopolysaccharide (LPS) on BV-2 microglia cells (Chiocchio et al., 2020). It has been reported that the methanol extract of *Castanea sativa* has an anti-inflammatory effect (Cerulli et al., 2021). It has been reported that different extracts of *Castanea sativa* are effective on MCF-7 breast cancer cells, especially ethanol extract, in terms of anticancer (Genovese et al., 2021).

3. CONCLUSION

In this study, the biological activity studies of *Castanea sativa* reported in the literature were compiled. According to the findings, it was seen that *Castanea sativa* has antimicrobial, allelopathic, antiviral, antidiabetic, cytotoxic, antihyaluronidase, antiurease, antioxidant, anti-neuroinflammatory, anti-inflammatory, anticancer activities. In this context, it has been seen that *Castanea sativa* has very important biological activities and therefore may be important natural agents.

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Evaluation of *Cucumis sativus* in terms of Biological Activity

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Abstract

Plants are used for various purposes in different societies. Many studies have shown that plants are widely used especially in the treatment of diseases. In this study, the biological activity studies reported on *Cucumis sativus* in the literature were compiled. According to the findings, it has been reported that it shows antioxidant, antimicrobial, analgesic, anti-hyaluronidase, anti-elastase, anticancer, cytotoxic, anticholinesterase activities. In this context, it has been seen that *Cucumis sativus* can be used as a natural product in pharmacological designs.

Keywords: Antimicrobial, Antioxidant, Anticancer, Cucumis, Traditional medicine

1. INTRODUCTION

Plants Since ancient times, people have used plants for many purposes such as food, medicine, fuel, and shelter (Mohammed et al., 2022). The nutritional properties of plants are at the forefront of many human diets. They are very important natural sources in terms of vitamins, minerals and essential nutrients (Sevindik et al., 2017; Mohammed et al., 2020a). In addition to these features, it has different usage areas. One of them is used in the treatment of diseases within the scope of complementary

medicine (Mohammed et al., 2020b; Mohammed et al., 2021a). Many studies have shown that plants have many effects such as anticancer, antimicrobial, antioxidant, antiaging, antiallergic, anti-inflammatory, and DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, the determination of biological activities of plants is very important in terms of their use. In this study, the biological activities of *Cucumis sativus* reported in the literature were compiled.

Cucumis sativus (Cucurbitaceae) is a plant species that bears cylindrical to spherical fruits used as a vegetable in cuisine. It is cultivated all over the world and grown commercially.

2. BIOLOGICAL ACTIVITY

Extracts such as methanol, dichloromethane, essential oil, ethanol, ethylacetate, n-hexane, aqueous, benzene, chloroform, water, petroleum ether and acetone were used in in vitro and in vivo biological activity studies on *Cucumis sativus*. The biological activity study of *Cucumis sativus* is shown in Table 1.

Table 1. Biological activity of *Cucumis sativus*

Plant species	Extraction	Biological activity	References
<i>Cucumis sativus</i>	Methanol, dichloromethane, essential oil, ethanol, ethylacetate, n-hexane, aqueous, benzene, chloroform, water, petroleum ether, acetone	Antioxidant, antimicrobial, analgesic, anti-hyaluronidase, anti-elastase, anticancer, cytotoxic, anticholinesterase	(Kumar et al., 2010; Sotiroidis et al., 2010; Nema et al., 2011; Agarwal et al., 2012; Mallik and Akhter, 2012; Gopalakrishnan and Kalaiarasi, 2014; Oboh et al., 2017; Begum et al., 2019; Tuma and Mohammed, 2019; Sleimi et al., 2021)

Antioxidant activity

Free radicals are oxidant compounds that cause cellular damage at high levels (Bal et al., 2019). As the levels of oxidant compounds increase, serious damage may occur (Selamoglu et al., 2020). Antioxidant defense system comes into play in reducing the effect of oxidant compounds (Saridogan et al., 2021). In cases where the antioxidant defense system is insufficient, oxidative

stress occurs (Eraslan et al., 2021). In case of oxidative stress, serious diseases such as cardiological disorders, cancer, neurological diseases, Alzheimer's, Parkinson's and multiple sclerosis can be seen in humans (Krupodorova and Sevindik, 2020; Uysal et al., 2021). In this context, it is thought that plants can play a role as supplemental antioxidant in reducing the effect of oxidative stress. In this study, antioxidant activity studies of *Cucumis sativus* reported in the literature were compiled. The antioxidant status of the methanol extract of *Cucumis sativus* was investigated. As a result of the study, it was reported that *Cucumis sativus* had an effect at a concentration of 1.75 mg BHTe/g (Agarwal et al., 2012). The antioxidant status of the methanol and dichloromethane extract of *Cucumis sativus* was investigated using the DPPH test. As a result of the research, it was reported that the EC₅₀ value was 1.31-5.82 mg/mL (Sotiroidis et al., 2010). It has been reported that the ethanol extract of *Cucumis sativus* showed a maximum DPPH scavenging activity of 46.05 at 500 µg/mL (Begum et al., 2019). It has been reported that *Cucumis sativus* exerts an antioxidant defense system with catalase, guaiacol peroxidase and ascorbate peroxidase activities, which increase due to the increase of Barium element (Sleimi et al., 2021). Comparing the free radical scavenging property of the aqueous fruit extract of *Cucumis sativus* with ascorbic acid BHA (Butylated hydroxyl anisole) at 250 and 500 µg/mL in vitro, it was reported that the highest effect was found at 500 µg/ml (Kumar et al., 2010). The LC₅₀ values of *Cucumis sativus* in DPPH and superoxide radical scavenging tests were reported to be 4.73 and 35.29 µg/mL, respectively (Nema et al., 2011).

Antimicrobial activity

Possible side effects of synthetic drugs have led people to natural products in the fight against

microorganisms (Baba et al., 2020). Unconscious use of antimicrobial drugs is among the general causes of diseases caused by microorganisms that have increased in recent years (Bal et al., 2017; Mohammed et al., 2023). In recent years, researchers have turned to the discovery of natural antimicrobial drugs (Islek et al., 2021; Korkmaz et al., 2021). In this study, antimicrobial activity studies of *Cucumis sativus* reported in the literature were compiled. The antimicrobial status of methanol and dichloromethane extract of *Cucumis sativus* was investigated. As a result of the research, it was reported that the MIC value was 0.50-3.78 mg/mL for *Staphylococcus aureus* and 0.067-3.70 mg/mL for *Staphylococcus epidermidis*, 0.15-3.25 mg/mL for *Pseudomonas aeruginosa*, 0.09-2.80 mg/mL for *Escherichia coli*, 0.24-3.15 mg/mL for *Enterobacter cloacae*, 0.40-3.00 mg/mL for *Klebsiella pneumoniae*, 2.90-3.75 mg/mL for *Candida albicans*, 1.87-2.89 mg/mL for *Candida tropicalis* and 1.84-2.84 for *Candida glabrata* (Sotiroudis et al., 2010). The antimicrobial status of ethanol, ethyl acetate, dichloromethane and n-hexane extract of *Cucumis sativus* was investigated. As a result of the study, it was reported that the ethanolic extract had the highest value of 21.5 mm against *Staphylococcus aureus*, and a minimum value of 17.0 mm against *Shigella flexneri*. In addition, it has been reported that the n-hexane fraction has the highest value of 26 mm against *Salmonella typhi*, 16.25 mm against DCM *E. coli*, 16.0 mm against ethyl acetate *Salmonella typhi*, and 8-20 mm of extracts against fungal strains (Begum et al., 2019). The antimicrobial status of petroleum ether, benzene, chloroform, ethanol and water extracts of *Cucumis sativus* was investigated. As a result of the research, it was reported that petroleum ether, benzene and chloroform extracts did not have any inhibitory effect against the tested organisms. It has also been reported that the minimum inhibitory concentration

(MIC) value of the ethanolic extract of *C. sativus* against *Bacillus cereus*, *Bacillus subtilis* and *Streptococcus* is 200 µg/mL (Gopalakrishnan and Kalaiarasi, 2014).

Other activity

Comparing the juicy fruit extract of *Cucumis sativus* with Diclofenac sodium at 250 and 500 mg/kg in vitro, it was reported that the highest effect was analgesic at 500 mg/kg (Kumar et al., 2010). The LC50 values of *Cucumis sativus* for anti-hyaluronidase and anti-elastase were reported to be 20.98 and 6.14 µg/mL, respectively (Nema et al., 2011). The effects of methanolic and acetone extracts of *Cucumis sativus* on anticancer were investigated. As a result of the study, it was reported that the LC50 value was 715.6 for MCF and 28.2 for HeLa (Tuma and Mohammed, 2019). In brine shrimp lethality bioassay of *Cucumis sativus* ethanol extract, LC50 (µg/mL) and LC90 (µg/mL) values were reported to be 75 µg/mL and 250 µg/mL, respectively (Mallik and Akhter, 2012). It has been reported that the aqueous extract of *Cucumis sativus* has anticholinesterase properties (Oboh et al., 2017).

3. CONCLUSION

In this study, the biological activity studies of *Cucumis sativus* reported in the literature were compiled. As a result of literature research, it was determined that *Cucumis sativus* showed antioxidant, antimicrobial, analgesic, anti-hyaluronidase, anti-elastase, anticancer, cytotoxic, anticholinesterase activities. In this context, it has been seen that *Cucumis sativus* is an important natural material.

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Morphology, Ecology and Color Change of *Leocarpus Fragilis* (Dicks.) Rostaf.

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Abstract: The biology of the myxomycetes narrative follows the stages in the life cycle beginning with the spore. The spore germinates giving rise to either a myxamoeba or a swarm cell that may form a microcyst under adverse conditions, or given optimal conditions, may fuse with genetically compatible types, eventually developing into a plasmodium. The plasmodium is the stage that develops into the fruiting bodies where spores are formed. They feed on bacteria, fungi, and any other organic matter that is encountered which they can engulf. The single most distinctive stage of a myxomycete is the assimilative structure, the plasmodium. When the plasmodium exhausts the available nutrients in the presence of visible light, it differentiates into specialized fruiting bodies, called sporangia, where spores are formed. These fruiting bodies eventually rupture, releasing the spores into the environment.

Introduction: The myxomycetes (plasmodial slime molds or myxogastriids) are a group of fungus-like organisms (Alexopoulos et al., 1996; Baba et al., 2019; Baba et al., 2020a). The myxomycetes are approximately 1088 species (Lado, 2005-2023). The life cycle of these organisms is characterized by vegetative phases and generative phases, that superficially resemble those of some macrofungi (Baba and Sevindik, 2020; Baba et al., 2021a). Slime molds were historically classified as fungi, but today they belong to the class of true slime molds, Myxomycetes (Baba and Sevindik, 2018; Baba et al., 2020b; Baba et al., 2021b). As soon as the clouds parted after last week's heavy rain, this slime mold seemed to be everywhere (Baba and Sevindik, 2022a; Baba and Sevindik, 2022b).

Leocarpus Genus is in Physaraceae Family and Physarales Order has got one species;

Key to the species of *Leocarpus* in Turkey;

1. Capillitium of two morphologically distinct systems 2
1. Capillitium essentially homogenous 4
2. Fruiting body plasmodiocarpous, peridium opaque, encrusted with red spots and white lime granules on the surface Willkommlangea

2. Fruiting body sporangiate, if plasmodiocarpous, then usually accompanied by sporangia 3
3. Sporangia ovate; outer peridium yellowish brown, cartilaginous, smooth, shining; capillitium a limy network, connected with and interpenetrating a limeless net of flattened tubules
..... *Leocarpus*

Leocarpus Link: Fruiting bodies sporangium, subglobose or obovoid, sessile or short-stalked, crowded in clusters. Sporotheca ellipsoid to subglobose, shining chestnut-brown. Hypothallus pale ochraceous. Stalk flat, weak, pale ochraceous to pale orange. Columella none, but a pseudocolumella often present. Peridium double, the outer wall smooth, polished, limy within, thick and strong, destitute of lime, polished, shining within and without, the inner wall delicate, hyaline, dehiscence into lobes, sometimes petaloid, irregularly, enclosing the capillitium and spores. Capillitium reticulate, duplex, comprising a system of strongly calcareous tubules bearing lime-knots intermingled with a network of hyaline. Limeless threads consisting of a network of pale, slender, branching, mixed with broad, yellow tubules with expansions, yellowish or brownish lime-knots, filled with calcareous granules, occasionally massed in the centre to form a pseudocolumella. Spore-mass dark brown to nearly black. Spores globose, violaceous brown. Plasmodium yellow (Baba and Sevindik, 2019).

Material and Method:

Myxomycete samples were collected from natural area. On different substrates, cortex, woods, barks, leaf, debris, organic plants and samples were transported to the laboratory in small carton boxes. Samples were kept at room temperature (24°C) (Baba et al., 2021b). Myxomycete samples were allowed to dry and the myxomycetes were dried for one week. Myxomycete plasmodia or fruiting bodies were noted and recorded. Each time the cultures were checked. All fruiting bodies were removed. The samples were photographed and identified. The samples were identified under stereomicroscope and light microscopy. Samples were arranged as fungarium material and kept in the Biology Department's laboratory of Hatay Mustafa Kemal University Hatay-Turkey.

Key to the species of *Leocarpus fragilis* (Dicks.) Rostaf. in Turkey;

Sporophores sporangiate and stalked. Peridium shining chestnut-brown. Duplex capillitium consisting of brown nodes and slender colourless tubules which are never spiny.
..... *Leocarpus fragilis*

Domain: Eukaryota

Regnum: Protista

Divisio: Amoebozoa

Subdivisio: Mycetozoa

Classis: Myxomycetes

Order: Physarales

Family: Physaraceae

Genus: *Leocarpus*

Leocarpus fragilis (Dicks.) Rostaf., Sluzowce monogr. 132 (1874).

Description: Sporocarps large, obovoid-oblong, long, stalked or occasionally sessile, short-stalked, crowded in clusters. Sporothecae ellipsoid to subglobose, hemispheric, pulvinate on broad base, 0.6-1.6 mm diam. up to 4 mm long, 1mm in thickness, white or pinkish-cream, shining chestnut-brown, paler when freshly developed yellowish brown, chestnut or purplish brown, shining. Hypothallus pale ochraceous, confluent and merging into the stalks. Stalk flat, weak, pale ochraceous to pale orange, variable in length, but usually much shorter than the sporangium, short, or as long as the sporangium, weak, yellowish, translucent, rising from a membranous hypothallus. Peridium single (membranous layer firmly attached to the crustaceous layer), opaque, not iridescent, covered with lime scales, destitute of lime, these 30-50 µm in diameter and conglomerated forming a dense crust. Dehiscence into lobes, sometimes petaloid, dehiscing in revolute lobes; outer layer of the sporangial wall cartilaginous, brittle, orange-brown, usually with dense deposits of lime-granules on the inner side; inner layer a firm, hyaline membrane, giving attachment to the capillitium. Columella pulvinate, large, filled with lime scales, creme to pinkish. Capillitium abundant, firmly attached to columella and peridium, composed of long, straight, rarely branched and smooth threads, 0.5-1 µm in diameter, reticulate, duplex, consisting of a network of pale, slender, branching, limeless threads mixed with broad, yellow tubules with expansions, filled with calcareous granules, with hyaline blunt ends, occasionally massed in the centre to form a columella, a network of rigid, hyaline threads with flattened expansions at the axils, connected with angular, branching, and anastomosing, yellowish or brownish lime nodes.. Spore-mass dark brown to nearly black. Spores brown, 12-18 µm diameter, very variable in size but usually 10-14 µm diam., paler on one side, verruculose, spinulose up to 1 µm long spinulae are widely scattered and branched at the ends: more or less spinulose, sometimes slightly clustered, dark purplish brown or paler, with

a pale area of dehiscence (Baba and Sevindik, 2019). Plasmodium lemon, then orange-yellow (Figure 1).



Figure 1: Sporocarps, calcareous granules and spores

Distribution in Turkey: Ergül and Dülger, 1998, 2000d; Ocak and Hasenekoğlu, 2005; Yağız and Afyon, 2005; Ergül and Akgül, 2011; Ocak, 2015; Baba et al., 2019.

Result and Discussion:

Leocarpus fragilis is growing on dead leaves, twigs, and ground wood (Figure 2).



Figure 2. *Leocarpus fragilis* on decaying plants

Leocarpus fragilis is found worldwide, and typically inhabits shady, cool, moist areas, growing on decaying leaves and logs. The main vegetative phase of this organism consists of the

plasmodium (the active, mobile, streaming phase), a membrane-bound, giant single cell, containing multiple nuclei (Figure 3). It is during this stage that the organism searches for food, creeping across decaying matter, spreading at an impressive rate. The plasmodium surrounds its food and secretes enzymes to digest it. The plasmodium generates networks of protoplasmic ‘veins’ that act as tunnels for nutrient transport.



Figure 3. Plasmodial phase of *Leocarpus fragilis*

In this phase *Leocarpus fragilis* is very easy to see and from a distance almost looks like egg yolk spilled on decaying logs and leaves. When the plasmodium exhausts the available nutrients in the presence of visible light, it differentiates into specialized fruiting bodies, called sporangia, where spores are formed. These fruiting bodies eventually rupture, releasing the spores into the environment (Figure 4).



Figure 4. Fruiting bodies of *Leocarpus fragilis*

The early fruiting bodies of *Leocarpus fragilis* resemble clusters of insect eggs. In this phase *Leocarpus fragilis* may be mistaken for clusters of insect eggs, and this species of slime mold is commonly referred to as the 'Insect-Egg Slime Mold' (Figure 5). It's important to realize that slime molds grow and regress quickly, and are very sensitive to environmental conditions. The best time to observe the slime-like plasmodial phase is immediately following a period of rain. The shift from the plasmodial phase to spore forming phase is rapid, literally occurring overnight.



Figure 5. Insect-Egg Slime Mold

Approximately less than 48 hours later slime mold has completely transformed from plasmodium to spore producing fruiting bodies (Figure 6). When the fruiting bodies first appear, they are bright orange and impossible to miss, but this stage is short lived. Within 24 hours they age and take on the same dull brown color of the decaying leaves and logs, and can be difficult to spot.



Figure 6. Newly emerging fruiting bodies of *Leocarpus fragilis*



Figure 7. Within 24 hours the color of the fruiting bodies has faded from bright orange, to brown.



Figure 8. *Leocarpus fragilis* on the debris of plants with vegetative and generative phases.

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SLIME MOLDS (MYXOMYCETES)

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Abstract: Slime molds have cellulose in the cell walls of their spores and heterotrophs and do not have chitin in their cell walls. These organisms move about as amoebae engulfing bacteria. When conditions become unfavorable, whether due to lack of food or lack of moisture, they form spores. They can be found in damp substrates with ample bacteria and are most frequently found on decaying logs and forest duff. Slime molds are; Cellular slime molds (Dictyostelids) Protostelids and Plasmodial slime molds (classified as Myxogastria or Myxomycetes). Dictyostelids are model organisms for studying. They are unicellular, but collaborate to form multicellular structures where only some of the individuals involved go on to make spores. Protostelids are less well-understood and form a single sporangium at the tip of a cellular stalk. Plasmodial slime molds (Myxomycetes) form a large, multinucleate amoeba during their feeding stage called a plasmodium.

Introduction: The Mycetozoa include the Cellular slime molds (Dictyostelid), Acellular slime molds (Myxogastrid) and Protostelid slime molds (Olive, 1970; Baldauf and Doolittle, 1997). These organisms move about as amoebae consuming bacteria until conditions become unfavorable at which point they form spores (Baba et al., 2019; Baba et al., 2020a). They can be found in damp substrates with ample bacteria and are most frequently found on decaying logs and forest duff (Baldauf and Doolittle, 1997; Baba and Sevindik, 2020; Baba et al., 2021a). The slime molds warrant their own classification within Protista because of their unusual morphology. At some stages in their life cycle, they show clearly protozoan characteristics, but at other stages they become almost fungus-like (Baba and Sevindik, 2018; Baba et al., 2020b; Baba et al., 2021b). Slime molds fall into two distinct groups that are not closely related: the cellular slime molds and the true, or acellular, slime molds. A distinguishing morphological difference between the two groups is the vegetative state of cellular slime molds in a haploid amebiod cell, whereas the vegetative state of acellular slime molds is a multinucleate diploid ameboid mass called a plasmodium. Both groups grow in moist soil or decaying plant matter and are white, yellow, or red in color (Baba and Sevindik, 2022a; Baba and Sevindik, 2022b).

Material and Methods:

Myxomycetes consists of 15 family, 70 genus and 1088 species worldwide. 70 genera are; *Alwisia*, *Amaurochaete*, *Arcyodes*, *Arcyria*, *Arcyriatella*, *Badhamia*, *Badhamiopsis*, *Barbeyella*, *Brefeldia*, *Calomyxa*, *Calonema*, *Clastoderma*, *Collaria*, *Colloderma*, *Comatricha*, *Cornuvia*, *Craterium*, *Cribraria*, *Diachea*, *Diacheopsis*, *Dianema*, *Dictydiaethalium*, *Diderma*, *Didymium*, *Echinosteliopsis*, *Echinostelium*, *Elaeomyxa*, *Enerthenema*, *Fuligo*, *Gulielmina*, *Hemitrichia*, *Kelleromyxa*, *Lamproderma*, *Leocarpus*, *Lepidoderma*, *Leptoderma*, *Licaethalium*, *Licea*, *Lindbladia*, *Listerella*, *Lycogala*, *Macbrideola*, *Meriderma*, *Metatrichia*, *Minakatella*, *Mucilago*, *Oligonema*, *Ophiotheca*, *Paradiachea*, *Paradiacheopsis*, *Perichaena*, *Physarella*, *Physarina*, *Physarum*, *Polyschismium*, *Protophysarum*, *Prototrichia*, *Reticularia*, *Semimorula*, *Siphoptychium*, *Stemonaria*, *Stemonitis*, *Stemonitopsis*, *Symphytocarpus*, *Thecotubifera*, *Trabrooksia*, *Trichia*, *Trichioides*, *Tubifera*, *Willkommlangea*.

Dictyostelids are 13 genus; *Acytostelium*, *Cavenderia*, *Coenonia*, *Coremiostelium*, *Dictyostelium*, *Hagiwararea*, *Heterostelium*, *Polysphondylium*, *Raperostelium*, *Rostrostelium*, *Speleostelium*, *Synstelium*, *Tieghemostelium*.

Protostelids are 15 genus: *Cavostelium*, *Ceratiomyxa*, *Ceratiomyxella*, *Clastostelium*, *Endostelium*, *Microglomus*, *Nematostelium*, *Planoprotostelium*, *Protosporangium*, *Protosteliopsis*, *Protostelium*, *Schizoplasmodiopsis*, *Schizoplasmodium*, *Soliformovum*, *Tychosporium* (Lado, 2005-2023).

Result and Discussion:

Dictyostelids: The cellular slime molds exist as individual amoeboid cells that periodically aggregate. The aggregate then forms a fruiting body that produces haploid spores. One cellular slime mold, *Dictyostelium discoideum*, has been an important study organism for understanding cell differentiation, because it has both single-celled and multicelled life stages, with the cells showing some degree of differentiation in the multicelled form.

Cellular slime moulds spend the majority of their life cycles as individual, single celled amoebas. Once they have exhausted the resources of their immediate environment the individual cells join together to form a slug which travels to fresh pastures before fruiting and dispersing spores.

The organisms in this group have a complex life cycle during the course of which they go through unicellular, multicellular, spore producing, and amoeboid stages. Thousands of

individual amoebae aggregate into a slimy mass - each cell retaining its identity (unlike plasmodial slime molds). The aggregating cells are attracted to each other by the cyclic AMP (cAMP) that they release when conditions become stressful, such as a depletion in food. Individual amoebae respond to the chemical signal by moving to areas of higher cAMP concentration (chemotaxis), eventually aggregating into a single slug. The slug can respond to moisture and light gradients, navigating to a good spot for spore production. Some cells in the slug contribute to a 2–3-millimeter stalk, drying up and dying in the process. Cells atop the stalk form an asexual fruiting body that contains haploid spores. The spores are disseminated and can germinate if they land in a moist environment (Adamatzky et al., 2013).

Protostelids

Protostelids are a group that has received less attention than either the Dictyostelids or plasmodial slime molds, as each of the latter groups contains a model organism used to study a specific system. Protostelids make simple fruiting bodies, similar to the Dictyostelids, with a stalk and spores at the apex. The slime mold *Ceratiomyxa* looks more like a plasmodial slime mold, but closer inspection reveals that spores are formed on minute, stalked fruiting bodies covering the external surface of the tentacle-like structures (Figure 1). *Ceratiomyxa* may not actually be a protostelid, but the small, stalked fruiting bodies formed on the external surface are similar to what would be found in a true protostelid. Acellular slime moulds have a “plasmodium” stage in their life cycles. Plasmodium is made up of millions of nuclei which share a single, gigantic cell without any membranes to separate them (Adamatzky et al., 2013).



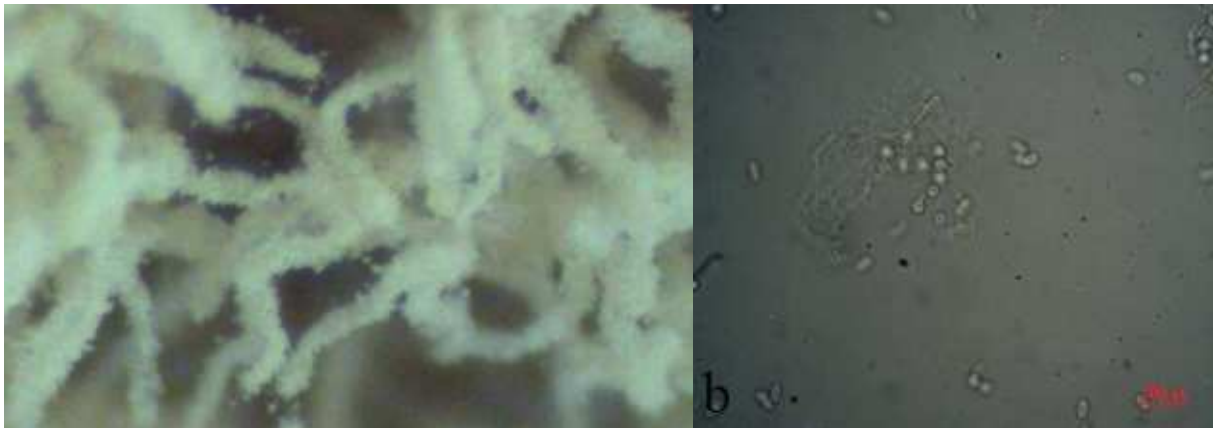


Figure 1. *Ceratiomyxa fructiculosa*; sporophores and spores (Baba, 2012c).

Plasmodial Slime Molds (Myxomycetes-Myxogastria)

Myxomycetes (plasmodial slime molds) or Myxogastrea are a group of amoeboid eukaryotes with unicellular and coenocytic phagotrophic phases, live predatory on other micro-organisms in terrestrial habitat. In their feeding stage, myxomycetes form one large amoeba called a plasmodium with many nuclei and no cell wall. This plasmodium moves over damp, decaying material looking for bacteria (and sometimes fungi) to engulf and digest. When it dries out or runs out of food, it begins to make fruiting structures called sporangia (sporangium, singular). Inside these sporangia, the diploid nuclei will undergo meiosis and haploid nuclei will be walled off to make spores for aerial dispersal (Ing, 1999). Dispersal by spores, heterotrophism, and glycogen as a storage carbohydrate originally classified this group within Kingdom Fungi, but this is the end of the similarities. The spores have cell walls made of cellulose, like plants. When these spores land, they will germinate into haploid cells with two flagella (called swarm cells) or amoebae that will fuse together to form a diploid plasmodium (Figure 2).

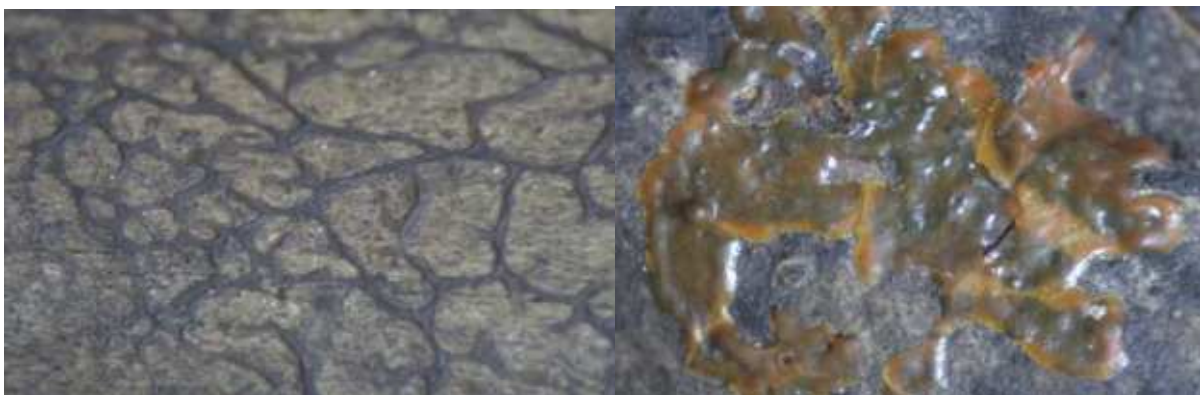


Figure 2. Plasmodium types of Myxomycetes (Baba and Tamer, 2007)

Sporocarp Diversity

The diversity of sporulating structures, or sporocarps, has led many to fall in love with this group of organisms. In Plasmodiocarp types of Myxomycetes sporophores (*Hemitrichia serpula*) the plasmodium forms into a network of veins that then become fruiting bodies (Figure 3).



Figure 3. Plasmodiocarp type sporophores of Myxomycetes (Baba, 2012a; Baba et al., 2019)

In some slime molds, Aethalium type sporophores of Myxomycetes (like *Fuligo* and *Lycogala*), the entire plasmodium forms a cushion that dries and produces spores (Figure 4).



Figure 4. Aethalium type sporophores of Myxomycetes (Baba et al., 2021a;2021b)

In other slime molds, Pseudoaethalium type sporophores of Myxomycetes individual sporangia are so closely clustered together, they appear to be a single fruiting structure (Figure 5).



Figure 5. Pseudoaethalium type sporophores of Myxomycetes (Baba and Sevindik, 2020a)

The last type of sporocarp is more familiar, Sporangium type sporophores of Myxomycetes forming many distinct stalked sporangia (Figure 6).



Figure 6. Sporangium type sporophores of Myxomycetes (Baba, 2012a;2012b;2012c)

Plasmodiocarp types forms an uncommon fruiting body. The feeding stage accumulates its protoplasm into the veins of the plasmodium, forming strange linear, intertwining shapes. Fruiting bodies of the plasmodial slime mold *Lycogala epidendrum* form into cushion-like structures called aethalia. The plasmodium has formed into pink ball-like structures on the surface of a rotten log. One of these structures has been popped and is oozing a pink slime, full of immature spores. Another option for a fruiting structure is the pseudoaethalium, where there are distinct sporangia but they still form together like a cushion. This is the type of fruiting structure formed by *Tubifera ferruginosa*, the red raspberry slime mold. Fruiting bodies of *Diachea leucopodia* have a distinct stalk and sporangium. The stalk in this species is white, while the elongate sporangium displays an oil-sheen rainbow of colors.

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A study on the Biological Activities of *Aspalathus linearis*

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Abstract

Plants are the most important natural products used in complementary medicine. Many studies have shown that plants have different biological activities. In this study, the biological activities of *Aspalathus linearis* reported in the literature were compiled. In this context, it has been observed that *A. linearis* has antioxidant, antimutagenic, antiviral, antimicrobial, hepatoprotective, anti-inflammatory, cytotoxic effects. In this context, it is thought that the plant can be used in pharmacological designs in addition to its nutritional properties.

Keywords: Antimicrobial, Antioxidant, *Aspalathus*, Biological activities, Traditional medicine

1. INTRODUCTION

Many different natural products are used in traditional medicine (Mohammed et al., 2022). Especially mushrooms, plants and animals are widely used in traditional medicine for the treatment or prevention of diseases (Sevindik et al., 2017; Mohammed et al., 2020a). Plants are the most widely used natural product among these natural products (Korkmaz et al., 2021). The medicinal use of plants, which are rich in vitamins, minerals and essential nutrients, is also common (Mohammed et al., 2020b; Mohammed et al., 2021a). Many studies have reported that plants have many biological activities such as antioxidant, anticancer, antiaging, anti-inflammatory, antiproliferative, DNA protective, antimicrobial (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this study, the biological activities of *Aspalathus linearis* reported in the literature were compiled. The leaves of *Aspalathus linearis*, known as Rooibos, are used as red tea, red bush tea in making herbal tea. It is widely used in many parts of the world.

2. BIOLOGICAL ACTIVITY

In vitro and in vivo biological activity studies on *Aspalathus linearis* showed that extracts such as ethyl acetate, crude, aqueous, essential oil, butanol, ethanol and water were used. The biological activity study of *Aspalathus linearis* is shown in table 1.

Table 1. Biological activity of *Aspalathus linearis*

Plant species	Extraction	Biological activity	References
<i>Aspalathus linearis</i>	Ethyl acetate, crude, aqueous, essential oil, butanol, ethanol, water	Antioxidant, antimutagenic, antiviral, antimicrobial, hepatoprotective, anti-inflammatory, cytotoxic	(Schepers, 2001; Joubert et al., 2005; Snijman et al., 2007; Van Der Merwe et al., 2010; Bhebhe et al., 2015; Lee and Bae, 2015; Rahmasari et al., 2017; Reid et al., 2020; Akinfenwa et al., 2021)

Antioxidant activity

Reactive oxygen species are oxidant compounds produced as a result of metabolic activities (Bal et al., 2019). Low levels of these compounds do not cause harmful effects, while high levels can cause serious damage (Selamoglu et al., 2020). The antioxidant defense system plays an active role in suppressing these compounds (Saridogan et al., 2021). In cases where the antioxidant defense system is insufficient, oxidative stress occurs (Eraslan et al., 2021). As a result of oxidative stress, diseases such as multiple sclerosis, cancer, cardiological disorders, Alzheimer's disease and Parkinson's can be seen (Krupodorova and Sevindik, 2020; Uysal et al., 2021). In this context, plants are very important natural sources as supplemental antioxidants. In this study, antioxidant activity studies of *Aspalathus linearis* reported in the literature were compiled (Table 1). The antioxidant status of ethyl acetate, crude and aqueous extract of *Aspalathus linearis* was investigated. As a result of the study, it was reported that it showed anti- and/or pro-oxidant activities using a deoxyribose degradation assay based on a Fenton reaction model system containing a linoleic acid-Tween-buffer emulsion for lipid peroxidation (Joubert et al., 2005). The antioxidant status of the butanol extract of *Aspalathus*

linearis was investigated by DPPH and phospholipid peroxidation tests. As a result of the study, it was reported that the antioxidant percentage was 67.27% and the value was 0.053 g/ml as LC50 (Bhebhe et al., 2015). Aspalathin from *Aspalathus linearis* and a structural analogue lacking the A-ring catechol group, nothofagin, has been reported to have an antioxidant aspect (Van Der Merwe et al., 2010).

Antimicrobial activity

In recent years, there has been a significant increase in the number of microbial diseases (Baba et al., 2020). The increase in the number of resistant microorganisms due to the unconscious use of antibiotics has rendered the antimicrobial drugs used insufficient (Bal et al, 2017; Mohammed et al., 2023). Possible side effects of synthetic antimicrobial drugs have pushed people to the discovery of natural antimicrobial drugs (Islek et al., 2021). In this study, the effects of *Aspalathus linearis* against microorganisms reported in the literature were compiled. The antimicrobial status of the ethanol extract of *Aspalathus linearis* was investigated. As a result of the study, it was reported to be effective against *Mycobacterium tuberculosis* (Reid et al., 2020). Antimicrobial studies were conducted to determine the inhibitory effect of ethyl acetate and water extracts of *Aspalathus linearis* on the growth of *Escherichia coli*. As a result of the study, decrease in bacterial cell density (Nmax) from 0.59 00 to 0.25 00, maximum specific growth rate (~max) from 1.12 h⁻¹ to 0.20 h⁻¹, doubling time (~) from 0.59 hours to 1.80 hours and changes in latency (t_{lag}) from 4.81 hours to 1.80 hours (Schepers, 2001)

Other activity

The mutagenicity of *Salmonella typhimurium* was investigated by using 2-acetamido-fluorene (2-AAF) and aflatoxin B1 (AFB1) and TA98 and TA100 test strains of flavonoids obtained from the essential oil of *Aspalathus linearis*. As a result of the study, in addition to its mutagenic and promutagenic properties, it was reported that quercetin and isoquercitrin exhibit concentration-dependent commutagenic and/or antimutagenic effects against 2-AAF- and AFB1-induced mutagenesis (Snijman et al., 2007). Crude extracts of *Aspalathus linearis* were investigated for their activity against influenza A. As a result of the research, it was reported that an alkaline extract of *Aspalathus linearis* showed the strongest inhibition against influenza A virus and could also inhibit it (Rahmasari et al., 2017). It has been reported that the hepatoprotective effect of the ethanol extract of *Aspalathus linearis* is 40% (Reid et al., 2020). The anti-inflammatory status of aspalathin (Asp) and nothofagin (Not) in *Aspalathus*

linearis was investigated by measuring permeability, monocyte adhesion and migration, and activation of pro-inflammatory proteins in LPS-activated human umbilical vein endothelial cells (HUVECs) and mice. As a result of studies, it has been reported that each compound inhibits LPS-induced barrier disruption, expression of cell adhesion molecules (CAMs), and adhesion/transendothelial migration of neutrophils to human endothelial cells (Lee and Bae, 2015). The cytotoxic status of gold and silver nanoparticles (AuNPs/AgNPs) of *Aspalathus linearis* was investigated. As a result of the research, it was reported that GR-AgNPs were the most cytotoxic against SH-SY5Y and HepG2 with IC₅₀ of 108.8 and 183.4 µg/mL, respectively (Akinfenwa et al., 2021).

3. CONCLUSION

In this study, the biological activities of *Aspalathus linearis* reported in the literature were compiled. According to the researches, it has been seen that *Aspalathus linearis* has many biological activities such as antioxidant, anticancer, antiaging, anti-inflammatory, antiproliferative, DNA protective, antimicrobial. In this context, it is thought that *Aspalathus linearis* can be used as a natural product in pharmacological studies.

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Feeding ecology of fish populations from River Oituz

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Key-words: stomach contents, macroinvertebrates, fish species

Abstract The trophic spectrum study highlights not only the diversity of food but also the association between the consumers and preys, in this case, the relation between fish and macroinvertebrates. We analyzed 198 stomachs belonging to 5 different species: *Squalius cephalus*, *Cottus gobio*, *Phoxinus phoxinus*, *Barbus meridionalis*, and *Orthrias barbatulus*. In the stomach contents of 75 specimens of *Squalius cephalus* 10 groups of macroinvertebrates were identified with 196 macroinvertebrate specimens. Almost all the *Squalius cephalus* had fish scales in their stomachs, even radii or vertebrae. Of the groups of macroinvertebrates identified, Coleoptera and Nematoda were the most common with 75% and 36.6%, respectively. The highest dominance index was calculated for Coleoptera group with 60.68%. In the 45 stomachs of *Barbus meridionalis* analyzed, the highest frequency was realized by Ephemeroptera with 68.8%, as well as dominance with 34.29%. In the 10 stomachs of *Orthrias barbatulus* analyzed, the most common were Ephemeroptera by 80%. Also dominant were Ephemeroptera with 75%. Following the analysis of the 65 stomachs of *Phoxinus phoxinus*, the highest frequency of occurrence was realized by Ephemeroptera and Chironomidae with 66.6%, but the most dominant is Coleoptera with 43.8%. In the stomachs of *Cottus gobio*, the most common were Ephemeroptera and Trichoptera with 66.6%, but the highest dominance was realized by Trichoptera with 60%. Ephemeroptera had the most representatives found in the stomachs of fish. In addition to macroinvertebrates we have also identified: feathers, vegetal fibers, pebbles, fat droplets, and microplastics.

Biological Activities of Edible Cherry Plum

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Abstract

Since ancient times, people have benefited from different properties of plants. Plants are used for many purposes such as food, shelter, heating, and disease control. In this study, the biological activities of edible *Prunus cerasifera* reported in the literature were compiled. According to the findings, it has been observed that it has antioxidant, insecticidal, antimicrobial, anti-inflammatory effects. In this context, it has been observed that *Prunus cerasifera* has biological activities as well as nutritional properties.

Keywords: Antimicrobial, Antioxidant, Anti-inflammatory, Cherry Plum, Traditional medicine

1. INTRODUCTION

Due to many possible side effects of synthetic drugs in recent years, people have turned to natural drugs (Mohammed et al., 2022). Many natural products such as mushrooms, plants and animals used in this context have an important place in the fight against diseases. Plants are natural products that have been widely used by humans since ancient times (Sevindik et al., 2017; Mohammed et al., 2020a). Plants have been used by humans for many purposes such as shelter, heating, spice, food and medicine (Korkmaz et al., 2021). With its nutritional properties, it is at the top of people's diet lists. In addition to these properties, plants are widely used to combat many diseases (Mohammed et al., 2020b; Mohammed et al., 2021a). In many studies, it has been reported that plants have many activities such as antioxidant, anti-inflammatory, antiproliferative, hepatoprotective, antiaging, antimicrobial, DNA protective (Mohammed et al., 2018; Mohammed et al., 2019; Mohammed et al., 2021b; Unal et al., 2022; Uysal et al., 2023). In this context, it is important to investigate the biological potential of plants in terms of evaluation. In this study, the biological activities of *Prunus cerasifera* reported in the literature were compiled. Cherry plum (Rosaceae) is a tree species native to

Eastern Europe, Southwest and Central Asia. They can grow up to 6-15 m in length. The leaves are 4-6 cm long and shed in winter. The flowers have 5 petals. The fruit is 2-3 cm in diameter, with yellow or red drupe. The fruits ripen in August-September.

Biological activity

It has been observed that extracts such as crude extract, essential oil, aqueous, ethanol and methanol have been used in in vitro and in vivo biological activity studies on *Prunus cerasifera*. The biological activity study of *Prunus cerasifera* is shown in table 1.

Table 1. Biological activity of *Prunus cerasifera*

Plant species	Extraction	Biological activity	References
<i>Prunus cerasifera</i>	Crude extract, essential oil, aqueous, ethanol, methanol	Antioxidant, insecticidal, antimicrobial, anti-inflammatory	(Wang et al., 2012; Ganchev et al., 2013; Celik et al., 2017; Jaffri and Ahmad, 2018; Saraswathi et al., 2020; Hatipoğlu, 2021; Putkaradze et al., 2021; Duan et al., 2022)

Antioxidant activity

Antioxidants play an important role in reducing the effects of oxidant compounds (Bal et al., 2019). While low levels of oxidant compounds are not harmful, high levels can have very harmful effects (Selamoglu et al., 2020). Antioxidants may be insufficient due to high levels of oxidant compounds. In such cases, oxidative stress occurs (Saridogan et al., 2021). As a result of oxidative stress, many diseases such as multiple sclerosis, Alzheimer's, Parkinson's, cancer, and cardiological disorders can be seen in humans (Krupodorova and Sevindik, 2020; Uysal et al., 2021). In this context, supplemental antioxidants play an important role in reducing the effects of oxidative stress (Eraslan et al., 2021). In this study, antioxidant activity studies of *Prunus cerasifera* reported in the literature were compiled. The antioxidant status of the extract obtained from *Prunus cerasifera* was examined using the DPPH test. As a result

of the study, it was reported that the value of DPPH was between 2.16-38.68 mg according to the 50% inhibition status (Putkaradze et al., 2021). Ferric reducing antioxidant properties of the phenolic compound obtained from the extract of *Prunus cerasifera* were examined. As a result of the study, it was reported that the ferric reducing antioxidant power values ranged between 11.20 and 44.83 $\mu\text{mol Trolox equivalent/g FW}$ (Wang et al., 2012). Antioxidant status of ethanol extract obtained from *Prunus cerasifera* was investigated by DPPH, superoxide, ABTS, phosphomolybdenum reduction and Fe^{3+} reduction tests. As a result of the study, it was reported that the maximum DPPH \cdot radical and Superoxide ($\text{O}_2\cdot^-$) radical scavenging activities at 120 $\mu\text{g/mL}$ concentration were $82.11\pm0.42\%$ and $46.26\pm0.28\%$, and IC_{50} values were 45.40 $\mu\text{g/mL}$ and 129.70 $\mu\text{g/mL}$, respectively. In addition, it was reported that the maximum ABTS activity was 88.64% at 30 $\mu\text{g/mL}$ concentration, IC_{50} value was 10.09 $\mu\text{g/mL}$, and Fe^{3+} reduction was 86.29 and 79.82%, and RC_{50} values were 20.45 $\mu\text{g/mL}$ and 24.21 $\mu\text{g/mL}$, respectively (Saraswathi et al., 2020). The total antioxidant capacity (TAC) status of the extract obtained from *Prunus cerasifera* was examined. As a result of the study, it was reported that the TAC value was 0.355 mmol TE kg^{-1} fw (Celik et al., 2017).

Antimicrobial activity

In recent years, the effects of antimicrobial drugs have been gradually decreasing (Baba et al., 2020). One of the most important reasons for this is the increase in the number of resistant microorganisms due to unconscious drug use (Bal et al, 2017; Islek et al., 2021). In this context, people have turned to natural antimicrobial drugs, especially due to the possible side effects of synthetic drugs. Natural products are seen as very important sources for new antimicrobial drugs (Mohammed et al., 2023). In this study, antimicrobial activity studies of *Prunus cerasifera* reported in the literature were compiled. The effect of the extract obtained from *Prunus cerasifera* on *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans* was investigated. As a result of the study, it was reported that the MIC values of the strains used were 0.25-0.5 mg/mL, 0.125-0.25 mg/mL, 1.0 mg/mL, 0.5-1.0 mg/mL and 0.5 mg/mL, respectively (Hatipoğlu, 2021). The effect of *Prunus cerasifera* on *Xanthomonas axonopodus*, *Pseudomonas syringae*, *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus terreus*, *Penicillium chrysogenum*, *Fusarium solani* and *Lasioidiplodia theobromae* was investigated. As a result of the study, it was reported that the minimum and maximum values of the inhibition zone were 9 and 23 mm, 6 and 21 mm, 8 and 21 mm, 8 and 27 mm, 8 and 20 mm, 5 and 16 mm, 7 and 26 mm, 9 and 23 mm, 8 and 22 mm, respectively (Jaffri and Ahmad, 2018). It has been

reported that the antibacterial activity of the ripe fruits of the ethanol extract of *Prunus cerasifera* showed a maximum inhibition zone of 20 mm for *Bacillus subtilis* among the strains used at a concentration of 500 µg/mL (Saraswathi et al., 2020).

Other activities

It has been known that cyclopentanespiro-5-hydantoin, cyclopentanespiro-5-(2,4-dithiohydantoin) and 1-aminocyclopentanecarboxylic acid obtained from *Prunus cerasifera* have an insecticidal effect on *Hyalopterus pruni* (Ganchev et al., 2013). It has been reported that *Prunus cerasifera* inhibits the increase in the anti-inflammatory inducible nitric oxide synthase (iNOS), cyclooxygenase 2 (COX-2), nuclear transcription factors κB (p65), MAPK pathway, pyrolytic related proteins node-like receptor family (Duan et al., 2022)

3. CONCLUSION

Plants have different uses. In this study, the biological activity studies of *Prunus cerasifera* reported in the literature were compiled. According to the findings obtained, it was observed that they have antioxidant, insecticidal, antimicrobial, anti-inflammatory activities. In this context, it is thought that *Prunus cerasifera* can be used as a natural resource in pharmacological studies.

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Zebrafish as a model to study the effects of environmental concentrations of antibiotics

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Key-words: antibiotics, zebrafish, pollution, chronic exposure, acute exposure, immune system.

Abstract: In the last decade, antibiotic pollution is a concern in increasing its potential impact on public health and the environment. The dominant sources of antibiotic pollution in the aquatic environment are wastewater from antibiotic manufacturers, large-scale animal husbandry, and aquaculture. On the other hand, the increased consumption of antibiotics is directly responsible for the pollution of the environment with them. Their presence in ecosystems can lead to the spread and evolution of antibiotic resistance, as well as direct impacts on natural microbial populations, invertebrates, and vertebrates. Among the dominant antibiotics found in the aquatic environment are: sulfonamides, penicillins, cephalosporins, fluoroquinolones, tetracyclines, and macrolides. Zebrafish are an advantageous model organism to study the effects of antibiotics on the immune system and antibiotic resistance due to their multiple advantages. A growing body of research has reported that the health and ability of zebrafish to respond to environmental changes are affected by both acute and chronic exposure to antibiotics. Chronic exposure of zebrafish to environmental concentrations of antibiotics can have a significant impact on the taxonomic composition and potential functions of their gut microbiome. Likewise, the immune system of zebrafish is weakened if one of the parents has been exposed to antibiotics. Thus, studying the effects of antibiotics on zebrafish is relevant to understand the development of antibiotic resistance and the impact of antibiotics on the immune system and gut microbiome.

THE TROPHIC SPECTRUM OF CERTAIN FISH SPECIES FROM THE RANCACIOV RIVER

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Key-words: stomach contents, macroinvertebrates, feeding mode, Shannon-Wiener index, Pielou index

Abstract: Macroinvertebrates play an important role in freshwater ecosystems because they are important indicators of water quality because different types of macroinvertebrates tolerate different flow conditions and pollution levels. The aim of the study was to analyze the diversity of macroinvertebrates present in the food of fish populations living in the Rancaciov River a tributary of the Arges River.

Through the quantitative and qualitative analysis of macroinvertebrates from the stomach contents of 8 species of freshwater fish counting 191 individuals, 19 species or groups of macroinvertebrates were identified. The sampling of fish was carried out by electronarcosis method in the spring-summer of 2006. The macroinvertebrates in the stomach contents were identified to the smallest possible taxon, while their importance in fish feeding was expressed by ecological indicators: the Shannon-Wiener index and the Pielou index. Regarding the presence of macroinvertebrates in the digestive contents of fish, the dominance of the Class Insecta was observed, generally over 90% to 100% in all fish species studied. The larvae from the Order Diptera, Family Chironomidae, were the most numerous, representing a percentage of 57.66% of the total number of individuals identified, and the larvae from the Order Coleoptera, respectively the Order Ephemeroptera with a percentage of 6.6% and 3.47% are in second place. The analysis revealed that *Phoxinus phoxinus*, *Sabanejewia balcanica*, and *Squalius cephalus* have a broad food spectrum and a generalist feeding mode.

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