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CONTENTS

	(Series - A)	Page No.
Comparative Study on Compressive Strength of Concrete having E-waste, Rice husk, Fly ash and Rice husk Ash by partial replacement of Concrete Ingredients <i>Shekhar Singh and Asna Yani</i>		1-5
	(Series - B)	
Phishing Detection System Using Machine Learning <i>Akshita Verma, Anubhav Mishra, Avnish Kumar and Ayush Shama</i>		6-9
Brain Tumour Prognostic Detection Using Neuro-Imaging Data <i>Himanshu Agarwal, Achal Gupta, Abhishek Sharma and Ayush Sharma</i>		10-11
Gas Leakage Detection and Alert System using IoT <i>Praveen Saini, Honey Tyagi, Aashish Pal, Harshit Pandey, Minal Sagar and Deependra Singh Raghav</i>		12-17
College Automation Process System <i>Veena Rajpoot, Shazar Zaidi, Bhuvnesh Kumar Sharma, Sankalp Gupta and Neelaksh Sheel</i>		18-20
Detection of Exoplanets using Machine Learning Techniques <i>Shivansh Mathur, Anurag Malik, Sanskriti Agarwal, Ishita Rastogi, Ishvinder Singh and Kartik Tiwari</i>		21-27
A CNN Model for Emotion Recognition System <i>Shrey Ruhela, Priyanka Goei, Vasundhra Gupta, Shubham Yadav and Zareen Aqiq</i>		28-32
	(Series - C)	
Implementation of Pulse Meter <i>Ashish Rana and Manas Singhal</i>		33-34
Smart Dustbin using Arduino <i>Vasu Agarwal, Kshitij Shinghal, Amit Saxena, Shuchita Saxena and Bawar Husain</i>		35-36
Android Controlled Remote AC Power System <i>Ginni Chauhan, Mukul kumar, Saurabh Saxena, Rajul K. Misra and Tapish Chauhan</i>		37-39
	(Series - D)	
A Technical Review on Multi-purpose Agriculture Machine <i>Pravesh Chandra, Yasir Mumtaz and Nipun Vashistha</i>		40-43
Mechanical Behavior of Biomaterials in Medical application: A Review <i>Ganesh Kumar Sharm and Vikas Kukshal</i>		44-49
	(Series - E)	
DeRog: A Way to Detect and Recognize Face from a stream <i>Deepti Gupta, Neha Gupta and Prachi Gupta</i>		50-54
The Analysis of Elastic Properties of Composite Laminate Plate in Term of Mathematical Method <i>Pratosh Kumar Awasthi, Manish Saxena and Pratibha Shukla</i>		55-58
Role of Investor Awareness and Motivation behind Investment on Investor Purchase Decision: A Study of Moradabad Region <i>Himani Grewal, Rahul Singh, Smrita Jain and Sachin Bhardwaj</i>		59-62

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Comparative Study on Compressive Strength of Concrete having E-waste, Rice husk, Fly ash and Rice husk Ash by partial replacement of Concrete Ingredients

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Abstract—This paper focuses on the comparative study between Plain, E-waste, Rice husk, Fly Ash and Rice husk Ash by reducing them from environment and adding it into M20 concrete which are further tested for compressive strength. This study helps in determining the optimum quantity of E-waste, Rice husk, Rice husk ash, Fly ash and their scope in Construction industry. As cement is depleting rapidly, hence researchers are trying to use waste material like Fly ash, E-waste, Rice husk, Coconut shell, glass powder etc. in concrete by partially replacing the ingredients of concrete and making it light in weight.

Keywords—Compressive strength, unit weight, modulus of elasticity, E-waste, Fly ash, Rice husk, Rice husk Ash, M20 concrete.

I. INTRODUCTION

Concrete is one the most common building material. It can be used in various ways. For example, it can be used in buildings, roads, bridges, etc. In addition, it can also be used in electronic devices such as computers, televisions, calculators, etc. Therefore, we can say that e-waste is an important part of our lives. However, if we do not dispose of these wastes properly, then they may cause harm to the environment. Thus, we should use them in concrete instead of throwing them into landfills.

Fly ash is the fine powdery material produced during the burning of coal. It consists mainly of silica(SiO_2), alumina (Al_2O_3) and lime(CaO). When mixed with water, fly ash forms a paste called slag. This paste is then added to Portland cement to produce a new type of mortar known as pozzolana cement. Pozzolana cement is stronger than ordinary Portland cement because it contains high levels of silica and alumina. These minerals react chemically with water to create a strong bond between the particles of cement.

In today's world, where we are surrounded by so much garbage, we often overlook one of the most valuable resources – our own waste. We throw out food scraps, coffee grounds, eggshells, paper towels, cotton balls, and countless other items that could be recycled. But what about those old newspapers? What about your old clothes? Your old shoes? Even your old furniture? These things may not be useful anymore, but they can be put to good use!

Mixing of fine aggregate, coarse aggregate, cement, admixture with water to prepare the concrete and use it for the different construction purposes. Here E-waste replaced coarse aggregate, Rice husk replaced Fine aggregate, Fly ash and Rice husk Ash replaced cement.

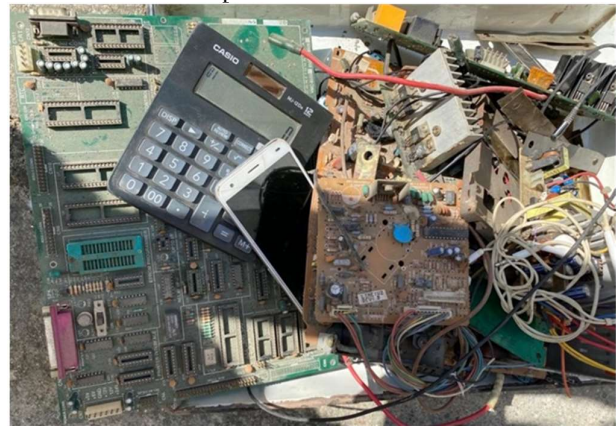


Figure 1: E-waste Material



Figure 2 : Rice Husk Concrete Preparation

II. LITERATURE REVIEW

E-waste is used as partial replacement to the coarse aggregate, they prepared samples using e-waste pellets as coarse aggregate, with replacement percentages ranging from 0% to 20%. With regular interval of five percent and with addition of ten percent fly ash. Conventional specimens were also prepared for M30 concrete without the use of e-waste aggregates, and compressive strength tests and cleavage tensile strength tests were performed. They have resulted that strength of concrete is reduced 33.7% when fine aggregate is replaced by 20 % of e-waste and it is reduced 16.86% when fine aggregate is replace by 20% of e-waste plus 10% fly ash. They have also observed the compressive strength of concrete is found to optimum when fine aggregate is replaced with 15% of e-wastes.

Beyond it the compressive strength gets decreased. They have recommended that reuse of e-waste as coarse aggregate substitutes provides a good approach to reduce costs of materials and solve solid wastes problem posed by e-waste [1].

E-waste can cause very high environmental damage due to the use of toxic materials in the manufacture of electronic products. E-waste contains highly toxic substances such as lead and cadmium in circuit boards and cathode ray tubes, lead oxide and cadmium in monitor cathodes, mercury in switches and fluorescent lights we use every day, cadmium in computer batteries and flat panel displays, Then there are polychlorinated bisphenols (PCBs) used in capacitor and transformer coils, and finally brominated flame retardant compounds on printed circuit boards, plastic casings, cables and PVC cable insulation, which release large amounts of toxic dioxins when burned, to remove copper from the wires [2].

The United Nations Environment Programme (2010) listed India's equipment-related e-waste as over 100,000 tonnes from refrigerators, 275,000 tonnes from televisions, 56,300 tonnes from personal computers, 47,000 tonnes from printers and 1700 tonnes from mobile phones. A survey of computers, mobile phones and television equipment estimated that 3,82,979 tons of e-waste were generated in 2007, of which 50,000 tons (about 13%) were illegally imported [3].

This paper addresses the use of fly ash in cementitious concrete by replacing cement and additives, providing disposal and reuse of fly ash. This work is a research project at Deep Nagar Thermal Power Plant in Jalgaon District, Maharashtra. The cement in the concrete is gradually replaced from 5% to 25% in 5% increments. It has been observed that replacing cement in any proportion reduces the compressive strength of concrete and delays the hardening process [4].

They have studied use in concrete where cement is partly replaced by fly ash. The variation in fly ash in concrete is by 0%,25%,50%,75% and 100%. They have studied the effects of fly ash on the workability, setting time and compressive strength of concrete [5].

The replacement of fly ashes as a cementation component in concrete depends upon (1) the design strength, (2) the water demand, and (3) the relative cost of ash compared with cement. They have selected M15 grade of concrete for the different types of test like compressive strength of 7, 14, 28 days, slump test etc. They replaced cement by 10%, 20% and 30% of class F fly ash by the weight [6].

They have partially replaced cement of concrete by Rice husk ash (RHA). They performed compressive, flexural, tensile and slump tests for the different percentages of RHA and different water to cement ratios (w/c). The replacement of RHA gives economical and environmental benefits related to recycling [7].

Rice Husk Ash (RHA) consists mainly of amorphous material, which is used as pozolona in making concrete. The proportion of replacement chosen is at 2.5% intervals starting from 5% to 20%. Concrete is tested for compressive strengths [8].

III. METHODOLOGY

3.1 Materials

3.1.1 Cement

Ordinary Portland cement (OPC) of grade 53 is used for this research.

3.1.2 Fine Aggregate

Medium sand (0.25-0.5) mm size is utilized in this investigation with the specific gravity of 2.69 and fineness modulus of 2.77.

3.1.3 Coarse aggregate

20mm angular aggregate are used with specific gravity 2.76 and fineness modulus 6.99.

3.1.4 E-waste

20mm Pieces of Electronic Waste.

3.1.5 Fly Ash

Standard fly ash material

3.1.6 Rice Husk

Clean rice husk

3.1.7 Rice Husk Ash

Cleaned completely burned Rice Husk Fine Powder

3.2 Equipments

150mm x 150mm x 150 mm

3.3 Preliminary Test on Cement

Specific gravity

Fineness Test

Consistency Test

Initial setting Time

Final setting Time

3.4 Preliminary Test on Cement

Aggregate impact Test

Loss Angeles abrasion test

Water absorption test

3.5 Mixing Proportion

The mixing proportion is taken as standard for M20 Grade 1:1.5:3 as Cement:Sand:Aggregate. The w/c ratio adopted here is 0.36.

3.6 Properties

Table 1: Ingredients properties

S.N.	Properties
1	M20 concrete
2	Grade 53 OPC
3	Specific gravity of cement= 3.15
4	Max. size of E-waste= 20mm
5	Curing Time Period= 7,28 days
6	Cube size = 150 x 150x 150 mm
7	Specific gravity of E-waste = 1.25
8	Total water absorption of E-waste= 0%

3.7 Sample Preparation

3.7.1 Plain Concrete

A Plain Concrete will be prepared using a conventional method.

Specimen cubes of size (150mm X 150mm X 150mm) will be cast for compressive strength test. The specimens will be cured in curing room at 30°C temperature and 90% relative humidity.

3.7.2 E-waste Concrete

E-waste concrete composition containing 5%, 10% and 15% E-waste by weight of concrete is prepared and the

compressive strength test is performed on these Concrete cubes. Here coarse aggregate is replaced by the E-waste.

3.7.3 Rice Husk Concrete

Rice husk concrete composition containing 5%, 10% and 15% rice husk by weight of concrete is prepared and the compressive strength test is performed on these Concrete cubes. Here fine aggregate is replaced by rice husk concrete.

3.7.4 Fly Ash Concrete

Fly Ash concrete composition containing 5%, 10% and 15% fly ash by weight of concrete is prepared and the compressive strength test is performed on these Concrete cubes. Here cement is replaced by fly ash concrete.

3.7.4 Rice Husk Ash Concrete

Rice Husk Ash concrete composition containing 5%, 10% and 15% rice husk ash by weight of concrete is prepared and the compressive strength test is performed on these Concrete cubes. Here cement is replaced by rice husk ash concrete.

3.8 Procedure

Following procedure has been adopted in this research

1. Selection of material & equipment is done prior performing the experiment.
2. For Plain cement concrete the ratio of mixing proportion is 1:1.5:3 of cement, fine aggregate and coarse aggregate and the w/c ratio is 0.4. As M20 grade of concrete is used.
3. Here Weigh batching is used for exact proportioning the different materials.
4. For casting the cubes the different types of admixture is also used. The admixture proportion here was 5%, 10%, and 15% of the total weight.
5. Slump cone test is done for measuring the workability of 6 samples for each type of concrete.
6. Firstly we prepared Plain concrete.
7. Second concrete was of E- waste concrete.
8. Third concrete was of Rice husk.
9. Fourth concrete was of Fly Ash.
10. Fifth type of concrete is of rice husk ash.
11. Slump cone test is used here for the finding the workability of the prepared sample.
12. After mixing the concrete is placed in mould for one day and after setting cube is taken out safely from the mould.
13. 10 cubes of each type of mixture is prepared. (5 cubes each for 7 and 28 days curing)
14. All the samples are dipped into water tank for respective days.
15. Each sample is tested for compressive strength test for their respective days and graph is plotted for this test.
16. Average value of three cubes for each type of concrete is noted as strength of that cube.

IV. RESULT

4.1 slump value

Slump values of various samples are following

Table 2: Test results of workability

Specimen	E-waste (%)	Slump (mm)	Water Content	Workability
E1	0	126	0.45	High
E2	4	123	0.45	High
E3	8	117	0.45	High
E4	12	109	0.45	High
E5	16	101	0.45	High
E6	20	104	0.45	High

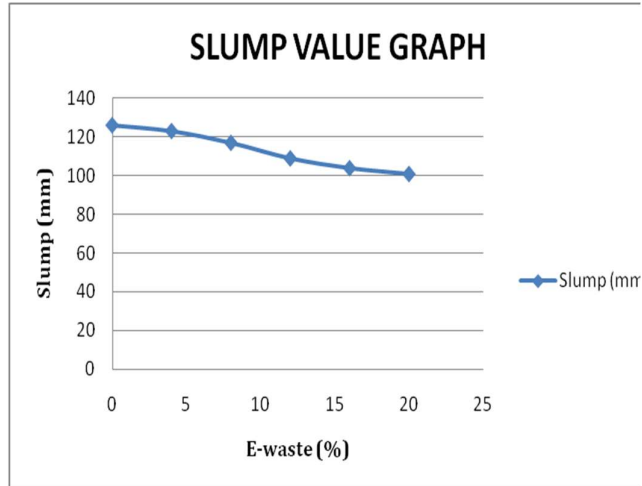


Figure 3: Slump Value Graph

4.2 Compressive Strength Test

Table 3: Test results for compressive Strength

Type of concrete	Mix specification/ Variation	7 days	28 days
Plain concrete	M20	17.32	20.45
E-Waste Concrete	5%	17.67	26.22
	10%	18.83	28.43
	15%	17.85	26.86
Rice Husk Concrete	5%	12.2	18.65
	10%	9.34	13.84
	15%	6.80	10.13
Fly Ash Concrete	5%	15.66	24.26
	10%	13.32	19.34
	15%	10.18	14.91
Rice Husk Ash Concrete	5%	13.56	20.25
	10%	15.32	22.88
	15%	14.84	20.72

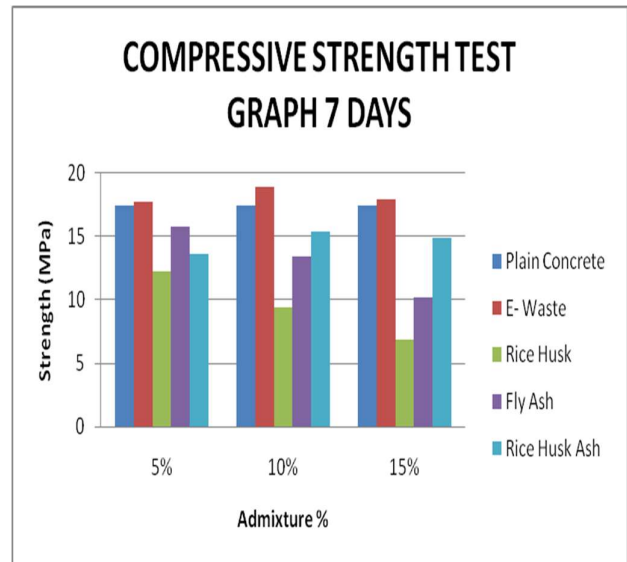


Figure 4: Compressive Strength Graph for Different Admixture

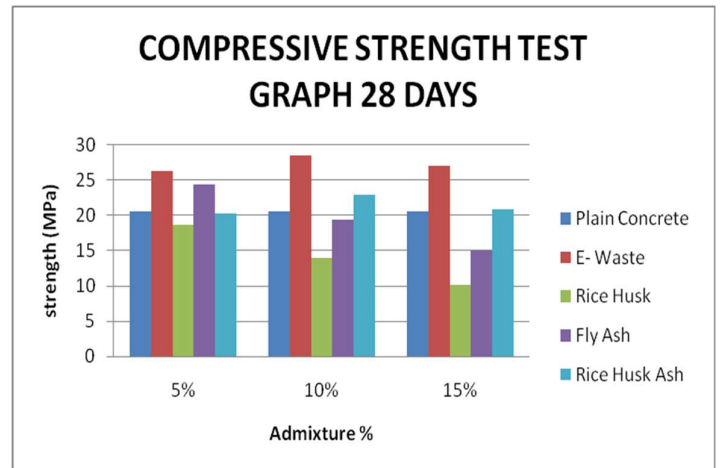


Figure 5: Compressive Strength Graph for Different Admixture

V. CONCLUSION

Mixing of different type of admixture into the concrete has given very important points.

1. E-waste concrete strength has increases up to 10% after that strength of e-waste concrete decreases and even at 10% mixing of E-waste gives 39% more strength than Plain concrete. Compressive strength of E-waste concrete is maximum at 10%.

2. Rice husk Concrete strength is poor than the Plain concrete as rice husk is an organic material. As we are increasing rice husk the strength of concrete is getting decreases. Rice husk concrete is maximum at 5% but we never suggest use rice husk concrete.

3. Fly ash concrete given satisfactory result only up to 5% after that strength of concrete is decreases as fly as content increases. The strength of fly ash concrete is maximum for 5%.
4. Rice husk ash concrete results are better than the rice husk concrete. Even the rice husk ash concrete strength is 18.6% greater than the plain concrete at 10% replacement.

If we want use rice husk than use rice husk ash at place of Rice husk. But the best result is given by E-waste concrete.

VI. FUTURE SCOPE

As rice husk is making so much air pollution so we can replace some percentage of cement by rice husk ash and even electronic waste is also a harmful for environment so we can also replace coarse aggregate by these E-waste material. This will help in reuse of waste material for exact amount as we needed and will reduce pollution in the environment.

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PHISHING DETECTION SYSTEM USING MACHINE LEARNING

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Abstract—Phishing attacks are those attacks when a person sends a misleading verbal exchange that seems like comes from a sincere supply. The most commonplace kind of verbal exchange or interaction is e-mail. The goal of phishing is to take personal facts of the consumer like credit score card numbers and login credentials or infect the sufferer's machine with diverse viruses like malware. Phishers are ordinarily interested in obtaining private data, which includes person IDs, passwords, and bank savings account statistics, human beings running in cyber safety are actually searching out truthful and steady detection approaches for the phishing net website. by way of keeping apart and comparing several elements of true and phishing URLs, this research uses, the gadget getting to know technology to hit upon phishing URLs. To locate phishing websites, decision trees, random forests, and support vector machine algorithms are applied. The goal of take a look at is to compare the correctness rate, advantageous charge, and the poor price of each system studying algorithm to detect phishing URLs and clear out them all the way down to the pleasant system studying method.

I. INTRODUCTION

Phishing is an attack by a third party. Phishing simply means stealing confidential information of someone from an organization, individual, or group of people and these are mainly bank details. It can be done by spoofing or mimicking, malicious activity, etc. Thieves will commit little to large crimes because of these attacks, which are commonly referred to as cyber-attacks. Phishing is the most common scam that attempts to insist you give your username, password, or any other sensitive data or information by impersonating someone you know and trust.

II. PHISHING IS OF FIVE TYPES

A. NORMAL PHISHING

Normal Phishing is simply called deceptive phishing which involves fake mail to steal someones confidential information or any personal credential. The email attack scams commonly use many threats.

B. SPEAR PHISHING

Spear phishing is a sort of phishing that specifically targets individuals or groups within a corporation. Its a sophisticated version of phishing, a dangerous technique that uses emails,

social media , instant messaging, and other platforms to induce users to expose personal information or engage in actions that compromise networks, cause data loss, or result in financial loss.

C. WHALING

Whaling phishing is like spear-phishing, but it mainly focuses on employees rather than an organization. It simply tricks an individual into disclosing sensitive information through e-mails, mimicking, and website spoofing techniques.

D. VISHING

Vishing is the type of phishing attack which is also called clone phishing. These attacks mainly make a clone website. These clone websites replicate messages you have received. Also, some- times it swaps the link to a malicious one and insists users update the version of the e-mail so that they will go on the fake websites and re-entering the personal details.

E. BEC Phishing

BEC phishing is usually for lower-level employees who have administrative rights of any organization or corporation where employees only know the name of the executive, but rarely interact with them. BEC may be a kind of phishing scam during which associate degree assaulter impersonates or compromises associate degree executive's email account so as to trick the victim into creating a wire transfer or divulging crucial info.

III. PREVENTION

Phishing attacks is important as many of the users, are a victim of phishing. So that they dont want to switch on a digital platform for online transactions and they used to go for an offline option for transactions. The best protection is awareness and education. Even if the emails came from a known source, don't open attachments or links in unwanted emails. If the email comes as a surprise, be cautious about opening the attachment and double-check the URL." As a result, prevention is essential. Nowadays, the Computer Science department gives various options to detect fake websites and give options on how to handle that website.

IV. DATASET

The dataset contains phishing websites and bonafide websites. The URLs of phishing websites were collected from https://www.phishtank.com/developer_info.php and also the URLs of legitimate websites were collected from <https://www.unb.ca/cic/datasets/url2016>. Markup language website that features a total of 1 hundred thousand dataset, 50,000, is phishing websites and 50,000, is legitimate websites.

V. FEATURE EXTRACTION

We have implemented many features in the python language. Features extracted for phishing URL detection are listed below: -

A. Using IP Address In URL

If the URL has associate scientific discipline address, the feature is about to the figure one, otherwise, it's set to the figure zero. To transfer an online page, most legitimate sites don't utilize the scientific discipline address because the URL. The assailant is trying to steal tip if the scientific discipline address is enclosed within the URL.

B. Hide The Suspicious spare a protracted computer address

Sometimes the phishing web site encompasses a long computer address to cover the suspicious half because the computer address ends with "phishing.website.com".

C. Use of "Small URL" URL shortening services

A phishing website may use a short URL that finishes in "bit.ly/19DXSk4" to mask the suspicious component.

D. URL Having Special Symbol

If the universal resource locator contains the @ sign, operate is about to the digit (1), otherwise, it's set to the digit (0). Phishers embrace the special image @ within the universal resource locator, that causes the browser to ignore something before the "@" sign and therefore the actual address to look once the "@" image.

E. Redirecting Using //

If "//" appears in the URL path, the function is set to the binary digit(1); otherwise, it's set to the figure zero. If there is a "//" in the URL path, users will be forwarded to another website.

F. Adding Prefix Or Suffix Separated Via(-) To The Domain

If the name is separated by a hyphen (-), an operate is ready to 1; otherwise, it's set to zero. Invalid URLs, the hyphen is never used. Phishers add a splash image () to the name to fool users into thinking they are addressing an internet site. A lot of dots within the hostname - Phishing URLs have tons of dots in them. as an example, within the URL <http://shop.fun.amazon.phishing.com>, hishing.com may be a valid name, whereas the word "amazon" is employed to deceive customers into clicking on that. In real URLs, the typical variety of dots is 3. The operate is ready to one if the amount of dots in URLs is bigger than three, else to 0.

G. Domain Registration Length

We tend to believe that respectable domains have been there for many years because phishing websites only live for a short time. According to our information, the longest imitative domains were only used for one year.

H. Favicon

The graphic image is mostly referred to as a favicon related to a particular web site that seems at the highest of the page. The favicon is displayed within the address bar of many existing user agents, like graphical browsers and newsreaders, as a visible reminder of the website's identity. The webpage is probably going to be deemed a phishing try if the favicon is loaded from a site apart from the one displayed within the address bar.

I. Request URL redirects to another web- site:

Some web sites have loads of pictures and videos that may be redirected to a different website. As a result, that individual may visit a phishing website. Request URL checks whether or not external assets on an internet site, like photos, videos, and music, are loaded from a different domain on a website. The webpage address and most of the things enclosed at intervals the webpage shares identical domain in legal web content.

J. Links in $\langle \text{Meta} \rangle$, $\langle \text{Link} \rangle$ and $\langle \text{Script} \rangle$ tags

Real websites frequently employ $\langle \text{meta} \rangle$ tags to offer meta-data about HTML content, $\langle \text{script} \rangle$ tags to construct client-side scripts, and $\langle \text{link} \rangle$ tags to download external web resources, as our research covers all components used in a webpage's source code. All these tags must be connected to the same website's domain.

K. The Presence Of Url With Https Token:

If the HTTPS token is present in the URL, the feature is set to 1; otherwise, it's set to the figure zero. To deceive users, phishers may append the "HTTPS" token to the domain section of the URL <http://https-www-paypal-it-mpp-home.soft-hair.com>.

L. Hostname length:

A phishing website uses a long hostname to create a bogus website. "The average length of legitimate URLs is 25. If the URL's length is greater than 25, the feature is set to 1; otherwise, it is set to 0."

M. Sensitive terms present in the URL:

Phishing websites use sensitive phrases in their URLs to trick humans into questioning they are visiting a legitimate website online. the subsequent are the phrases which might be present in many phishing URLs: - "affirm," "account," "banking," "secure," "ebyisapi," "webscr," "signin," "mail," "set up," "toolbar," "backup," "PayPal," "password," "username," and so on.

N. Website Traffic:

This feature determines the popularity of a website by means of counting the number of site visitors and the wide variety of pages they go to. However, because phishing websites are only online for a short amount of time, the Alexa database may overlook them (Alexa the web statistics organization., 1996). According to our data, reputable websites are ranked in the top 100,000 in the worst-case scenario. Furthermore, it is categorized as "Phishing" by kilometers if the area has no traffic or is not detected using the Alexa database. In all other circumstances, it's considered "suspicious."

O. IFrame Redirection:

The IFrame is HTML tag that lets you insert some other webpage into the only you are looking at proper now. Phishers can make use of the "iframe" tag to make the body invisible, i.e. without the use of frame borders Phishers employ the "frameborder" attribute in this example, which causes the browser to draw a visible line.

P. Page Rank:

PageRank is a number that runs from 0 to 1 that indicates how important a page is. PageRank's purpose is to determine how important a webpage is on the Internet. The greater the PageRank value of a webpage shows that the website is not fake. We have a lot of data in our datasets. 95 percent of phishing websites have no PageRank, according to the study. Furthermore, we discover that the remaining PageRank values of up to "0.2" are possible for 5% of phishing web pages.

Q. Website Rank:

We compared the Alexa rank of each website to the first 100,000 domains in the database. The feature is set to 1 if the website's rank is more than 10,0000; otherwise, it is set to 0.

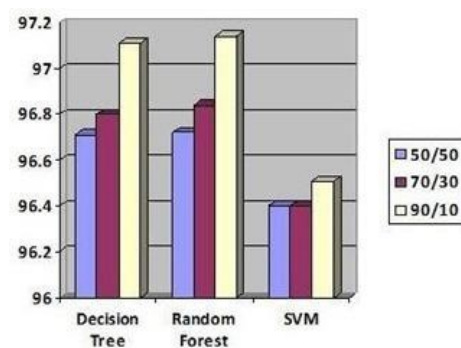


Fig. 1. Detection accuracy comparison

VI. MACHINE LEARNING ALGORITHM USED

A. Decision Tree

The selection tree set of guidelines is straightforward to understand and look at. the selection tree starts off evolved with the aid of choosing the high-quality splitter from the to be had tendencies for categorization, that is known as the tree's root. A choice tree is a flowchart like shape in which

each inner node represents a "test" on characteristic (as an example, whether or no longer a coin flip will arise heads or tails), each department displays the check's end, and every leaf node represents a category label (desire taken after computing all attributes). In tree representation, each inner node of the tree corresponds to characteristic and every leaf node of the tree belongs to a category label, which is used to assume the intention rate or magnificence. The Gini index and records, gain processes are employed within the choice tree set of rules to determine those nodes.

B. RANDOM FOREST

The random wooded area and the set of policies, that's based totally mostly on the belief of the choice tree set of rules, is one of the most powerful algorithms in tool gaining knowledge of generation. The bootstrap approach is used to create trees. To generate a single tree, the bootstrap approach selects traits and samples from the dataset at random with an alternative amongst those decided on at random. The random wooded area and the set of guidelines will select the first rate based totally on the chosen functions splitter for categorization, like the choice tree approach. The Gini index and facts also are used inside the random wooded area set of rules collect get entry to methods for locating the finest splitter. This technique will become more complex preserve until the random woodland has produced n timber. The random wooded vicinity algorithm generates a woodland with many desire trees. Many bushes result in a excessive degree of detection accuracy. Random forests or random choice forests are an ensemble analyzing approach for sophistication, regression, and other responsibilities that operates by means of manner of building a mess of desire timber at education time.

C. Support Vector Machine

The assist vector device is another useful tool for system analysis. Within the help vector system set of rules, each entry item is displayed as a factor in n-dimensional space, and the algorithm develops a dividing Line for the type of lessons, referred to as a hyperplane. The aid vector machine searches for the closest factors, known as support vectors, and then generates a Line connecting them. The assist vector machine seems for the nearest points, which might be called aid vectors, and then constructs a line linking them. The support vector gadget then creates a separate line this is perpendicular to the connecting line and bisects it. The margin ought to be as large as viable to appropriately classify records. The margin is the gap among the hyper-aircraft and aid vectors in this situation. Inside the real global, it's far impossible to differentiate among complex and nonlinear statistics. To address this issue, the guide vector system employs a kernel trick that converts lower-dimensional space to higher-dimensional space.

VII. CONCLUSION

The Phishing detection website is used for checking the website is fake or real. This website helps people to protect them from fake website. So that their confidential information may not leak by fake websites.

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Brain Tumour Prognostic Detection Using Neuro-Imaging Data

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Abstract—Brain tumours are created due to uncontrolled and aberrant cell growth in the mind. The patient may not be able to recuperate if the enlargement reaches more than 50%. As a result, brain tumour detection must be quick and precise. The goal of this paper is to detect brain tumours. The images from a brain MRI scan are used in this procedure. So, initially, noise filters are employed to remove noise, and then enhancement techniques are applied to the images of a brain MRI scan. Following that, the CNN method is used to extract the tumour-affected region, and then the region found is verified using CNN, which is implemented through the use of TensorFlow and Keras.

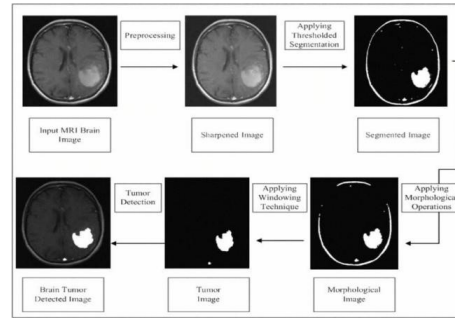


Fig. 1.

I. INTRODUCTION

Doctors can now easily diagnose the insides of body thanks to imaging technology. It has also aided doctors in performing Ultrasound procedures. By forcing doctors to examine the body's elusive third dimension, MRI has supplanted x-ray imaging. A brain tumour is an abnormal growth of cells in the brain that may or may not be cancerous. According to the National Brain Tumour Society, there are approximately 688,000 people in the United States living with primary brain and central nervous system (CNS) tumours, with 138000 malignant tumours and 550000 non-malignant tumours. Brain tumours are expected to kill an estimated 13700 people this year.

II. OVERVIEW OF PROPOSED SYSTEM

The image type dataset is used for segmentation and detection of Brain tumour in MRI scans with the help of CNN algorithm.

III. LITERATURE SURVEY

[1] [2020] S. Irsheidat and R. Duwairi suggested A tumour can be analysed through radiology and imaging. A brain tumour is detected with MRI (Magnetic Resonance Imaging), giving a idea of problem in brain. In this project, we have developed a model based on Artificial Intelligence algorithm such as Convolutional Neural Network (CNN) that takes these scans and analyses them with the help of scientific equations and network calculation and operations. The neural network tells the presence of a brain tumour within the brain and has been trained on magnetic resonance images. [2][2021]P.Gokila,Brindha1, M Kavinraj, P Manivasakam, and P Prasanth are the authors of P Gokila Brindha1. A brain tumour is the growth of abnormal cells in the brain, some of which can turn cancerous. The regular strategy to distinguish Brain Magnetic Resonance Imaging (MRI) scans are used to detect tumours. Data about the abnormal tissue development within the brain is discerned from MRI images. Machine learning and profound learning calculations were used in several research publications to find brain tumours. When these calculations are combined with MRI images, the likelihood of a brain tumour is quickly determined, and the next degree of precision makes a difference in how patients are treated. The radiologist's ability to make quick decisions is also aided by these forecasts.

[3] [2018] B. Devkota proposed a model that predicts the presence of the tumour using Mathematical Morphological

Reconstruction. A median filter is applied to MRI scans prior to processing. The CNN method was chosen due to the high complexity of the segmentation procedure. As a result, this new approach can be used because this algorithm gave significantly greater accuracy than earlier models.

[4] [2017] Umit Ilhan et al. suggested it was based on photos from The Cancer Imaging Archive (TCIA). The suggested model correctly identified images with tumours with a 94.28 percent accuracy and correctly identified images without tumours with a 100 percent accuracy. [5] [2020] For brain tumour detection, segmenting the pictures of the tumour with the use of MRI scans is required. Only then will we be able to differentiate between different tumour types.

The process can be improved with various deep learning models and methods. MRI images have typically been used for detection, but they are prone to human mistake, therefore we must continue to improve our procedures over time

IV. FRAMEWORK

The task of automatically recognising brain tumours from brain MRI pictures is investigated in this paper, which uses the CNN architecture as a foundation for how to detect brain tumours from brain MRI images. There are 1500 raw photos in all, ranging in size from little to large. The images are from the Kaggle website, which specialises in brain MRI imaging. JPG is the file format. Based on the presence of tumours, the data is divided into two categories: YES and NO. There are 700 images with brain tumours and another 800 images without tumours. The proposed approach is made up of a number of processes that are carried out in stages.

V. RESULTS

As a result, this was a classification task determining if a brain MRI image had a tumour or not.

Accuracy, Epoch, and Loss vs Epoch Graphs are used to assess the model's performance. The accuracy reached is roughly 86

VI. CONCLUSION

The conclusion drawn from this paper is that the CNN (Convolutional Neural Network) is an effective algorithm in predicting Brain tumours provided that the data set is large.

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Gas Leakage Detection and Alert System using IoT

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ABSTRACT

The Internet of Things (IoT) is a network of devices, cars, and household equipment that comprise hardware, programming, actuators, and a network that allows them to communicate, cooperate, and exchange data. IoT refers to the expansion of the Internet network beyond traditional devices such as workstations, cell phones, and tablets to any range of normally dumb or non-web enabled physical devices and common products. These innovative devices can communicate and connect via the Internet, as well as be monitored and controlled remotely. Because of the convergence of multiple technologies, continuous research, AI, wear sensors, and implanted frameworks, the meaning of the Internet of Things has progressed. Installed frameworks, remote sensor systems, control frameworks computerization (including home and building mechanization), and others are all traditional disciplines. Add to the Internet of Things' empowerment. A gas spill is a leak of petroleum gas or another vaporous substance from a pipeline or other regulator into an area where the gas is not supposed to be present. Spills are dangerous because even a little hole may turn into a dangerous gas confluence over time. Aside from posing a risk of fire and explosion, holes may also kill flora, particularly large trees, and release dangerous ozone-depleting compounds into the atmosphere.

IoT, MQ5 sensor, Arduino module, GSM networks are some of the terms used.

I. INTRODUCTION

The Internet of Things (IoT) is a rapidly evolving issue of specialized, social, and monetary importance. Customer products, rugged goods, automobiles and trucks, contemporary and utility segments, sensors, and other common items are being combined with Internet accessibility and incredible information system capabilities, ensuring that the way we work, live, and play will be transformed. The impact of IoT on the Internet and economy is astounding, with some forecasting upwards of 100 billion connected IoT devices and a global economic impact of more than \$11 trillion by 2025. The Internet of Things (IoT) is a hot topic in the innovation, strategy, and design communities. This creativity is reflected in a wide range of products.

Structured products, frameworks, and sensors that take use of advances in computing power, device scaling down, and connectivity organization to provide new capabilities. The widespread use of IoT devices will undoubtedly alter many aspects of our daily lives. New IoT products, including as Internet-enabled devices, house mechanization components, and vitality the executive's gadgets, are bringing us closer to the goal of the Internet of Things "smart home", which provides increased security and vitality efficiency. IoT frameworks such as organized automobiles, smart traffic frameworks, and sensors embedded in roadways and scaffolds bring us closer to the Internet of Things ""Bright cities," which aid in limiting congestion and energy consumption. By increasing data accessibility along the value chain, IoT innovation has the potential to alter horticulture, industry, and vitality creation and diffusion.

LPG is an order less gas, but to prevent accidents and identify leakage at an early stage, ethanol is added to make it smell. It has replaced many traditional fuel systems used by domestic sectors. However, LPG is also an explosive gas, with a volume of gas and air ranging from 1.8 percent to 9.5 percent.

LPG is provided to the user in three different categories according to the mass of the liquefied petroleum gas in household and commercial cylinders. The smallest size cylinder is a household cylinder weighing 14.2 KG, which is the weight of the actual LPG present inside. For industrial and commercial purposes, the weight of LPG is standardized at 35KG and 19KG, respectively. Helping possess the properties of expansion and because of this property, help is only filled up to 85% and above this vapor is filled to avoid any kind of unwanted situation. Because the pressure of the gas within the cylinder increases at a rate of 15 KG per centimeters cube for every one-degree increase in temperature. Because of this property, LPG becomes as a very inflammable and dangerous gas. Atmospheric pressure and average ambient temperatures, LPG are a gas; however, this gas can be liquefied when significant pressure is applied, or the temperature is reduced. Utilization and storage are very easy for LPG, which advances its application in terms of passive energy sources. The weight within the cylinder is determined by the type of liquid petroleum gas used (commercial butane or propane) and the outside temperature. When customers first start using LPG, a portion of the weight of the gas inside the cylinder is released. Some heat is also expected to change over the fluid to vapor, known as "inactive heat of vaporization". As the fluid bubbles, it absorbs heat vitality from its surroundings.

II. PROBLEM STATEMENT

The government has made several attempts to connect households with LPG connections, but the risks associated with it are often neglected. Accidents due to LPG leakage claim many lives every year. According to Indian government statistics, the average deaths per year due to LPG leakage are 62 now days. Although accidents are comparatively rare, they are extremely dangerous. Over six crore households in India have already been provided with LPG connections, but households with installed LPG gas leak detection system share still very rare.

There are specific systems, discussed in the literature survey section, developed for LPG leakage detection in households, but none of these performs after detection tasks. These jobs have to do with what individuals do when a leak has been discovered. One of them are common mistakes done by people in the habit of instinctively switching on the lights as soon as they reach home.

However, according to the guide lines provided by the government, one should not turn on any switch during gas leakage, as the gas can easily catch fire due to the spark. Further unexpectedly, short circuits also impose a threat during the incidents of gas leakage.

The gas detection system must not only maintain a constant watch on the surroundings, but it must also be regulated in such a manner that it can prevent future leaking while also achieving its purpose of reducing the possibilities of fire. When it comes to leakage of any gas it is a serious problem, in case of leakage, it does not matter from which sector gas is related to like factories, household, restaurants or kitchens, etc. Gas sensors are used in a gas leakage detecting system.

III. LITERATURE SURVEY

Several evaluations of gas leakage detection techniques have been conducted in the past, either as part of research papers/technical reports on a specific leak detection method or on other gas-related themes. **A. Mahalingam, R.T. Naayagi, n. E. Mastorakis**; They present the design and execution of a low-cost gas leak detector. They provided solutions to several difficulties in prior gas leakage detectors. They stated that numerous standards, including IEEE, BS 5730, and IEC, have been developed for the design of a gas leakage detecting system. The recommended UK safety standards have been used for this job. The suggested alarm system is primarily intended to detect LPG leakage, which is extensively utilised in residential and commercial buildings. The system detects not only the presence of gas (gas leak), but also the volume of gas leaking in the air, and raises an appropriate auditory visual warning as a result. The system's goal is to identify LPG gases such as propane and butane. Butane has an allowable threshold in the UK of 600 ppm, over which it is deemed hazardous and dangerous. The suggested technology guarantees that the gas levels are continuously monitored. If the gas level rises above the normal threshold of 400 ppm butane (LPG), the system begins to issue early warning alarms at 100ms intervals, indicating low-level gas leakage. When the leakage level reaches 575 ppm of butane (LPG), the system initiates high severity audio alerts at 50ms intervals, advising occupants to flee to safety..

IV. PROPOSED SYSTEM

The proposed LPG leaking detecting system comprises one sensor, ATMEGA 328 Arduino UNO micro controller, an LCD relay module, battery, and power supply. Figure 1 shows below refers to the proposed system block diagram. 230V AC supply is used to power up the proposed system, and it is converted to a 12V DC power supply with the use of AC-DC converter circuit.

Fig 1. Block Diagram of AC Mains Cut off System using Arduino Uno R3 during LPG Leakage. The system operates in three phases, the first of which is to acquire or retrieve information from its surroundings, which is achieved via the MQ5 gas sensor. The operating voltage for this sensor was 4.9-5.1 volts.

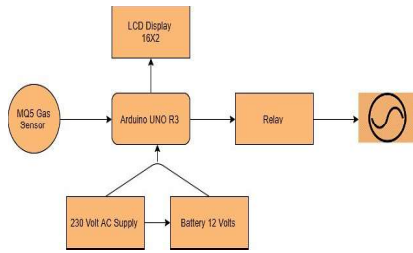


Fig.1. Block Diagram of AC Mains Cut off System Using Arduino Uno R3 during LPG Leakage

A threshold value (200 ppm for the proposed system) was fixed through the programming of ATM 88C52. The sensor continuously detects the surrounding atmosphere. When a gas leak is detected, the sensor informs the microcontroller. The incoming signal is processed by the microcontroller in the second step, and the signal is then sent to the peripherals in the third and final step. The relay disconnects the AC supply of the house, and the LCD continuously shows the message "Gas Leakage."

All the systems discussed in the literature survey are only focusing on the indication to the user via different, different modules like a buzzer, text messages, etc. The Arduino Based LPG leakage Detection and Preventing System not only provides the alert to the user, but it will cut off the AC mains supply itself as a precautionary measure to avoid any incident that may occur due to the AC mains. The system will turn off the AC mains till the sensor detects gas.

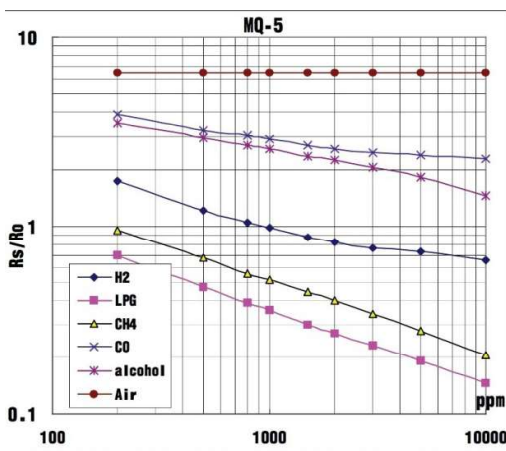


Fig. 2. Sensitivity characteristics of MQ5

A. Automatic AC Mains Cut off System

It comprises of a power supply unit and a converter that converts 230V AC to 12V DC voltage, which serves as the system's principal voltage source. The LPG content in the air was measured using a MQ5 LPG gas sensor. Arduino Uno requires a peripheral input device to execute the process. The MQ5 gas sensor possesses a high sensitivity for the detection of LPG and natural gas.

Shown in Fig. 2. However, the sensitivity of this gas sensor is poor to alcohol. The proposed system over short and long distance. The system can be utilized effectively for home and industrial applications. Fig. 6 and Fig. 7 show the live demonstration of the system. In Fig. 8, the live concentration of LPG in the PPM is recorded on the serial monitor of the Arduino IDE. As the detection range of the MQ5 gas sensor is from 200 PPM to 10000 PPM, the technology is extremely quick, and it detects LPG levels in the environment at an early stage.

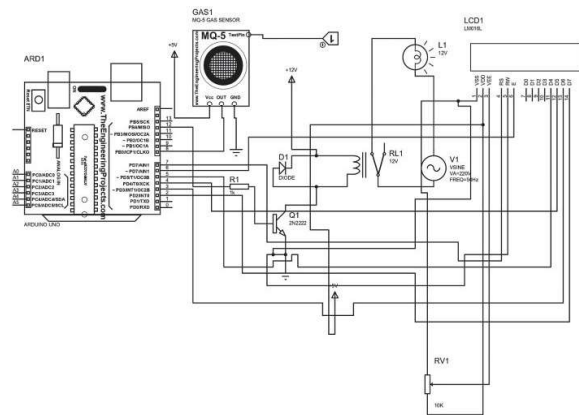


Fig. 3. Circuit diagram of the proposed system

The sensor module can be placed far from the primary control circuit. An LED indicator is provided on the sensor module. The blinking LED can ensure MQ5 gas sensor module functions and process execution is happening correctly. Interfacing of MQ5 with Arduino Uno is simple; the MQ5 gas sensor has three terminals, that is, D0 (sensor module output), VCC (sensor module input supply), and ground. The MQ5's D0 pin is wired to Arduino Uno's digital pin 8. It requires an external power supply, which is provided by connecting the VCC of the gas sensor module to the Arduino Uno's 5V output. Finally, the ground (GND) pin of MQ5 is connected to the Arduino Uno ground pin to complete the circuit of the MQ5 module. Fig. 3 and Fig. 4 display the proposed system's entire circuit setup and PCB layout, and for simulation, we utilized the Arduino UNO library for Proteus from [www. the engineering projects.com](http://www.theengineeringprojects.com), which offers open-source libraries for Proteus.

V. METHODS AND MATERIAL

Input: Sensor data signal which is not regular or Change in Signal

Output: End User get in formed with alert buzzer and Display to LCD

Functions:

1. Access (): In this module, we will access the module's features, which will include sensor data access.
2. Control (): In this module, we control the Alert System using a system that is linked to hardware or sensor data.
3. Broadcast (): In this module, we will broadcast the alarm Display to the LCD.
4. Success Prerequisites:
 1. If the data from sensors is not steady or exceeds a certain threshold, it indicates that there is a leakage scenario.
5. Failure Conditions: The desired output is not produced as a result of the following failures.
 1. Software Error
 2. Hardware Defect
 3. Failed network Connection

HARDWARE INFORMATION:

1. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Fig 4 Arduino uno

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega16U2 (ATmega8U2 up to version R2) programmed as a USB-to-serial converter.

2. LCD (Liquid Crystal Display)

Liquid Crystal Display is the abbreviation for liquid crystal display. Because of the following reasons, LCD is increasingly being used to replace LEDs (seven segment LEDs or other multi segment LEDs):

1. LCD costs are decreasing..
2. The capability of displaying numbers, characters, and pictures. LEDs, on the other hand, are restricted to numbers and a few letters.
3. Integration of a refreshing controller into the LCD, freeing the CPU from the process of refreshing the LCD. The LED, on the other hand, must be updated by the CPU in order to continue showing the data.

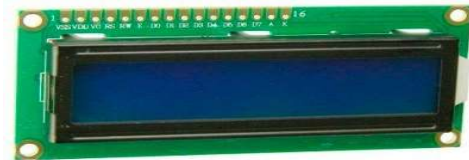


Fig 5 LCD

3. BUZZER

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signaling device. Alarm clocks, timers, and confirmation of human input such as a mouse click or keyboard are all common uses for buzzers and beepers. Joseph Henry created the first electric buzzer in 1831. They were mostly employed in early doorbells until they were phased out in favor of musical chimes, which had a softer tone, in the early 1930s. During the 1970s and 1980s, Japanese manufacturers produced piezoelectric buzzers, also known as piezo buzzers, which were used in a broad range of items. This progress was largely due to the efforts of Japanese industrial businesses working together. They formed the Barium Titanate Application Research Committee in 1951. They formed the Barium Titanate Application Research Committee, which allowed the com to work together to develop various piezoelectric advancements and ideas.



Fig 6 Buzzer

4. Bluetooth Module:

SIM900 GSM Module — This indicates that the module may communicate in the 900MHz band. We are from India, where the 900MHz spectrum is used by the majority of mobile network carriers. If you are visiting from another nation, you must first determine the mobile network band available in your location. The 850MHz band is used by the majority of mobile networks in the United States (the band is either 850MHz or 1900MHz). The 1900 MHz band is largely used in Canada.

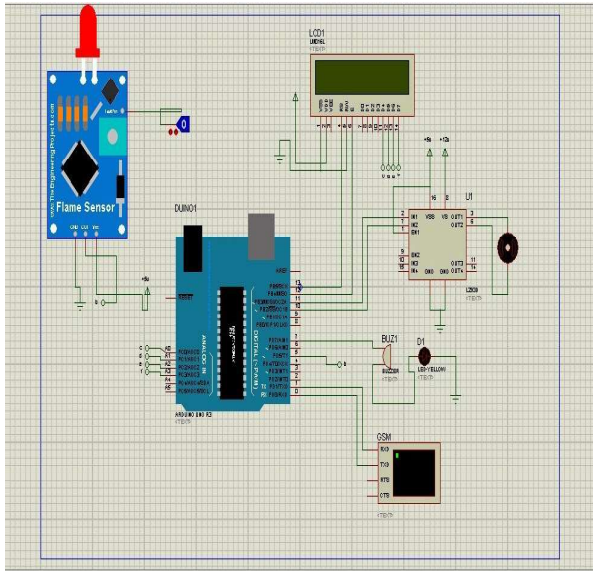


Fig7 Simulation Diagram

5. LCD PIN CONFIGURATION

Pin1(Ground): This pin connects the ground terminal.

Pin2 (+5 Volt): This pin provides a +5V supply to the LCD.

Pin3 (VE): This pin selects the contrast of the LCD.

Pin4(Register Select): This pin is used to connect a data pin of an MCU & get either 1 or 0.

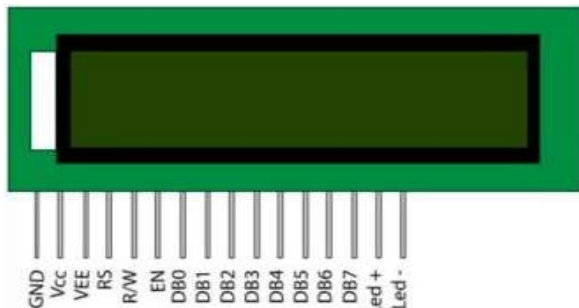


Fig 8 LCD PIN

VI. CONCLUSION.

The advantage of this simple gas leakage detector is its simplicity and its ability to warn out the leakage of the LPG gas. This system uses GSM technique to send alert message or respective person if no one is there in the house and then gas leaks occur, GSM module is the reposed immediate messages to the respective person regarding the gas leak. The main advantage of this system is that it off their regulator knob of the cylinder automatically when gas leakage detected.

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College Automation Process System

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Abstract—In today's world every cooperative organization, government agency, Hospital, factory and Institution requires data and good quality of information to function effectively. College Automation Process System project is a function-oriented design. The poor efficiency of the present manual management system in institutions today results from the inordinate length of time it takes to search for and locate student folders and ineffective attendance system adopted. In college automation process system project, we work on three module online admission, attendance system and student/faculty feedback. This project help college administrator to manage the overall functionality of college, students academic details, attendance of students and also faculties details. Also, students get admission by online registration on college portal. In this project MySQL is the database server where the data is sent and retrieved from while active server pages (JavaScript programming language).

I. INTRODUCTION

College is an institution for education that provides education by specialized faculty and equipments. In some colleges all management system work by pen paper and this takes the huge time and energy for

a small query about any student and faculty, so we create an online system for colleges to make their work fast, easy and flexible. College automation process system is a software to manage college activities and helps both students and administration department of the college. In this college automation process system, we have three main elements of college management authorities, faculties and students. Management authorities can access all over the information about faculties and students. This college automation process system can store students details and also teachers detail and maintain their details. College automation process system access activities happening in the college, admission, attendance and feedback of students and faculties. In this work on three main problems of college which mainly paper work of institution. First is online admission in which the students who want to take admission in our college visit our portal and know about college and apply for admission after the admin permission he/she can take admission. They need to upload their necessary documents and fill all the criteria. Second is attendance system in which we take attendance by webcam. This method made the attendance process strict to the students for attending their classes. Third is online student/faculty feedback system to give and get honest review.

II. LITERATURE SURVEY

Many of the institutions in India in today world manage college activities by pen and paper. This is the very critical problem in Indian institutions. Working by pen and paper take energy and huge amount of time. This is why there is the need of such type of system which make this work very easy and fast, so we create college automation process system. Several countries use this type of system. 80 percentage of college work can be automated and provides maximum online facilities to the students. So, it is a hope that college automation process system helpful for students as well as the faculty members. So, we can say college automation process system is user friendly too.

III. COMPARISON STUDY

Today college management systems are there but not a college automation process system. This college automation process system provides extra flexibility in daily work of college management department. Key Parameters are

A. Online admission

College automation process system provide facility to take online admission in the institution. In existing college management system does not provide this facility to students.

B. Taking attendance using webcam

This system take attendance using webcam this make attendance process strict to the students for taking their class regularly for good attendance record. In existing college management system attendance is taking manually.

C. Student/faculty feedback

College automation process makes this process advance because in this system students and faculty need to login password to enter in the system and give their feedback to particular faculty.

College management system need to provide google for every student and then receive feedback from students.

D. Flexibility

College automation process system is more flexible than existing college management system from both or admin side. Existing system comparatively less flexible than college automation process system.

E. User friendly

College automation process system is user friendly. This provides web pages which make easy to user to access the system. College management system less user friendly mostly access by admin.

IV. PROBLEM DEFINITION

In this time everything we see today is automated. like hospital management, company management, industry management etc. are manage their activities automatically. and we see there is many things which have to be automated in a college like admission of students, attendance of students and many more. The management department manage students details manually and this pen and paper method take a lot of time. A college need to update and manage details by just some clicks. And since day one number of students is growing so management department facing problem in managing their details. So, there is need to build a computerized system that work as representing side of the college and working side of the college. It is necessary to build a system that can work automatically to manage and update details of students. So, we create college automation process system to save time and efforts of Management Department this system can helps the college management a lot and provide flexibility in work. This also helps faculty to take attendance of students by using webcam and upload attendance. College automation process system helpful for students to take admission in college online, know about college policies and facilities provided to the student after the admission student gives the feedback to their faculty.

V. INDUSTRY/SOCIETY BENEFITTED

College automation process system is a software. This system helps both students and management authorities. College automation process system storing students details as well as the faculties details. In a college number of students growing day by day and managing their details manually is most difficult work of management department. This college automation process system provide flexibility by automated all manual activity to reduce time and effort of management authorities. And students can easily aware about the activities happening inside the institution. The main aspects of this system

- 1) Time saving
- 2) Efforts saving
- 3) Very flexible

VI. PROPOSED METHODOLOGY

You want to take admission in a college but you confused about the college environment, policies and education system in college so this college automation process system provides the facility to you go on the college website and know about the college policies, facilities provided by the college and environment of college. And then decide that this college is good for you or not. If good then just go to the college website fill the registration form admin provide you username and

password to login in to the system the need to upload your necessary document like 12th marksheet, 10th marksheet and character certificate and some other documents. Then admin view you details and documents and decide if you are able to take admission in the college or not. After this faculty come to in the class and take students attendance with the help of webcam and upload their attendance on portal. In this college automation process system, there is a feature of taking feedback from students and faculties by filling feedback form and the details which student fill what feedback to which faculty is hide from the faculties. This is college automation process system these functionalities.

VII. CONCLUSION

The advancement of technical application smooths our day-by-day schedule is presently center of each IT organization. People want to do multiple tasks in a day and doing all manually is very difficult. These general problems of every individual make technology this much advanced. So, the purpose of his college automation process system is reduced time and efforts need in the management of any institution or college. We create a website which provide online admission facilities, taking attendance uploading and taking facilities and right to give honest feedback by the students and faculties as well.

VIII. FUTURE DIRECTIONS

College automation process system is a very growing application which can modified in many different ways to serve the purpose of facilitated the easy interaction of functioning department of college. Some of other features could be added to this college automation process system in future are as followed: -

- 1) Online Library Management
- 2) Internal Marks Module
- 3) Semester marks can be access by this application
- 4) Notice already published can be updated in this college automation process system

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Detection of Exoplanets using Machine Learning Techniques

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Abstract—In this paper, we are going to use machine learning techniques for the detection of exoplanets based on the dataset provided by Kepler. Astronomers are already working on the detection of such planets using different techniques but here we will be using transit approach and train different models for the given data. The different models will have different accuracy and will be compared after the complete training of the model and the model with the maximum accuracy will be considered. According to the data till November 18, 2021, Kepler has confirmed the discovery of 2402 planets and have shown 2361 planets as true positives. We aim at discovering more such exoplanets or search about the discovered true positives. Our approach will be comparatively less time consuming as compared to the already used approaches.

Keywords—exoplanets , machine-learning , Kepler, TESS, astronomy, transit approach

I. INTRODUCTION

The study of planets, stars and other astronomical objects has always fascinated the human species. From the discovery of Moon in 1610 till today we have come a long way in our search of celestial bodies. Just like Earth and it's other siblings that revolve around our native star Sun, we have discovered other stars and planets that revolve around them. The planets that revolve around star other than Sun are called Exoplanets or Extra Solar Planets.

Since the launch of Kepler satellite, the number of discovered exoplanets have increased significantly and in 2018 NASA launched TESS (Transiting Exoplanet Survey Satellite) aimed specifically to find more such planets the list is expected to grow more. However the task is not very simple due to complex data analysis and manual processing of this huge data, but with advancements in technology the process is being machine-controlled with the assistance of Machine Learning and Deep Learning techniques.

There are various ways to detecting exoplanet signals. Some of them are :

Direct Imaging[4] The exoplanet is imaged directly with the help of massive telescopes fitted with accommodative optics and coronagraphs. The technique is most sensitive to the hotter, bright (young) and large exoplanets on wide and/or eccentric orbits (large sky projected separations). The separation from the host star permits for spectra to be obtained directly and permits for the direct activity of the light.[17]

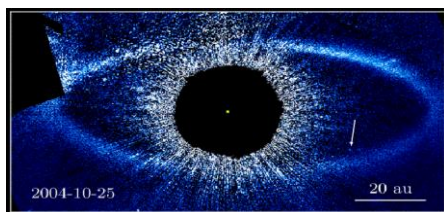


Figure 1: Direct Imaging method of exoplanet detection

Radial Velocity[5] The exoplanet is detected by measure the Doppler effect within the host star light, a consequence of the attractive force affects between the 2 bodies. The technique is most sensitive to exoplanets with an outsized mass orbiting near to their host star perpendicular to the plane of the sky. The radial velocity technique permits for a minimum mass (dependent on orbital inclination) to be calculated.[17]

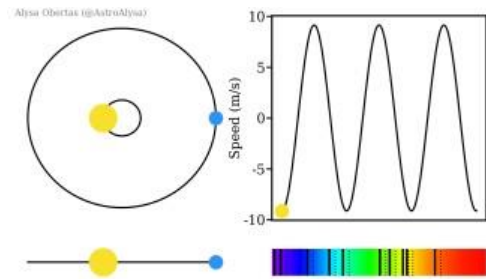


Figure 2: Radial Velocity method

Gravitational Microlensing The exoplanet is detected by measuring characteristic light curve changes caused by changes within the lensing effect ascertained once a star with a planet passes in front of a remote star. The technique is restricted to distant one-time events and by the shortage of correct determinations of the world and orbit parameters. It is however a really valuable technique because of the lack of strong radii or mass biases creating it ideal for applied math population studies.[17]

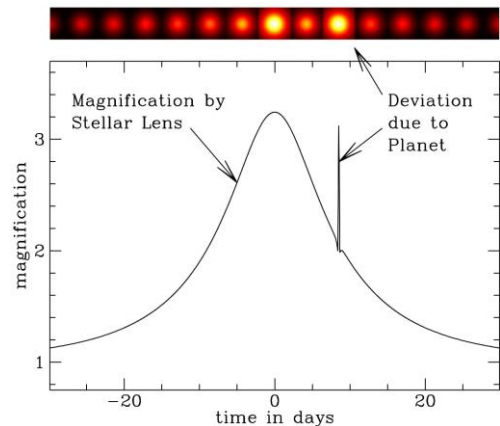


Figure 3: Graph for exoplanet detection using Microlensing

Transit The exoplanet is detected by measuring a periodic decrease within the flux received from the host star, as a consequence of the exoplanet transiting ahead of the host star. The transiting technique is most sensitive to massive exoplanets orbiting near to their host star stars and provides an correct determination of the planetary radius relative to the host star. It is also the most popular and successful method and till date more than 2000 exoplanets have been found using Transit Method.[17]

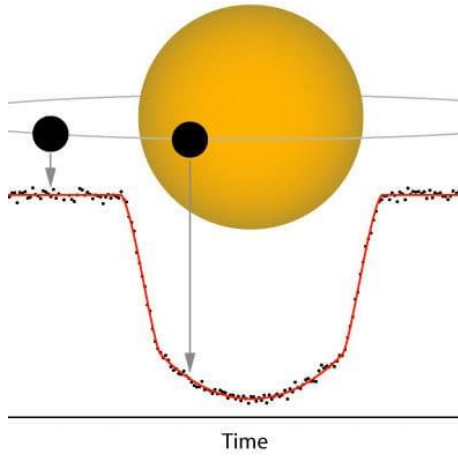


Figure 4: Transit method of exoplanet detection

In this paper, we are going to train some Machine Learning models to sight whether or not a given object is an exoplanet candidate or not using the data available on Mikulski Archive for Space Telescopes also called as MAST archive.

The general flowchart of our approach is as follows

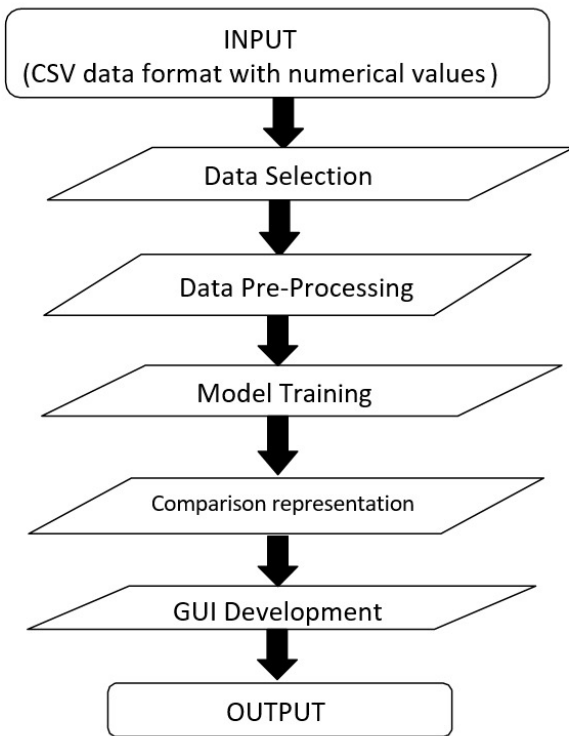


Figure 5: General solution flowchart

II. PROBLEM STATEMENT

We are trying to determine whether a signal is exoplanet candidate or not using transit approach with the help of different machine learning models. The aim is to find planets which may be a bit similar to Earth and will help us to identify if there is any other system existing which is similar to our solar system. The major technique used till now is the Transit approach which includes the monitoring of dips in the brightness of the stars and identifying the appearance of some planets which are causing these dips. But currently, the graphs

of these dips are plotted manually and also monitored manually so we focus on discovery of these planets without using manual approach.[17]

III. EXISTING SOLUTIONS

According to our literature survey, there have been multiple solutions given for automating the vetting process of exoplanets and even today new discoveries and new exoplanets are being discovered. There are various methods of detecting exoplanets but in our survey we found that Transiting Method is the most used as well most successful method among all other methods.

Deep Learning approaches made by Christopher J Shallue and Andrew Vanderberg[1] showed high results with around 98% accuracy. Their model was able to successfully discover two new exoplanet belts around stars Kepler-80 and Kepler-90.

Other approaches used classification models like Decision Tree Classifier, Random Forest Classifier, SVM, KNN, etc. were trained and tested. In a paper by Abhishek Malik, Benjamin P Moster and Christian Obermeier[2], a gradient boosted tree model was trained over 789 extracted features and it yielded an accuracy of 91%.

Shafi in his article 'Exoplanet detection using AI'[3] talked about hunting extra solar planets using CNN and SVM and trained them on combined data of Kepler, K2 and TESS.

Pat Brennan[8] found a circumbinary planet called 'TIC 172900988 b' which revolves around two stars and hence categorized as Circumbinary which means a planet revolving around two stars. The planet has been found using the transit method and is found to be a gas giant like Jupiter but even larger in size.

IV. PROPOSED SOLUTION

After studying about the early methods used for the exoplanet discovery and their needs we have found the transit method to be the most effective way which can be used for the exoplanet discovery at the best success rate. It will be based on different dips caused due to the planet crossing a star. These dips will be monitored continuously and the values received will be used for further detection. For the implementation we are using the data provided by MAST (Mikulski Archive for Space Telescopes). The data contains the values for various transit parameters. We will be using machine learning technique to train different models like the logistic regression, decision tree classifier and random forest classifier. These models will be classifying all the signals as either exoplanet candidate or false positive. Now, these models will be working on raw data, standardized data as well as normalized data. For checking which model will be the best we will be comparing these models based on their precision score, f1 score, accuracy, recall and confusion matrix. The one with the best values will be selected for the detection. Also we will be checking on how our models are more efficient than the models mentioned. [17]

A. Data Gathering

There are various publicly hosted resources available that contain loads and loads of data. NASA's Exoplanet Exploration Program or ExEP[6] is an online archive that holds observational data from satellites like Kepler, K2 and TESS. Also California Institute of Technology (CalTech) also hosts an online archive that contains tools and data captured by Kepler and TESS satellites. But we have used another publicly available resource called as Mikulski Archive for

Space Telescopes that contains a plethora of data from various satellites and missions including Kepler, K2, TESS and many more. The data is available in raw format, csv format, .tpf(Target Pixel File) format and we can also obtain data obtained through different pipelines as well. It is extremely fast and has a great search feature that helps to find very specific range of data along with an extremely friendly user interface. Hence MAST is the platform of choice for this project.

Table 1: Some important features in dataset

S No	Feature	Description
1	koi_disposition	Exoplanet Archive Disposition
2	koi_period	Orbital Period
3	koi_time0bk	Transit epoch
4	koi_duration	Transit Duration
5	koi_depth	Transit Depth
6	koi_prad	Planetary Radius
7	koi_teq	Equilibrium Temperature of planet
8	koi_model_snr	Transit signal to noise ratio

B. Data Cleaning and Processing

We downloaded the data in .csv format from MAST and the data contains 9564 rows and 50 columns. However upon close observation we found that some of the columns were entirely null as well as some were irrelevant for our purposes hence we dropped some of the columns.

To fill columns having some null values we used two methods, if data was numerical we filled it using the mean which is the average of the column and if the data was categorical we used mode which is the most frequent data in the column.

Also we found that the categorical data was nominal in nature hence to convert it from categorical to numerical data we used one-hot encoding technique. Also we split the data into training and testing set in the 70-30 fashion i.e. 70% percent data for training the model and 30% remaining for testing. During splitting we set randomness to 1 and set the shuffle flag to True.

Lastly since our data contains values ranging very differently we decided to perform normalization and standardization using MinMaxScaler and StandardScaler respectively so that the data comes down to a more reasonable range. The MinMaxScaler changes all the values to range between 0 and 1 where as StandardScaler ranges down the values between -1 and 1. [17]

C. Model Selection

For our project we decided to train three different models on three datasets (main data, normalized data and standardized data). The three models are :-

a. Logistic Regression[9] - Logistic regression is a method of modeling the probability of a distinct outcome given associate input variable. the foremost common logistic regression models a binary outcome; something that may take 2 values like true/false, yes/no, and so on. Multinomial logistic regression can model eventualities wherever there are more than 2 potential distinct outcomes. logistic regression could be a helpful analysis technique for classification issues, wherever you are attempting to work out if a brand new sample fits best into a class. As aspects of cyber security are classification issues, like attack detection, logistic regression could be a

helpful analytic technique. Issues, like attack detection, logistic regression could be a helpful analytic technique.

Input: Training data

1. For $i \leftarrow 1$ to k
 2. For each training data instance d_i :
 3. Set the target value for the regression to $y_j - P(1 | d_j)$

$$z_i \leftarrow \frac{y_j - P(1 | d_j)}{[P(1 | d_j) \cdot (1 - P(1 | d_j))]}$$
 4. initialize the weight of instance d_j to $P(1 | d_j) \cdot (1 - P(1 | d_j))$
 5. finalize a $f(j)$ to the data with class value (z_j) & weights (w_j)
- Classification Label Decision**
6. Assign (class label:1) if $P(1 | d_j) > 0.5$, otherwise (class label: 2)

Figure 6: Logistic Regression Algorithm

b. Decision Tree Classifier[9] - Decision Tree is a supervised learning technique that may be used for both Classification and Regression issues, however largely it is most popular for solving Classification issues. It's a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the choice rules and every leaf node represents the end result. In a decision tree, there are two nodes, that are the Decision Node and Leaf Node. Decision nodes are accustomed to create any decision and have multiple branches, whereas Leaf nodes are the output of these choices and don't contain any further branches. The decisions or the test are performed on the idea of features of the given dataset. It is a graphical illustration for obtaining all the potential solutions to a problem/decision supported given conditions. It is known as a decision tree because, just like a tree, it starts with the root node, that expands on more branches and constructs a tree-like structure.[17]

```

GenDecTree(Sample S, Features F)
Steps:
1. Ifstopping_condition(S, F) = true then
   a. Leaf = createNode()
   b. leafLabel = classify(s)
   c. return leaf
2. root = createNode()
3. root.test_condition = findBestSplit(S, F)
4. V = {v | v a possible outcome of root.test_condition}
5. For each value v in V:
   a. S_v = {s | root.test_condition(s) = v and s in S};
   b. Child = TreeGrowth(S_v, F);
   c. Add child as descent of root and label the edge {root -> child} as v
6. return root

```

Figure 7: Decision Tree Algorithm

c. Random Forest Classifier[9] - Random Forest is a supervised machine learning algorithm in which multiple Decision Tree Model work together as a committee. Every individual tree within the random forest spits out a {class category} prediction and also the class with the most votes becomes our model's prediction. The fundamental idea behind random forest is a straightforward however powerful one —

the knowledge of crowds. In data science speak, the rationale that the random forest model works so well is: A large variety of comparatively unrelated models (trees) operating as a committee can exceed any of the individual constituent models.[17]

Algorithm 1: Pseudo code for the random forest algorithm

To generate c classifiers:

```

for  $i = 1$  to  $c$  do
    Randomly sample the training data  $D$  with replacement to produce  $D_i$ 
    Create a root node,  $N_i$  containing  $D_i$ 
    Call BuildTree( $N_i$ )
end for

BuildTree( $N$ ):
if  $N$  contains instances of only one class then
    return
else
    Randomly select  $x\%$  of the possible splitting features in  $N$ 
    Select the feature  $F$  with the highest information gain to split on
    Create  $f$  child nodes of  $N$ ,  $N_1, \dots, N_f$ , where  $F$  has  $f$  possible values ( $F_1, \dots, F_f$ )
    for  $i = 1$  to  $f$  do
        Set the contents of  $N_i$  to  $D_i$ , where  $D_i$  is all instances in  $N$  that match  $F_i$ 
        Call BuildTree( $N_i$ )
    end for
end if

```

Figure 8: Random Forest Algorithm

D. Evaluation

After training our models with data we tested them using our test data set and evaluated Confusion Metrix, Accuracy, Precision, Recall and F1 Score.

The test results of all are three models is given below

Table 2: Result for Logistic Regression Model

Dataset	Accuracy	F1 Score
Main	79.634%	.7975
Normalized	79.540%	.7968
Standardized	79.751%	.81673

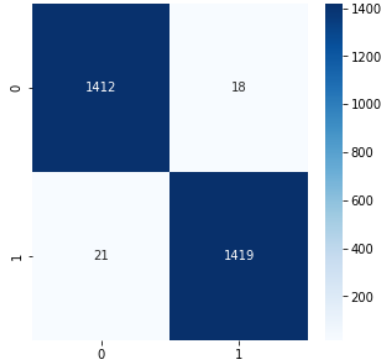
Table 3: Result for Decision Tree Model

Dataset	Accuracy	F1 Score
Main	97.780%	.9784
Normalized	98.765%	.9886
Standardized	98.540%	.9855

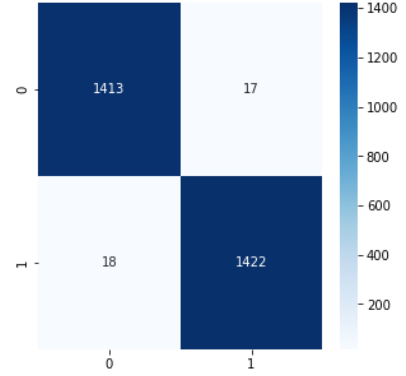
Table 4: Results for Random Forest Model

Dataset	Accuracy	F1 Score
Main	98.675%	.9867
Normalized	98.571%	.9855
Standardized	98.432%	.9844

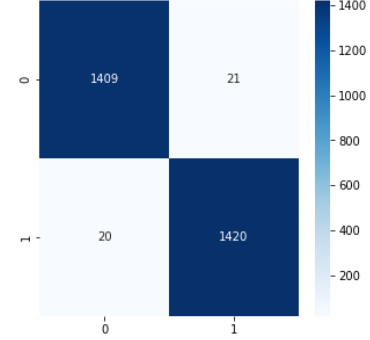
Decision Tree model with raw data



Decision Tree model with normalized data



Decision Tree model with standardized data



V. MODEL SELECTION

From the results we have obtained, we have decided to go with a Decision Tree Classifier based approach for our project. The results of both Decision Tree Classifier and Random Forest Classifier are very similar to each other (since Random Forest is an extended version of Decision Tree and uses multiple Decision Trees), however, there were two main reasons for choosing Decision Tree Classifier over Random Forest Classifier

1. It requires less resources and computational power than Random Forest Classifier.
2. Based on our results, Decision Tree Classifier outperformed Random Forest Classifier by a small margin.

Hence we have decided to go forward with Decision Tree Classifier.

VI. TOOLS AND LIBRARY USED

Throughout the course of this project, we have made use of various tools and libraries to help facilitate our tasks. We have chosen Python as our choice of programming language. The reason behind this was the flexibility that Python provides. Its syntax is easy to read thus it improves the overall efficiency and it has a large, free to use library support that allowed us to do all the work from data pre-processing till model deployment using Python only.

The libraries that we have used are

- A. Pandas – According to the official website, “pandas is a Python package providing fast, flexible, and expressive data structures designed to make working with “relational” or “labeled” data both easy and intuitive. It aims to be the fundamental high-level building block for doing practical, real-world data

analysis in Python. Additionally, it has the broader goal of becoming the most powerful and flexible open-source data analysis/manipulation tool available in any language. It is already well on its way toward this goal.” [10].

- B. NumPy - NumPy is the fundamental package for scientific computing in Python. It is a Python library that provides a multidimensional array object, various derived objects (such as masked arrays and matrices), and an assortment of routines for fast operations on arrays, including mathematical, logical, shape manipulation, sorting, selecting, I/O, discrete Fourier transforms, basic linear algebra, basic statistical operations, random simulation and much more.[11]
- C. Matplotlib - Matplotlib is a python library used to create 2D graphs and plots by using python scripts. It has a module named pyplot which makes things easy for plotting by providing feature to control line styles, font properties, formatting axes etc. It supports a very wide variety of graphs and plots namely - histogram, bar charts, power spectra, error charts etc. It is used along with NumPy to provide an environment that is an effective open-source alternative for MATLAB. It can also be used with graphics toolkits like PyQt and wxPython.[12]
- D. Scikit Learn - Scikit-learn (Sklearn) is the most useful and robust library for machine learning in Python. It provides a selection of efficient tools for machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction via a consistence interface in Python. This library, which is largely written in Python, is built upon NumPy, SciPy and Matplotlib.[13]
- E. Pickle - Python pickle module is used for serializing and de-serializing a Python object structure. Any object in Python can be pickled so that it can be saved on disk. What pickle does is that it “serializes” the object first before writing it to file. Pickling is a way to convert a python object (list, dict, etc.) into a character stream. The idea is that this character stream contains all the information necessary to reconstruct the object in another python script.[14]
- F. Flask - Flask is a web application framework written in Python. It was developed by Armin Ronacher, who led a team of international Python enthusiasts called Pocco. Flask is based on the Werkzeug WSGI toolkit and the Jinja2 template engine. Both are Pocco projects.[15]
- G. Bootstrap - Bootstrap is an open-source CSS framework that encourage clean and consistent design language through the website. It consists of pre-written css classes with additional javascript and jQuery support over which components like cards, navigation bars, etc are built, ready to use for the user.

These are all the tools and libraries that we have used to develop and test our project. All the resources used in the project are open-source and no paid software were used.

VII. METHODOLOGY

All of our data comes from MAST[16] portal which holds the data obtained from major telescopes like Kepler and TESS.

We have taken candidates from Kepler Data and chosen only the specific required columns from a list of 69 columns. The taken columns are as follows

1. Kepid – Kepler object id
2. kepoi_name – Name of the planet when confirmed
3. kepler_name – Name of the object before confirmation
4. koi_disposition – Result from observation
5. koi_pdposition – Result from prediction
6. koi_score – Confidence score of disposition
7. koi_fpflag_nt – Non-Transit like False Positive flag
8. koi_fpflag_ss – Stellar Eclipse False Positive flag
9. koi_fpflag_co – Centroid Offset false positive flag
10. koi_fpflag_ec – Ephemeris Match false positive flag
11. koi_period – Orbital period of object measured in days
12. koi_period_err1 – Upper limit error in orbital period
13. koi_period_err2 – Lower limit error in orbital period
14. koi_time0bk – Time taken for every transit to occur again.
15. koi_time0bk_err1 – Upper limit error in transit time
16. koi_time0bk_err2 – Lower limit error in transit time
17. koi_impact – The sky projected distance between the center of the stellar disc (star) and the planet disc
18. koi_impact_err1 – Upper limit error in impact parameter
19. koi_impact_err2 – Lower limit error in impact parameter
20. koi_duration – The duration of the stellar flux block from the point of minimum flux to the point of maximum flux blocked and back to the point of minimum flux blocked.
21. koi_duration_err1 – Upper limit error in transit duration
22. koi_duration_err2 – Lower limit error in transit duration
23. koi_depth – The curve depth of the point of minimum stellar flux to the maximum stellar flux computed using best fit model by Mandel-Algol.
24. koi_depth_err1 – Upper limit error in transit depth
25. koi_depth_err2 – Lower limit error in transit depth
26. koi_prad – It is the estimated radius of the object with respect to Earth Radii. It is the product of stellar radius and the planet star radius.
27. koi_prad_err1 – Upper limit error in planet radius
28. koi_prad_err2 – Lower limit error in planet radius
29. koi_teq – The equilibrium temperature of the object which is calculated on the basis of distance of object and parent star, and whether the object is a black body or not and the heat is distributed evenly between day and night side of the planet.
30. koi_teq_err1 – Upper limit error in equilibrium temperature
31. koi_teq_err2 – Lower limit error in equilibrium temperature
32. koi_insol – Insolation flux is another parameter used to calculate the equilibrium temperature of the planet using planetary parameters like planet radius.
33. koi_insol_err1 – Upper limit error in insolation flux
34. koi_insol_err2 – Lower limit error in insolation flux
35. koi_model_snr – It is transit signal-to-noise. Transit depth is normalized bu the mean uncertainty in the flux during transit

36. koi_tce_plnt_num – Planet number added to KOI objects.
37. koi_tce_delivname - TCE delivery name corresponding to the TCE data federated to the KOI.
38. koi_steff – The effective temperature of the parent star observed by the telescope.
39. koi_steff_err1 – Upper limit error in effective stellar temperature.
40. koi_steff_err2 – Lower error in effective stellar temperature.
41. koi_slogg – The stellar radius of the parent star as observed by telescope.
42. koi_slogg_err1 – The upper limit error in the parent star.
43. koi_slogg_err2 – The lower limit error in the parent star.
44. koi_srad - The base-10 logarithm of the acceleration due to gravity at the surface of the star.
45. koi_srad_err1 – Upper error limit in the acceleration due to gravity
46. koi_srad_err2 – Lower error limit in the acceleration due to gravity
47. ra – Right Ascension is the distance of a point east of the First Point of Aries, measured along the celestial equator and expressed in hours, minutes, and seconds.
48. dec – Declination is the angular distance of a point north or south of the celestial equator.
49. koi_kepmag – Kepler band or sector in which the object is located.

All these 49 columns represent information regarding the timeseries data of the candidate object which is important for transit analysis.

Further, we have decided to check for null values and we have filled that gap with mean value for the objects in same space sector. The reason for choosing mean value is that, since we are taking mean of objects in same sector, we observed that there is not much difference in the values, hence it is safe to take mean value.

Next, we noticed a categorical column i.e., column having non numerical and not null data. To change that to numerical form as our chosen model works best on numerical type data. We have done it using a technique called as One-Hot Encoding which simply converts categorical values into integer dynamic vectors. With 0(zero) in all the places except for the index of the actual value. This way if you have say three categories in your column, three additional columns with values in 0 and 1 will be added to your dataset. We used sklearn's preprocessing module to perform one-hot encoding. We also performed standardization on the dataset so that all the values are in same range which improves the overall accuracy of the model. Standardization was done using StandardScaler from sklearn's preprocessing module. The dataset was divided into 70-30 fashion where 70% data was used for training and 30% data was used for testing the model.

The trained model was then exported as binary file using Python Pickle library so that it can be used in another file.

VIII. GUI DEVELOPMENT

For developing GUI and model deployment we have decided to go with Flask which is a Micro framework for developing

web application. It is a common choice for developers to use flask for deploying machine learning models as it is simple to use and very fast to get started with. We created a view which is a python function to get the input csv file from the form and then that file is validated and sent to another function that intend to predict the result of the given csv file. There is constant use of validation and proper warning system for the user with instructions. Apart from HTML and CSS, Bootstrap framework is also used for a cleaner and consistent look throughout the website.

IX. CONCLUSION AND FUTURE SCOPE

From our results we can say that in our case Decision Tree classifier works the best with accuracy of 98.5% and F1 Score of .98. Also we have chosen the classical machine learning approach instead of deep learning method like Convolutional Neural Network (CNN) because classical algorithms are easy to implement and far more less complex and require less time as well space to train. Our result is also comparable to the results obtained by deep learning models and CNN based approaches. Classical Machine Learning algorithm also require less data as compared to deep learning algorithms. Also our score were comparable to the results of other algorithms we have discussed in this paper.

Our understanding for exoplanets have come a long way since the discovery of first exoplanet in 1995. In early stages the only extra solar planets found were big gas giants and hot Jupiter but now with the advancement in our technology and sophisticated satellites we are able to detect many Earth like exoplanets as well. The data has been pouring in since then and has helped to improve our understanding of our solar system and its creation. Also with the launch of James Webb Telescope there will be enormous increase in the amount of data that we are currently receiving hence we plan on improving our system to predict the data from additional satellite like TESS and also improve the overall accuracy of the model.

Overall, our aim is to provide budding exoplanet hunters like us a tool that help them save time and efforts in the manual task of performing the calculations and mapping the results and with current speed at which the data is coming from satellites we plan on improving our tool and built it as a platform over which discoveries can be made.

ACKNOWLEDGEMENT

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We, as a team, thank each other for all the co-operation and support required to complete this paper. All the authors whose papers were used for reference for our paper were a great source of information.

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A CNN Model for Emotion Recognition System

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Abstract—Understanding human emotions is widely employed in a variety of fields. It can be recognized by different factors. Emotion recognition is used to extract emotional features like happy, sad, angry, etc., from speech. An individuals emotions are mainly influenced by physical characteristics like muscle tension, skin elasticity, and blood pressure. A person's emotions are unique, but their understanding, interpretation, and reflections can be distinct.

Index Terms—Emotion identification, feature extraction, pre-processing, CNN, MFCC classifier.

I. INTRODUCTION

Human emotions are considered as mental and physiological state. Human emotions are basically, recognized in a different sound conditions. Detecting human emotions can play an important role in intelligent human-machine interlinkage systems. Emotions can also be recognized through the way a person speaks [1]. At the same time, this is a very demanding task due to different strains in the recognition of emotion through audio data. Emotion recognition has various applications in fields such as security, smart banking, marketing, crime investigation, medical, etc. Much research is also going into designing robots that can have the ability to detect the mental state of patients by voice interaction. This research paper reviews different projects done in the area of speech emotion identification. Our work will be extended to developing such a system for interaction with some AI-based applications such as playing music based on ones emotions. We decided to use audio mode instead of visual data for our project. To analyze an individual's emotion, we will only focus on 3 emotions: happy, sad, and neutral. The automatic speech emotion identification task is crucial to the development of human-machine interactivity systems. However, due to the vagueness of emotion categories and the subjective nature of human annotations, extracting discriminative emotional traits and improving classification accuracy is difficult. For a long time, emotion recognition has been a research topic. The core of studies in emotion identification was the detection of emotions through facial expressions and movements. In recent years, there has been a lot of study on emotion recognition from speech signals for a range of applications. Emotions and gestures are important in human-computer interaction.

Speech emotion recognition (SER), which aims to examine emotion states through speech patterns, has received much interest recently. Nevertheless, SER remains a challenging

task, with the question of how to extract effective psychic, or emotional features [2].

There has been a great deal of study into recognition systems. Weve collected various research papers that may or may not deal with various aspects of this field. Most of the time, the results of these studies show that the systems get results pretty accurately. This research has used popular machine learning (ML) and deep learning algorithms like SVM, CNN, ANN, RNN, Random Forest, etc., and classifiers like MFCC, Chroma, and MLP. With the help of different classifiers, i.e., MFCC and MLP, CNN and SVM give quite a decent accuracy of around 80-90 %.

II. LITERATURE REVIEW

There has been a lot of research on emotion recognition systems. We've collected various research papers that deal with various aspects of this field. Most of the time, results of these studies shows that the systems gets results pretty accurately. These research have used popular machine learning (ML) algorithms like support vector machine (SVM), convolution neural network (CNN), artificial neural networks (ANN), recurrent neural networks (RNN), etc., and classifiers like MFCC and MLP. With the help of different classifiers i.e., MFCC and MLP, CNN and SVM give quite a decent accuracy of around 80-90

Bharti and Kukana defined the speech emotion recognition system through Machine Learning using MSVM to identify the various types of expression. The research outlined the four primary steps of the Speech Emotion Recognition (SER) system: input sample, valuable features, detection/recognition, and emotion output. The input samples were taken from the RAVDESS data set. They used Gammatone Frequency Cepstral Coefficient (GFCC) as feature extraction method. This paper focused on ML using MSVM method and feature set was trained into three emotional categories (Sad, Happy and Joy) The work was simulated on MATLAB and parameters like AUC, FAR, FRR, MSE, and SNR were evaluated and compared with that of SVM and MFCC. This research work had concluded that the MSVM, GFCC, and ALO models have achieved a high accuracy rate and high signal-to-noise ratio in comparison with SVM and MFCC algorithms [1].

Another research demonstrated by the authors in [2] is focused on two different audio sets namely recorded audio and real time audio. The model proposed includes four steps from signal acquisition to modeling of extracted features.

The model focused on detecting continuous and qualitative speech.

The continuous speech features like pitch, intensity, energy, and jitter values were extracted from the voice signals. These acoustic characteristics of speech carry linguistic contents of emotional states. They worked on glottal pulse which is comprised of harmonics and noisy components.

In the first step, input signal was taken in four different emotional states. The second step of Voice extraction was further divided into three parts- voice activity detection (to select significant portions of input signal), voiced portion accumulation (to achieve glottal pulse concentration) and data preprocessing. (Linear Predictive Cepstral Coefficient for pitch detection). In the third step, the emotional state was identified from real time voice signals. After feature extraction from the dataset different classification methodologies have been applied to predict the emotional state. The prediction model had an approximate of 83

Authors of [3] proposed a model based on melfrequency cepstrum coefficient (MFCC). The objective of MFCC is to produce an output coefficient which works as input for the Hidden Markov Model to be classified into the speaker's emotions. The model was designed to identify seven certain types of emotions. The classification outputs are angry, calm, scared, happy, sad, disgusted and shocked. The data set was taken from SMART LAB from Ryerson University. These datasets were further divides into two parts for training and testing purposes. The main feature of the proposed methodology, Mel-frequency cepstrum, was used to extract sound signal characteristics based on the principle of hearing characteristics of the human ear. Then the testing is initiated through Hidden Markov Model and the categorization can be done. The evaluation was done on a dataset of 240 utterances and showed that the model gives an accuracy of 81.65A research work proposed in [4] demonstrated that modified mean cepstral features give an improved recognition rate when compared to other conventional methods. The input data was taken from two speech databases EmoDB and SAVEE. The average emotion recognition rates were 97.01% and 98.8% for EmoDB and SAVEE emotional speech datasets individually. Another attempt in the field of emotion recognition is done in [5] by combining speech and facial features. The model was implemented in steps. These steps are as follows:

- i. Preprocessing of speech and facial data.
- ii. Feature extraction using Deep Neural Network.
- iii. DNNs for fusing emotions by sensing acoustic properties and features of facial expression.

In the feature extraction, face ID, CNN, and bi-directional log short term memory (Bi-LSTM) for the extraction of temporal acoustic features was used. For facial feature extraction, multiple small-scale kernel convolutional blocks were implemented.

The proposed model worked on the dataset IEMOCAP recorded by the University of Southern California. Video,

audio, speech text, and facial expressions are all included in the dataset. It takes approximately 12 hours. [11] Provides a full overview of the dataset. The main strength of the paper is that the proposed model not only showed a great improvement over the uni-modal features model but also the use of multiple small scale convolution kernels confirmed a good recognition rate along with minimized training parameters when compared to multiple large scale convolution kernels.

By creating two models, the authors of [6] suggested an Emotion Recognition System. In order to extract features in the suggested system, MFCC was applied. A multi-layer perceptron and a Recurrent Neural Network were used to create the first model (RNN). A Recurrent Neural Network (RNN) and LSTM were used to create the second model (RNN). The dataset [6] is based on 1440 audio recordings from the "Ryerson Audio-Visual Database of Emotional Song and Speech." TensorFlow, Keras, NumPy, Matplotlib, Pandas, Librosa, Wave, and Scikit-Learn were used to build the system in Python. The model that used MLP had a result accuracy of 57.29 percent, whereas the model that used LSTM had a result accuracy of 92.88 percent. In [7], researchers suggested a model for detecting emotion from facial expressions. The recognition of emotions is aided by the use of facial expressions. Real-time video is used as an input in the model suggested in the paper. It uses a local binary pattern's cascade classifier to detect the face. After applying some preprocessing to the data obtained, the feature extraction stage is carried out. With Histogram Oriented Gradients (HOG) and facial landmarks, this model proposed a strategy in which features are retrieved by CNN. An input layer and four convolutional layers make up a CNN model [7]. The classifying dataset was derived from two publicly accessible databases: FER2013 and JAFFE (Japanese Female Facial Expressions). In the field of facial emotion recognition, both datasets are well-known. The results of two databases' computations reveal that the suggested technique may achieve excellent results, with accuracy of 91.2 percent and 74.4 percent on the JAFFE and FER2013 databases, respectively. Researchers in [8] proposed an audio-textual training framework. Word2Vec and Speech2Vec were trained and their two embedding spaces were aligned so that Speech2Vec features are as near to Word2Vec features as possible [10]. CNN is used to train the low-level aspects of the voice signal. The semantic and paralinguistic components are merged into a single representation, which is then transmitted through a long short-term memory (LSTM). Before the final prediction, a module that captures the signal's material dynamics[8]. The dataset utilised was the Sentiment Analysis in the Wild (SEWA), which has been previously used in the Audio/Visual Emotion Challenge (AVEC). Another work [9] in the related field has been done while considering acoustic features of the speech such as prosody, spectral, qualitative, and excitation source features. The proposed model is a blend of prosody, spectral and statistical functional feature values.

The goal is to help the classifier improve its performance. Various statistical functions such as mean, variance, range, standard deviation, and so on were used to extract meaningful

information. These functions' primary goal is to detect emotional states. The classifiers employed for classification were KNN, LDA, and SVM. However, the paper also advocates training & evaluating the model by other deep neural networks. The removed feature subset is taken as input to the classifier. The classifier is trained using some proven speech corpus Emo-DB, SES, IITKGP-SESC, IEMOCAP, and IITKGP-SEHSC. These entire speech corpora are benchmarked and contain a variety of samples.

It is observed that SVM gave 93.5% of accuracy which is the best among all three on the IITKGP-SEHSC dataset. Feature fusion approaches and optimal feature selection are the paper's strengths. In terms of accuracy, it improved the model's performance. At the same time, the results reveal that a model for positive and negative emotions performs differently. The general flowchart of our approach is as follows:

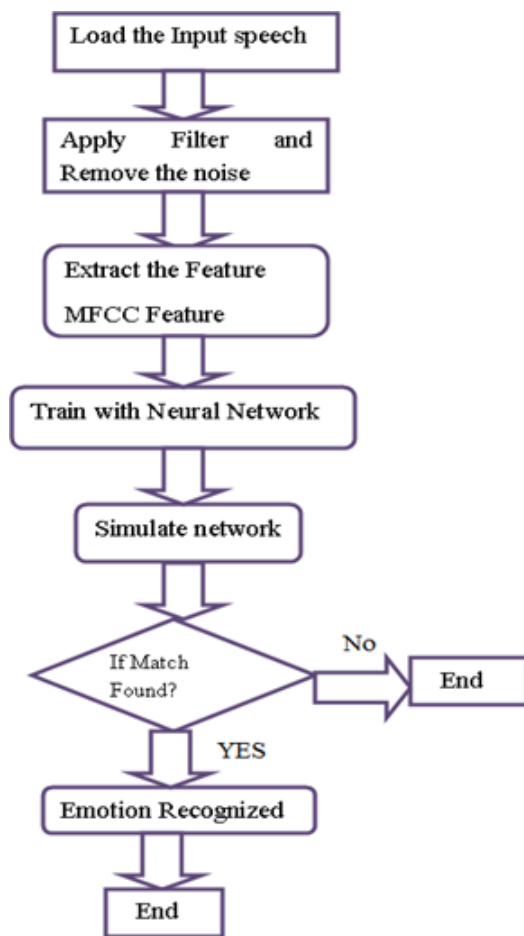


Fig. 1. General solution flowchart

III. PROBLEM STATEMENT

Speech Emotion Recognition (SER) is the task of recognizing emotion in speech regardless of semantic information. A person's emotions are unique, but their understanding, interpretation, and reflections can be distinct. Predicting the emotion through user speech data is a quite difficult task. For that, we made a webpage to record the speech of the user.

When we drag that audio file into this model, it detects the emotion of that speech. This project has immense possibilities in areas like Call centers to detect customers emotions, voice-based virtual assistance like Siri & Alexa, etc. Since emotions are calculated as distributed on a gender basis, the people who are not categorized as male or female voice can be identified if aggressive research happens behind this project.

Even we could detect the emotion of animals if we worked on the datasets related to that in the further research study. Making this project into a product can also help as an emergency system through voice, for example, in a home, if a person is causing a terrible injury where he is not able to walk, he can scream at the people/product asking for help. The product would detect his emotion & emergency and would proceed with further steps like calling a nearby hospital, an ambulance, or even the police if a robbery happens. These were the outlines of where we can execute this model.

IV. EXISTING SOLUTION

According to our literature survey, there have been multiple solutions given for the SER system. There are various methods of detecting emotions through speech, but, in our survey, we found that the CNN method is the most used as well as a most successful method among all other methods. The model implementing MLP gave results with an accuracy of 57.29

Other outlooks trained and tested classification models such as Decision Tree Classifier, Random Forest Classifier, SVM, KNN, and others. M. Aravind Rohan, K. Sonali Swaroop, B. Mounika, K. Renuka, and S. Nivas report an accuracy of 82 percent for the RF algorithm in their study [12]. This accuracy can be improved further by the implementation of hybrid classifiers for emotion recognition through speech.

A research work proposed in [4] demonstrated that modified mean cepstral features give an improved recognition rate when compared to other conventional methods. The input data was taken from two speech databases EmoDB and SAVEE. The average recognition rates were 97.01% and 98.8% for EmoDB and SAVEE emotional speech datasets individually.

V. PROPOSED SOLUTION

After studying the early methods used for the SER system and their needs, we've chosen CNN Method for our model, which is the most effective way to predict the emotion of a particular speech at the best success rate. CNN is a deep learning or neural network technique that comprises of multiple layers that are added in order. Convolution layers, pooling layers, fully linked layers, and a SoftMax unit is among the layers that make up the CNN model. For our model, we used the RAVDESS Dataset from Ryerson Audio-Visual Database of Emotional Song and Speech. The RAVDESS Dataset (Ryerson Audio-Visual Database of Emotional Speech and Song) was used. There are 1440 files in this portion of the RAVDESS, separated into 60 trials. The RAVDESS cast comprises of 24 professional actors (12 women, 12 men) who deliver two lexically-related phrases in a neutral North American dialect. Calm, joyful, sad, furious, afraid, astonished, and disgusted

expressions are only a few examples of speech emotions. We only used certain emotions for our project demonstration, such as happy, sad, furious, and neutral. We extracted 75% of our dataset for training after loading it. After loading our dataset, we have extracted 75% of the dataset for training and the rest 25% of the dataset for testing.

```
# load RAVDESS dataset, 75% training 25% testing
# X_train, X_test, y_train, y_test = load_data(test_size=0.25)
```

For the feature extraction method, we chose MFCC. It's a common technique for extracting features from an audio source. It's a representation of a sound's short-term power spectrum that uses a nonlinear Mel frequency scale and a linear cosine transform of a log power spectrum. After extracting features and doing enough computations, our model achieves a 75.60 percent accuracy.

```
# loss, acc model. evaluate (x_test, y_test)
# print ("Restored model, accuracy: {:.5.2f}
%format(100*acc))
Output: Accuracy = 75.60%
```

VI. LIMITATIONS

Emotion recognition has become an important problem in Human Computer Interaction technology. Since last decade, much work has been done and in progress, but there are many challenges that come across during designing of robust and efficient SER systems. One such challenge is the background noise which occurs in real time input acquisition. Though the data sets include audio with minimum or no noise but when it comes to taking real time data, noise is an obvious ingredient to the audio input. Another common challenge is the dimensional reduction and feature selection. Sometimes, feature selection comes with a trade off of removing significant data from the input. Other problem occurs with the selection of the classifier based on the input and the features selected. We have seen that there are many conventional approaches which are in use in SER systems. When additional features are used with the classifiers, it outperforms the conventional methods.

VII. CONCLUSION AND FUTURE SCOPE

From our results, we can say that in our case CNN gives the best with an accuracy of 75.60%. We attempted to conduct a thorough examination of some speech emotion identification systems in this research. Speech databases were required for such systems. These databases provide the data not only for the training process but also for testing purposes. However, the data needs certain initialization before applying it to the training or testing of the model. Certainly, preprocessing plays an important role. The validity and richness of data trigger researchers to develop a better solution. Feature extraction

is done after the data preprocessing. The observed feature extraction techniques used in other papers are MFCC, LPCC, DNN, and LSTM. After the feature extraction, classification models are used to train the model and produce required results.

This concludes that much work has been done in this field and when additional features such as semantics, acoustic, and facial expression are combined with the audio data, and appropriate classifiers are used, results are much better than conventional classifiers.

VIII. ACKNOWLEDGMENT

We are grateful to our institution for pointing us in the right direction so that we could take advantage of this opportunity. We would also want to express our gratitude to our guide, Ms. Priyanka Goel, and our Project Committee for their constant support. We, as a team, thank each other for all the cooperation and support required to complete this paper. All the authors whose papers were used for reference for our paper were great sources of information.

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Implementation of Pulse Meter

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Abstract—This report presents the design of a low-cost, portable, and blood pulse meter. A blood pulse meter is a non-invasive device capable of monitoring the blood Pulse meter. It is widely used in the world of medicine, fitness, and health care. Low-cost wearable BPM can greatly extend its functionality. The goal of this masterpiece design project was to design and build an inexpensive wearable pulse meter, using a portable electronic device. The Pulse oximeter is a medical device that can detect the fullness of the heartbeat as a signature of our quality of life. The heartbeat sensor is implemented to provide the binary output of the temperature rhythm when the finger pressed it. When the heart scanner is working, the LED rhythm flashes on each heartbeat at a time. This binary output can be connected to a small controller directly which measure Beats per minute (BPM). It mainly works on the principle of changing light due to blood flow on each pulse. It is a small device, like a clip and is attached to the limb, which usually attaches to the finger. Medical professionals often use them in critical care settings such as emergency wards in hospitals. The doctors who are professioned in pulmonary, may use them in office settings. You can even use one at home.

I. COMPONENTS USED

A. PULSE SENSOR

Pulse Sensor is a simple and effective way to connect the Arduino with a heartbeat sensor. Any student, artist, athlete, builder, game developer and other developers who wants to measure heart rate data can use the heart beat sensor for their projects. The theme is an integrated circuit for amplifying light and sound that eliminates the regional sensor. It can be clipped in your ear or fingertip. On connecting it with Arduino, you can read the heartbeat. Also, it has an Arduino demo code that makes it easy to implement.



Fig. 1. Pulse Sensor

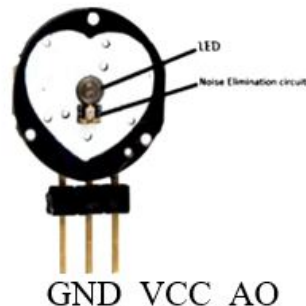


Fig. 2. PIN description of Pulse Sensor

There are three PINs: DCC, GND, and Analog pin.

At the center of the Pulse Sensor, the LED is switched on with this sensor module that helps detect heart rate. Under the LED, there is a noise reduction circuit that should prevent the sound from touching the reading.

B. 0.96 I2C OLED Display

It is a 0.96 inch OLED module having resolution 128x64 which can be connected with any microcontroller using SPI or I2C protocol. It is a package of the display board, the display and presoldered 4 pin male headers.



Pin 1: GND
Pin 2: 3.3V to 5V
Pin 3: SCL - Serial Clock
Pin 4: SDA Serial Data

Fig. 3. PIN description of OLED

II. CIRCUIT DIAGRAM & CONNECTIONS

Assemble the parts to design an ECG with display using the OLED and Arduino Pulse Sensor as shown in the diagram below.

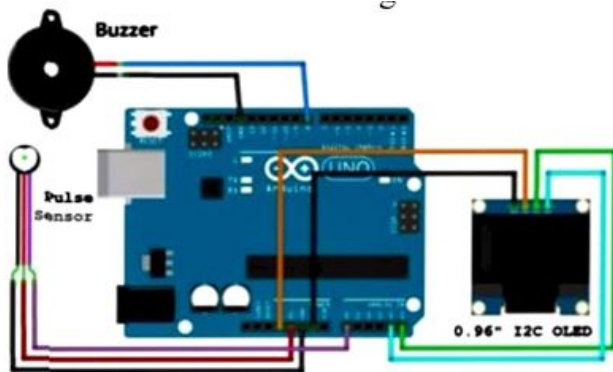


Fig. 4. Circuit diagram

On connecting Arduino 5V pin to Pulse sensor VCC pin and GND pin to GND, connects the Ao pin to Arduino Analog pin A0.

Likewise, after connecting the VCC pin of OLED Display to Arduino 3.3V pin and the GND pin to GND, connect the SDA and SCK pins to Arduino A4 and A5 pins.. At last connect the positive pin (+VE) of buzzer to Arduino digital pin 8 and GND pin to GND.

III. WORKING

Pulse Sensor: It uses an Infrared signal to measure blood flow and pressure. When the heart is pumping, increased blood flow and blood pressure to the arteries irritate the skin and show more Infrared than when the heart is not pushing. This irritates the capillaries slightly, and the capillary is slightly more exposed to Infrared than when the heart does not give your blood a "push". Converts this into an electrical signal that we can read with Arduino Analog input. **3.2 OLEO 128x64 (SSD1306 Driver) display:** For this project, we need to add an ECG waveform plotter and the BPM monitor to the OLED display. For this purpose, we need two different libraries, one for the SSD1306 driver and one for the GFX library. First, make sure you have the OLED display 128x68 I²C (SSD1306 driver). It should have four connections, namely SDA, SCK, 5V and GND.

IV. RESULT

The result can be shown as follows

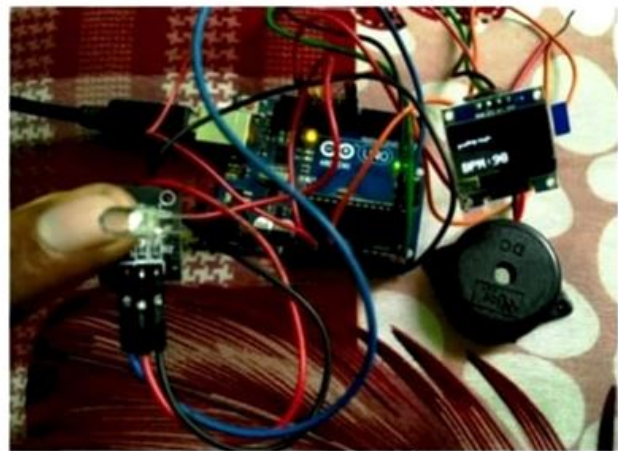


Fig. 5. Result

V. CONCLUSION

After uploading the code to the Arduino Board, initially, no waveform detected. But when a finger placed on the Pulse Sensor, the BPM value is displayed and a waveform detected. If the temperature is too high, Buzzer will create Sound. The value may be unstable at first for a few moments but later it become stable. The sensor has a limitation that it is unaccurate therefore it should not be use for medicinal purposes.

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Smart Dustbin using Arduino

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Abstract—Designing a smart dustbin which will helps in keeping our environment clean and eco friendly is the main objective of our project. The mission which inspired us is Swaach Bharat Mission. As we know day-by-day technologies are getting smarter so, we are designing a smart dustbin to clean the environment with the help of ARDUINO UNO, along with servo motor, ultrasonic sensor and jumper wires. If dustbins are not maintained properly than they can cause an unhealthy environment and also they will pollute the environment that will affect our health.

I. INTRODUCTION

As the rate of population is growing rapidly in our country due to which there is an increase in garbage which have increased environmental issues. Dustbin is a container either of any metal or plastic which collects garbages or stores items which can recyclable or non-recyclable, decomposable or non-decomposable. They are mostly used in homes, office etc, but in most of the cases when they are full there is no one to clean it due to which the garbage spilled out. Harmful diseases can be caused by the viruses and bacteria which are produced by the air pollution because of the open dustbins. Therefore, we have designed this smart dustbin using several components like ARDUINO UNO, servo motor, ultrasonic sensor which will sense when the item to be thrown in the dustbin and will open the lid. Our project is based on IOT that will bring the new and smart way of cleanliness. It is a decent gadget to make your home clean. Since the smart dustbin is unique, new and quiet interesting. Therefore, children will definitely make fun with it that will help to maintain cleanliness in home. Dustbin will open its lid when someone is near the range then it will wait for the given time period after that it will close automatically.

II. TECHNOLOGY

It is an IOT based project. Here we use an Arduino for the execution of code, ultrasonic sensor for sensing which will open the lid and wait for few moment which will be pre-defined. With the help of technology we are here to bring drastic changes in terms of cleanliness. Since, it is a sensor based dustbin therefore, it can be easily accessed by any age group. Servo motor has been used to open the lid. After successful placing of servo motor now its time for Ultrasonic sensor. So, it is placed at the front of the dustbin. Last (but not least) step in the build process is to make all the necessary connections by the help of long connecting wires as per

the circuit diagram. All the wires from both the components i.e. Servo Motor and Ultrasonic Sensor are connected to the respective pins of Arduino. After this the build process of the Smart Dustbin will be finished. After the successful set-up of connections now our next step is to upload code in the Arduino and to provide power to the circuit. Now, when the system is powered ON, Arduino keeps monitoring for things that come near the sensor in the given range. When Ultrasonic sensor detects any object for example hand than Arduino calculates its distance and if it less than the certain predefined value than servo motor get activated and lid will open for a given time than it will be closed automatically. The major components used in the implementation of smart dustbin is shown in figure 1 to 4.

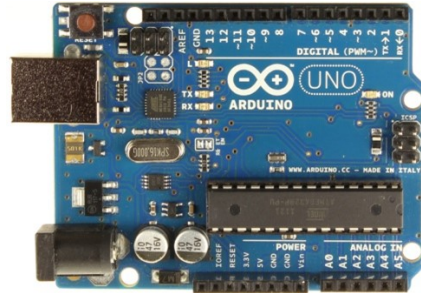


Fig. 1. Arduino UNO



Fig. 2. Ultrasonic Sensor



Fig. 3. Servo Motor



Fig. 4. Jumper Wires

III. CIRCUIT DIAGRAM

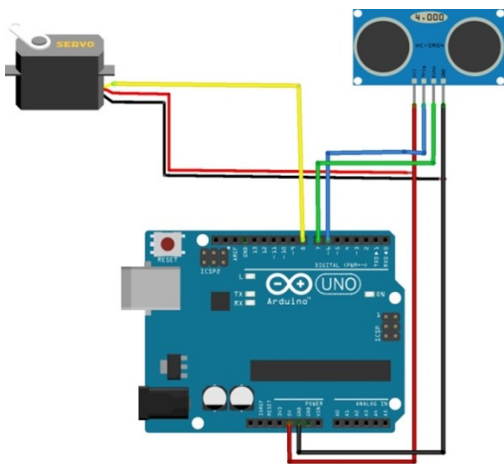


Fig. 5. Circuit diagram

Circuit diagram of our solution is given in the Figure 5. It consists of an Arduino UNO, a Servo motor and an Ultrasonic Sensor all the components are connected through the jumper wires. Ultrasonic sensor is placed at the surface of dustbin whereas the servomotor is placed under the lid and Arduino is kept inside the dustbin.

IV. RESULT



Fig. 6. Actual Implementation of Smart Dustbin

Smart dustbin has been working successfully. It is ready to use in houses, offices, schools and colleges etc.

It brings the revolutionary changes in the management of waste disposal. Since it is a new technique and children make fun with it so it helps to maintain cleanliness in home.

After its implementation the number of waste collections outside the dustbins reduces by up to 80%.

V. CONCLUSION

Here we are going to make an evolutionary change towards the cleanliness. With the combination of trash compaction and intelligent waste monitoring technologies, smart dustbins are shoulders above the traditional garbage dustbins. It is equipped with smart devices like sensor, motor, Arduino etc. For social it will help towards the health and hygiene, for business we have tried to make it affordable as many possible. So that anyone from normal to rich can take benefit from it. Believe me this will bring some unbelievable changes in the terms of cleanliness as well technology. So, our next target is to add one more sensor which will sense whether our dustbin is full or not. And a display will be added so that user can be notified when the dustbin is full.

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ANDROID CONTROLLED REMOTE AC POWER SYSTEM

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Abstract—The main aim of this project is to have control on the remote AC power supplied to the load by controlling the firing angle of Thyristor. In comparison to other various method is very effective to control AC power supply. The Android interface required for sending commands can be sent through any android based phone /tablet etc. This system make use of zero crossing point that is detected by a comparator and then output is fed to the comparator . Microcontroller is programmed to delay the triggering angle by making use of an optoisolator interface to a pair of SCR . The power through the SCR is then applied to the load so for this purpose we use 8051 microcontroller which is interfaced with LED screen to display various command and instructions to the user and we use bluetooth modem to receive command from the Android device. A100 watt bulb is used to demonstrate as load whose different glowing intensity help in demonstration .We can also use induction motor whose varying speed show the amount of power to the motor . The efficiency at which bulb is glowing or motor is running can be observe on the led screen . At present we are using step down 12 volt AC supply .This project can be further enhanced by using direct 230 volt supply in place of 12 volt AC to the bridge rectifier for achieving higher voltage control for charging number of batteries connected in series.

Index Terms—Bridge rectifier, voltage regulator, 8051 micro-controller, SCR, Optocoupler, LCD display

I. INTRODUCTION

As we all know that electricity has become an eternal part of our lives but proper use of electricity is still a big concern . Majority of appliances consume large amount of energy and power .Users /consumer most commonly leave their light ,fans ,airconditoner turn on when they are not in use leads to excessive energy consumption and energy wastage . Continuous use also reduce the life span and efficiency of electrical appliances. This project is a combination of both hardware and software. With the help of an application in android operating mobile phone we can turn on and off our appliances we can also adjust the output according to our requirements .Local and remote control both are included in the control applications .Remote controlling is done by using WiFi module .This remote controlling can be utilized in many areas like in controlling street lights ,in decoration at public places as well as for controlling household appliances. This system is very easy to operate as it does not requires any

type of training or skill so it can be easily used by local people . This is used for a better maintenance scheduling of the machines by the engineers, by avoiding unnecessary losses and operate machines at good efficiency. This data has been sent to the server via an ESP8266 Module and could be accessed remotely via a mobile application interface.

II. BLOCK DIAGRAM

The fig.1 shown below represents the arrangement of the various elements of the android controlled remote AC power System in the form of a simplified block diagram: .

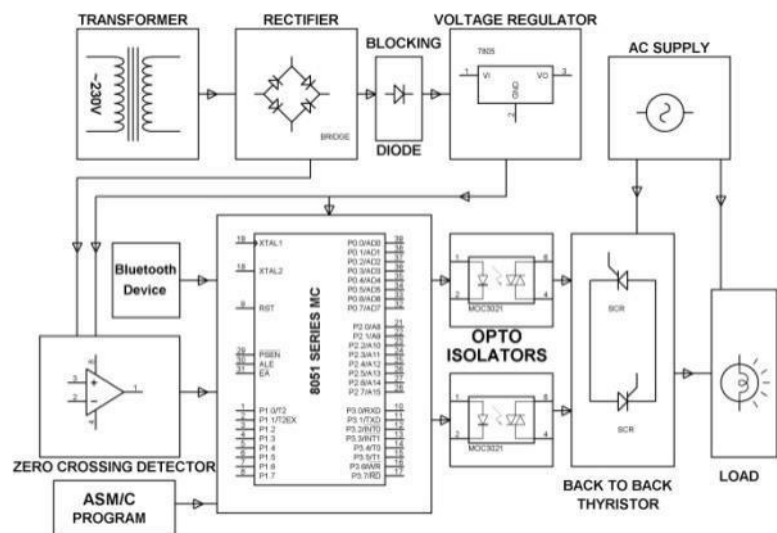


Fig. 1. Block Diagram of the proposed system

III. HARDWARE COMPONENTS

HARDWARE REQUIREMENTS:

8051 series Microcontroller, LM358, Opto isolators, SCRs, Push Button, Transformer, Diodes, Voltage Regulator, Resistors, Capacitors, Crystal, Lamp, Bluetooth Device.

Fig. 2. HARDWARE COMPONENTS

A. MICROCONTROLLER

Microcontroller is a device which is very small in size and control to the operation of all the other devices . It consists of various components like memory RAM and ROM serial input port . It can have a peripheral devices timers interrupts and clock circuit It is nothing but on chip embedded computer on a single chip . 8051 microcontroller has been manufactured by intel in 1981 . It is a 8- bit microcontroller . It made up of 40 DIP, 4 Kb of ROM storage and 128 bytes of RAM storage . Two 16 bit timer . It is a combination of parallel 8 bit ports which are programmable as well as addressable as per the requirements . An on chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHZ

B. VOLTAGE REGULATOR:

Voltage regulator is a device which provides constant voltage at the output terminal regardless of voltage fluctuations at the input terminal or fluctuation in the load current . Voltage regulators are generally available in the form of integrated circuits. LM317 voltage regulator IC can be used as variable voltage regulator which can effectively alter any value of positive fixed DC voltage within available voltage range . It is a 3 pin IC. First pin of the voltage regulator IC is used for altering the output voltage , second pin is used for generating the output voltage and third pin is used to give input . This IC can provide an adjustable output range of 1.25 to 37 volts.

C. THYRISTOR

Silicon controlled rectifier (SCR) is a semi controlled ,three junction device . SCR is made up of three terminals positive , negative electrode and gate respectively .It is a bipolar i.e it can block both positive and negative voltage and unidirectional device which means that it can conduct current in only one direction . SCR is an active device because it has a control terminal that is gate terminal . By providing the gate pulse we can turn on the SCR ,but cannot turn off by negative gate pulse due to this it is also known as semi controlled device. Different modes of operation : Reverse blocking mode : In reverse blocking mode anode voltage is less than cathode voltage so current will flow from cathode to anode .we cannot turn on the SCR in reverse mode. Forward blocking mode : In forward blocking mode anode to cathode voltage is greater than zero . In this mode also the SCR is in off state but forward biased. Conduction mode : In conduction mode also anode to cathode

voltage is greater than zero but the mandatory condition is anode to cathode voltage is greater than cut in voltage which results in the flow of current from anode to cathode .

D. OPTOISOLATOR

An Optoisolator is a device that is used to transfer signals between the device which are electrically isolated with the help of light . Optoisolator find wide range of applications in modern communications and surveillance technology system . Optoisolator also find use in electrical and electronics system which require electrical isolation . An Optoisolator is an integrated circuit or a transistor . It could be used to separate low power rating circuit from higher power rating output circuits and is used to remove unwanted sound from signals . It can also be used to transmit analog signals. Widely available speed for digital and analog Optoisolator is 1 Mbps , although 10Mbps and 15 Mbps digital speed are also available .

E. RECTIFIER

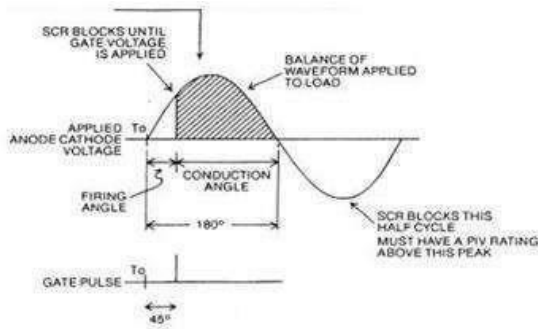
Many of the electrical appliances we use in our day to day life converts alternating current into desired direct current before the utilization of power. This process of conversion of sinusoidal alternating current into desired direct current is called rectification and the device used to rectify this alternating current into direct current is called rectifier. Rectifier can be controlled and uncontrolled depending upon their applications. The rectifier which uses active switches like SCR, MOSFET, IGBT etc are called controlled rectifier while the rectifier which uses passive switch i.e diodes are called uncontrolled rectifier. They are further classified as half wave rectifier and full wave rectifier . The rectifier which converts half cycle of the sinusoidal alternating voltage either positive half cycle or negative half wave into desired direct current is called half wave rectifier while the rectifier which converts the complete sinusoidal alternating voltage into desired direct current is called full wave rectifier . Half wave rectifier does not have many applications in electrical appliances due to its very low output efficiency . The total harmonic distortion is also very high in case of half wave rectifier ,so we generally use full wave rectifier in electrical appliances.

F. CRYSTAL OSCILLATOR

Crystal oscillator works on the principle of inverse piezo-electric effect and made up of piezo- electric Material . Crystal oscillator is required to provide the high level of stability but also provide the good selectivity because of this property they are used in Telecommunication as well as they are part of digital circuit . It is also an essential part of microcontroller for generating the clock .

IV. SYSTEM WORKING:

Wheel is a circular frame of hard material that may be solid, partly solid, or spoked and that is capable of turning on an axle. The power delivered by motor to the axle which is capable to move the machine With the help of wheel easily without any discomfort.[14]



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- RMS Output (Load) Voltage

$$V_{O(RMS)} = \left[\frac{n}{2\pi(m+n)} \int_0^{2\pi} V_m^2 \sin^2 \omega t \cdot d(\omega t) \right]^{1/2}$$

$$V_{O(RMS)} = \frac{V_m}{\sqrt{2}} \sqrt{\frac{n}{m+n}} = V_{i(RMS)} \sqrt{k} = V_s \sqrt{k}$$

$$V_{O(RMS)} = V_{i(RMS)} \sqrt{k} = V_s \sqrt{k}$$

Where $V_s = V_{i(RMS)}$ = RMS value of input supply voltage.

- Duty Cycle

$$k = \frac{t_{ON}}{T_o} = \frac{t_{ON}}{(t_{ON} + t_{OFF})} = \frac{nT}{(m+n)T}$$

Where, $k = \frac{n}{(m+n)}$ = duty cycle (d).

- RMS Load Current

$$I_{O(RMS)} = \frac{V_{O(RMS)}}{Z} = \frac{V_{i(RMS)}}{R_L}; \text{ for a resistive load } Z = R_L$$

V. RESULT

The project developed can effectively control the power to the load. It is tested by using a bulb as a load. The system can also control the output of the load using a Bluetooth device from a distance also. The efficiency of the load can be

VI. CONCLUSION

This android controlled remote AC power control system has a wide range of applications in the domestic as well as production or industrial areas. From light regulator, air conditioner, grinders speed control of a stepper motor and drill speed control, thyristors have found ways in many of these systems. Its only objective is to lead the research in this direction and upgrade the technology. Furthermore, modern day wireless technologies like IOT and Bluetooth etc. means remote control from a faraway distance is easily possible. This will increase its scope and help in better resolving safety issues.

A Technical Review on Multi-purpose Agriculture Machine

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Abstract—As we all know that 3/4th population of India live in rural areas. About 70% of population are employed because of agriculture sector. As we are the largest producer of pulses and second largest producer of rice in the world. But the condition of farmer in our country is not so good. They are still struggling for their livelihood. They still prefer conventional method of farming like use of bullock cart, handmade tool and labor work. Because machinery which were invented for the agriculture sector are too costlier for small scale farmer. The machine which can perform different agricultural process like sowing, tilling and spraying in a single input. It can reduce the labor work and the overall cost of farming. This machine will be helpful for small scale farmer which is the ultimate goal of this Machine.

Index Terms—Agriculture machine, Battery power source, multipurpose, sowing ,tilling, spraying.

I. INTRODUCTION

In India agriculture is the major part of Indian economy about 50% of total economy is obtained from rural areas by agriculture. As we all know that the 70% population lived in rural areas and their living is based on the agricultural. But the poverty rate in rural areas is high so many farmers not able to purchase costly equipment or machine or trolley etc. for the cultivation of the field. Mostly rural farmers used traditional methods for the farming these method are time consuming and also take too much effort of the farming which cause pain in their back, hand etc. The increasing rate of population day by day cause the need of food for everyone so for that the output of the agricultural should be increased . But when the traditional methods were used the output from the agricultural is remain less and take too much effort of the farmers. So, with the help of science and engineering we introduce a machine which is capable of performing 3 to 4 operations. Without extra effort putting by the farmers. This machine conduct seed sowing operation, tilling, spraying water or pesticides, move with the help of wheel which is powered by the motor. Which reduced the most of the farmer work and with respect to the cost they are economic for farmers as compare to the other machines which is costly and not affordable by the farmers. This machine is economic and easily operated by the farmers.

II. LITERATURE SURVEY

(1) In this paper they proposed a machine which can perform 4 agriculture process like sowing, weeding, ploughing and spraying. For this purpose, motor and battery is used. The cost of this machine will be approx. 24000 Rs which is less than other machinery which is used in agriculture sector. It can be afforded by small scale farmers. it consists mainly four components chasis frame rotavator, sprayer, battery and motor. The parts of this machine can be adjustable according to situation and condition. This machine can carry the load of approx. 65 kg and can wear the stress of 185mpa [1] . (2) This paper proposed a machine which can perform different process like spraying of pesticides, plugging or cutting process. The most important factor of this machine is it does not require a fuel to run. It is manually operated machine. It does not require any skilled labor also it converts rotatory of wheels into reciprocating motion for spraying pesticides. As it does not use any external energy resources the cost of this, machine will be very less. it uses the carbon steel as a frame material [2].

(3) This research paper proposed a machine which uses 24cc engine for the digging process and uses 12v battery for spraying the pesticides and other two processes like cultivation and sowing it perform manually. This machine consists hopper, fertilizer tank, cultivating too; sprayer and 24cc engine. It is less costly than other machine ,less man power is required and it take less time in performing these activity [3].

(4) This paper proposed a machine which uses AC motor chain drive and hydraulic system non return valve tube. This machine will run with the help of tractor. This machine is divided in to 3 section of 400 mm first section consists gearbox which uses worm gear to provide required speed ratio and second section consists hopper which is used to sowing the seeds inside the soil and third section is used for ploughing and consists chopper and pump[4].

(5) In this research paper they majorly focus on the cost of the vehicle so they dont use any external source. This machine can perform sowing and fertilizing process inter cultivation. they proposed different concept for their multipurpose agri-

culture machine. This machine looks like a bicycle and it can carry the load of 8 to 10 kg and it can do the work of 4 labor as a single unit [5].

(6) In this research they proposed a machine which uses solar energy to run the vehicle. Solar energy is used to recharge the battery which perform spraying process. It also consists motor and pump seed feeder, crop cutter and pesticide sprayer. They use renewable source of energy so that this machine will not produce any pollution and also use of solar energy make this energy cost very less. But the only problem with this that it is dependent on weather [6].

(7) The aim of this machine is to add automation in the agriculture sector so they proposed a machine which is fully automatic and use different sensor for their working. And it can be remotely operated. After this machine theres no labor work required for these process like sowing ploughing amid spraying [7] . (8) In this paper, they use BLDC motor, lithium-ion battery and controller to control the speed of the motor. It consists metallic frame, hopper, tiller water tank and sensors to run the vehicle. It is semi-automatic machine. it required less man power and having less cost than other machine[8] .

(9) This machine consists ESP8266 controller to control the motor speed. It perform three processes cutting, pumping and seeding. Connect the cutter pump, seeding mechanism on the robot Connect the surveillance robot to the Arduino controller. It uses separately excited dc motor and is generally used as crop cutter [9]

(10) one more thing that is add up through this paper is that machine should be work like robot and it takes energy from the solar panels. So that this machine will not require further any type of labor work. And help the farmer in reducing the cost of farming [10].



Fig. 1. Chassis

B. Motor

Motor is a device which converts electrical energy into mechanical energy. Motor is mounted on the chassis which used to run the machine. A 12 v DC motor is used for operating the machine with the help of the battery

- Which is used to give power to the front wheel.
- its used power source a battery and a controller [11].



Fig. 2. Motor

C. Battery

A battery is used to provide power to the motor through which they run. A 12-v lithium-ion battery is used. the battery is rechargeable. Able to provide power to the 12 motor easily[11].



Fig. 3. Battery

III. DESCRIPTION OF COMPONENTS

A. Frame or chassis

Chassis or frame is considered to be one of the basic structures of a machine in automobile which supports the equipment as well as body. It is the frame work which holds the body of the machine and others parts mounted on them. Various parts are bolted on the chassis. Its basically a structure made up of steel or mild steel rod by joining with the help of welding [2].

D. Water Tank

Water tank is situated on the chassis near the rear axle. The water tank is used to wet the soil for the seed sowing operation. The water tank connected with pipe mechanism which is attached to the rod which having hole to pour the water on the ground [2].



Fig. 4. Water Tank

E. Seed Sower

A seed sower is a roller like box which is mounted on the front axle of the machine. The main work of the seed sower is to sow the seed to the soil. Seed sower box design is made in such a way that several small holes dug on the box which are capable to release the seed on the ground while rolling. Its connects through chain and gear mechanism to the front or rear wheel [12].

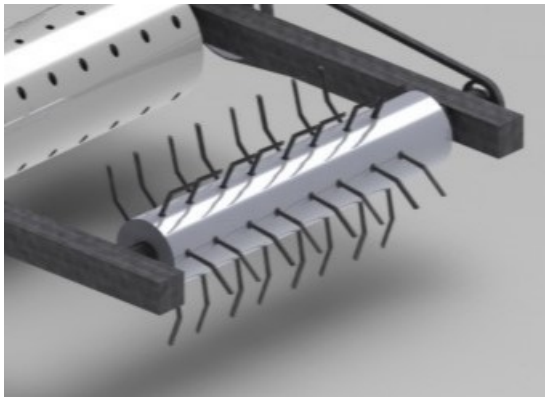


Fig. 5. Seed Sower

F. Tiller

Tiller is used to dig the ground for the cultivation of the soil or for the sowing of the seed. Tiller is placed on the front axle of the machine which is attached with two rod to the front axle of the machine [13].

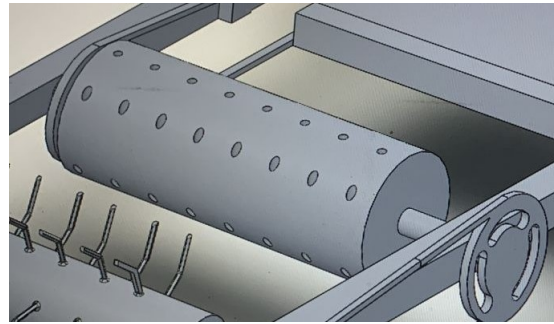


Fig. 6. Tiller

G. Wheel

Wheel is a circular frame of hard material that may be solid, partly solid, or spoked and that is capable of turning on an axle. The power delivered by motor to the axle which is capable to move the machine With the help of wheel easily without any discomfort.[14]



Fig. 7. Wheel

IV. OBJECTIVE

The objective of this multipurpose agriculture machine is

- Reduce the cost of farming
- Increase productivity of farmer
- Increase automation in agriculture sector
- Reduce the labor work

V. FUTURE SCOPE

- We can add sensor so that it can measure some parameters.
- We also can add more drill and type of wheel according to surface of field
- If machine required there should be provision to add through tractor
- We can add wireless technology with the help of raspberry pie
- We can add solar panel for spraying system.

VI. ADVANTAGES

- It can plough large surface area in less period of time.
- After this machine there will no animal work is required.
- It makes farming more advance and faster than traditional one.
- The time required for sowing is very less as compare to traditional one.

VII. CONCLUSION

This machine can perform three farming processes like sowing seeds, spraying pesticides and water and ploughing. This machine is designed in such a way it does not require any skilled labour. Multi purpose agriculture machine reduce the workload on farmer of doing different process through labour work. This machine is affordable for small scale farmers who cannot afford costlier machine. This machine reduce the cost of farming and reduce labour work also.

ACKNOWLEDGMENT

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Mechanical Behavior of Biomaterials in Medical application: A Review

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Abstract

Metal, polymer, composite and ceramic classes of synthetic materials are specifically used in the design of biomaterials. Investigation of the mechanical biomaterials is another major factor. The constant development of medical technology has resulted in an ever-increasing demand for innovative biomaterials utilized as implants and equipment. The key characteristic that goes hand in hand with the usage of biomaterials is biocompatibility. The properties that must be estimated include bending properties, fatigue strength, fracture behavior and performance under the applied load. The emphasis of this chapter, which is discussed in current research, is on the most promising methods and tactics for implant biomaterials. Finally, the researchers working in the field of biomaterials are informed about the future scope of the study based on the thorough review.

Introduction

The first biomaterials were created and designed in 1960 using common materials used in biomedical implants. Biomaterials are particularly made from classes of wholly synthetic materials such as metals, biodegradable polymers, nonbiodegradable polymers, composite materials, ceramics, and naturally occurring biomaterials based on proteins that are employed in medical applications. Materials characteristics play a significant influence in the analysis of biomechanical phenomena [1]. Medical engineering equipment frequently interacted with a variety of biomaterials, such as soft brain tissue or hard bone, that varied in their rigidity and brittleness [2]. The principal applications for biomaterials are in the fields of dentistry, orthopedics, skin, tissue engineering,

cardiovascular devices, and medication delivery. To ensure that a material is safe for use in implants, it must first be determined to be biodegradable. The functionally graded nature of natural biomaterials makes them a good fit for these criteria. Thus, the functionally graded materials (FGMs) technique is applicable in the vital subject of biomaterials manufacturing [3]. Functional gradation is one of the traits that sets live tissue apart from other types of tissue. Bio-inspired biomaterials open up new avenues for the development of bone tissue engineering prosthetics. Different approaches for innovative implant materials are described using the idea of functional gradation. According to Williams, "biocompatibility" is "the ability of a biomaterial to perform its desired function with respect to a medical therapy, while avoiding any unfavorable local or systemic effects in the recipient or beneficiary of that therapy, but instead producing the most suitable beneficial cellular or tissue response to that particular circumstance, and maximizing the clinically relevant output of that therapy"[4]. In order to repair or replace damaged tissue or hard bone, hip, joint, cardiovascular, and organs, these biomaterials are predominantly used in the field of medical engineering.

Biomaterial characterization

Biomaterials are unstable substances used to facilitate communication between biological systems. Its application is achievable inside a biological medium, including effective and efficient biomaterial features. Biological and synthetic biomaterials are the two categories into which biomaterials are divided [5]. Metal, polymer, ceramic, and composite types of synthetic biomaterials can all be categorized

with implant application as shown in Fig. 1. Stainless steel, chromium alloys, titanium alloys, and aluminum alloys have been recognized as metallic biomaterials in a variety of applications as medical devices because of their appealing mechanical characteristics, particularly their fracture and fatigue strength [6]. It has excellent mechanical properties, great oxidation resistance, and good biocompatibility. Metallic bonds, which are the building blocks of metals, enable free electrons to move between the atoms. In biomedical research, polymers are crucial therapeutic components that are employed as tools to replace and regenerate various connective tissues. The characteristics of polymers are characterized in terms of the composition and structure of dependent macromolecules [7]. The development of polymers prepared for specific purposes in diverse methods and compositions with acceptable bioactivity, morphologies, and biomaterials properties is another aspect of flexibility in many applications. Ceramics are frequently employed in biomaterial applications. Ceramic are high porosity, high strength, low weight, and favorable corrosion characteristics all had an impact on how they were used. Their body inertia also made them easily formable. Utilizing coating as part of hip prostheses and artificial knees, ceramic was employed to improve the biocompatibility of metallic implants [8]. Materials that combine metallic and non-metallic elements, such as silicon dioxide and aluminum oxide, to form ceramics. Covalent, ionic, or a combination of the two types of bonding may be used in ceramics [9]. Composites are made up of two or more discrete, microscopic or macroscopic-scale parts made of materials with different mechanical characteristics. Biomaterial uses for composites are numerous and include carbon fiber reinforcement, ultra-polyethylene and dental filling composite [10]. According to the substance makeup, biomaterials are often categorized into four classes, as illustrated in Table 1.

Table 1. Biomaterials are characterized with regard to their advantages, disadvantages, and uses.

Types of Biomaterials	Advantages	Disadvantages	Application
Metallic alloy	High strength, sterilizing	high modulus of elasticity	Orthopedic Clips, screws and plates
Polymer	Biodegradable, Bioactive	Hard for sterilization	Prostheses Tissue engineering
Ceramics	High strength material, High biocompatibility	High modulus of elasticity	bioactive implants, Hearing aids that are artificial
Composites	High mechanical properties, corrosive resistance	Expensive Costs,	Orthopedics, dentistry Catheters

It's important to note that because to their mechanical properties, polymers are often used in soft-tissue applications, whereas metals and ceramics are typically used in hard-tissue applications.

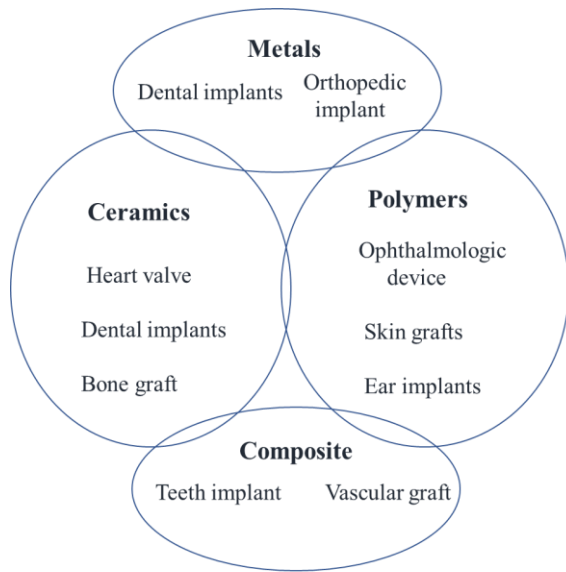


Fig. 1 Classification of biomaterials with their implant application

Biomaterial Design

In order for a biomaterial to function effectively as an implant in a biological system, it must acquire certain qualities as illustrated in Fig. 2. Considerations for implants should include biocompatibility, bio-functionality, chemical stability and mechanical qualities. Toxicants that leak from biomaterials are the subject of biomaterial toxicity. Biomaterials that are blood-compatible, nonpyrogenic and noninflammatory are often considered nontoxic [11]. The capacity of a biomaterial to respond to a specific application with an acceptable increased resistance is known as biocompatibility. This capacity can be demonstrated by a biomaterial's toxicity, tissues compatibility, hem-compatibility, prosthesis, or medical device. Biological processes, drug development, and cell growth have all benefited greatly from the use of biomaterials. Natural biomaterials are essential for tissue engineering because of their inherent bioactivity, including the ability to promote cell growth and adhesion and their non-toxicity to native healthy tissue [12]. The term "bioactivity" refers to the impacts of substances that trigger reactions or influence specific cell activities. As bioactive materials, calcium phosphate, hydroxyapatite, and calcium phosphate are employed [13]. The body's

response to a foreign body is being inhibited as much as possible by the use of bioinert biomaterials. Examples of common bioinert materials are carbon, alumina, zirconium, titanium and alloys, and titanium [14]. There is little fiber housing development, and the material doesn't even extract or simply release significant amounts of components. It has become more desired for bioactive biomaterials to proliferate in tissue engineering.

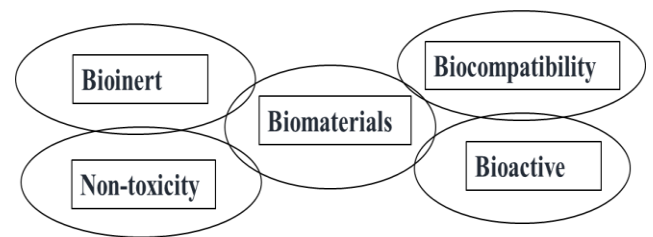


Fig. 2 Qualities that a substance must possess to qualify as a biomaterial

Mechanical Behavior

The mechanical and performance requirements for biomaterials and medical equipment should generally be acceptable and comparable to those for organ substitution [15-16]. The biomaterial's performance under different load situations is evaluated by its mechanical properties, which are always described by the stresses and strains that the material experiences as a result of fault deformations. In many areas of physiology, medicine, and surgery, understanding the mechanical behavior of biomaterials is crucial [17-19].

Table 2. Description of the mechanical characteristics of biomaterials

Biomaterial	Modulus (GPa)	Yield strength (MPa)	Tensile strength (MPa)	Elongation at break (%)	Density (g/cm ³)
317LV	188	190	490–790	45	7.8
M	98	340	425	27	4.1
Titanium					
m					

Ti-6Al-4V	112	860	910	16	4.6
Alumina	350–410	-	180–240	-	4
Zirconia	175–265	-	120–1200	-	5.5
carbon fiber	18–23	-	95–230	1–3	1.2
PLGA	1.5–2.6	-	40–55	2.5–9.5	1.4

The characteristics that must be evaluated included bending properties, fatigue strength, fracture behavior and performance under the applied load [20–22]. An overview of the mechanical properties of pure engineering biomaterials shown in table 2. As a result, as illustrated in Fig. 3, different mechanical properties of biomaterials can lead to variable degrees of basic weakness, differences in microstructure, and alterations in cell behaviors and functions [21–22]. A universal testing device can be used to assess tensile properties. The stress-strain graph is used to examine the materials' fundamental mechanical properties, including tension, compression, torsion, and shear. A uniaxial tensile load is given to a bulk material with defined geometry, the machine exerts a force on the material that can be measured by the load cell. From these tensile stress-strain data, the user can once more estimate the Young's module, yield stress, final tensile strength, toughness, and failure mechanics (e.g., ductile vs. brittle failure).

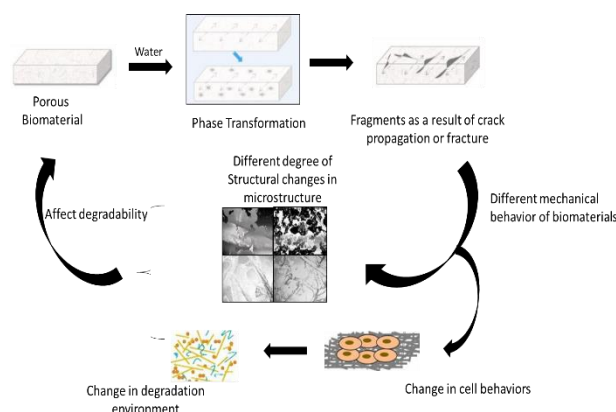


Fig. 3. Processes impacting the degradability of biomaterials based on mechanical properties [23].

A Universal testing apparatus can be used to evaluate compressive strength. Brittle materials are often created for compressive loading since compression strength is substantially higher than stress [24–25]. The general rule is that porous materials in uniaxial compression start to harden once they reach a certain stress limit, which is indicated by elastic bending, cracking or breaking [25–26]. The biomaterial's strength is a crucial characteristic. Typically, a material fails under mechanical loading as evidenced by the fracture of the test sample. The Weibull methodology, the bending flexural test, the biaxial flexural strength test, among other methods, can be used to assess the tensile strength of a material. The total stress that a material can resist while being mechanically loaded is referred to as its ultimate strength. In the context of engineering and actual stress-strain curves, these data would be quantitatively different [27]. The consistency of the material reveals fatigue properties under cyclical loads. High tensile strength, elasticity, and toughness are required qualities for structural biomaterials. Because even low-stress loading can cause elastic fibers in the material to be transferred over numerous cycles, biological materials like bone are particularly susceptible to lack mechanical behavior [28]. To obtain the appropriate qualities for tissue engineering, the difficulty in biomaterial mechanical design is to strike a compromise between mechanical and mass transport properties. The computational approach will be essential throughout the solving stage, as illustrated in Fig. 4. It was observed that the design response in some circumstances was connected to the mechanical properties of the biomaterials [29]. In this paper, mechanical properties and finite element modelling (FEM) were examined in relation to biomaterial mechanics, including elastic modulus, stress and deformation analysis [30].

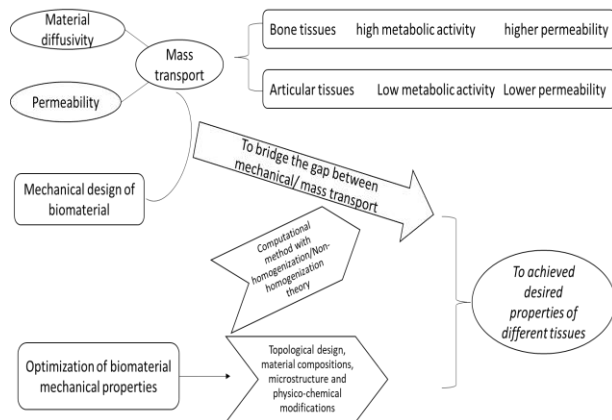


Fig. 4. Techniques for enhancing biomaterials' mechanical qualities [23].

Conclusion

Mechanical behavior and tissue biocompatibility are the primary requirements for the successful application of biomaterial implants in bone fractures and replacements. Basically, metal and its alloys, ceramics, polymers, and composites are some of the materials utilized in engineering, although metal and ceramics are extremely important in the biomedical field. In order to improve mechanical design and mechanical characterization, this review provided an overview of the mechanical properties of biomaterials. Additionally, it gives room for evaluation of biomaterials research in biomedical applications and promotes research into the mechanical properties of biomaterials. The inherent material characteristics of biomaterials implants, such as their tensile strength, elastic modulus, and fatigue strength, which ultimately influence the implant's performance and long-term success, are another factor to consider. The breakdown of a structure can also be caused by defective structural characteristics, surgical errors, and poor mechanical design, among other things. Mechanical behavior has aided in establishing the proposed model's viability in producing optimal biomaterials that can improve mechanical characteristics while providing a distribution of the structure suitable for use in medical engineering applications.

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DeRog: A Way to Detect and Recognize Face from a stream

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Abstract—Face identification and detection algorithms have been explored and developed for a range of purposes, including video surveillance, and managing face image databases. K-nearest neighbor (KNN) is a method which recognize faces. In this method firstly an unknown test image is recognized then it is compare with known training photos which are stored in database this technique also provide information about the individual recognized technique. As demonstrated empirically, these algorithms provide varying levels of accuracy under various settings. We've created a method for detecting faces in live video streams, storing them in databases, and using them for future recognition. We employed a haar cascade classifier for face detection, which can recognize human faces from an image or a live video feed. In psychological facial expression analysis and human-computer interactions, facial features detection has a wide range of applications. Certain facial traits are used as detection techniques. We successfully simulated algorithms in PYTHON using real-world instances.

Index Terms—Open CV, ML, KNN

I. INTRODUCTION

Biometrics is a technique for measuring and analyzing persons unique bodily traits. The technology is primarily used to detect a persons face and grant them entry to restricted areas, or to recognize them as surveillance targets. The underlying idea of biometric authentication is that each persons intrinsic bodily characteristics may be used to accurately identify that person. It makes use of the fact that a human attribute connected with a person serves as a data structure; using the incoming data, we may authenticate a person's identification. Biometric systems, such as recognition and detection, iris recognition, and others, are used for identification of humas in surveillance systems, identification of criminals , and face information, among other things. In social situations, our face is main centre of attention, and it plays a vital character in familiarizing facial identical characteristics and feelings. We can identify a variety of face that we have studied throughout our lives and can recognize face for short period . In spite

of considerable differences in visual stimuli owing to varying conditions, maturing, and distractions like beards, glasses, or hairdo changes, this skill is highly resilient. Faces recognition computational models are intriguing since they can provide theoretical understanding as well as practical implementations. Face detection and recognition computers could be used for plenty of reasons, involving identification of criminals, security, image and film processing, verification of identity , interaction of human. Face detection and recognition is challenging to construct a computational model. Since faces are complex , multifaceted, significant visual stimuli. Detection of face is now employed in a variety of areas, particularly on image-hosting websites such as Picassa, Photobucket, and Facebook. By using Haar feature-based cascade classifiers we have studied and implemented an easy but very effective face detection algorithm. We have established a method of face recognition that is rapid, strong, relatively simple, and precise with simple algorithms and easy to understand techniques.

II. LITERATURE SURVEY

Face is applied to analyze pictures has become one of the most successful applications of picture analysis and comprehension in the last ten years or so. As per the topic, neuroscientists and psychologists are also interested in it. Computer algorithms are widely used to recognize faces to pick out explicit features of a person's face. These characteristics are as eye distance between eyes or shape of chin are converted into mathematical representation and compare these data from other faces in a face recognition data base .A face prototype is a information on a detailed face that varies from an image in that it is intended to only comprise some traits which recognized one face to another.

III. METHODOLOGY

We employed a haar cascade classifier for face detection, which can recognise human faces from an image or a live video feed. In psychological facial expression analysis and human-computer interactions, facial features detection has a wide range of applications. Certain facial traits are used as detection techniques. During the implementation, we used Numpy and the open-cv package. NumPy is the most important Python package for scientific computing. NumPy also integrates with a wide range of databases with ease and speed. OpenCV is an open-source software package that allows programmers to access functions in computer vision APIs (Application Programming Interfaces). Open-Source Computer Vision(OSCV) is a library of Realtime which having capabilities of computer vision programming. This project's recognized the faces was done with the help of the OpenCV library. The reason behind this was that most Face APIs can only recognise faces in photos, though the project required face detection on live video data. The OSCV library demonstrated to be flexible sufficient for the project because it can identify a face in real time and emphasize it by drawing a rectangle around it.

HOW COMPUTER READ AN IMAGE ?

If numbers are in range $[0,255]$ computer read an image. There are three basic channels in any color image (RED, green, AND BLUE). For each primary colour, a matrix is created, and these matrices are then combined to produce a Pixel value for the individual R, G, and B colors. As seen in fig. 1, every element of the matrices provides data on the pixel's brightness intensity.



Fig. 1. Reading an image through a computer

To find sample in complex dataset or in big data, machine learning is considered as a branch of Artificial Intelligence as here the human intelligence can be used. It enables machines to learn from past experience with the goal to complement individual intellect. It also includes area of statistics, information theory, game theory and optimization algorithms

HAAR CASCADE-

One of the Machine learning object is Haar Cascade which recognized approaches that used characteristics proposed by Paul Viola and Michael Zones in their work rapid object detection using boost cascade of simple features in 2001 to

identify objects in an image or video. It is a machine learning based method which involves training a cascade function using a large number of negative and positive images. After that it is utilized to find items in other photos. The algorithms have four stages .

- 1) Haar features selection
- 2) Creating integral images
- 3) Adaboost training
- 4) Cascading classifiers

THE FIRST STEP IS TO COLLECT features consider adjacent rectangular region in a detection window sums up the pixel intensity in each part and calculate the difference between these sums, most of them are irrelevant in among all the features that we have calculated. For example, which is shown in image fig.2 . To show the good features using the top row, the first feature shows the fact that the eyes are often darker than the nose and cheeks. The second feature reveals the fact that the eyes are darker than the bridge of the nose. But the same windows applying on cheek or any other part is irrelevant.

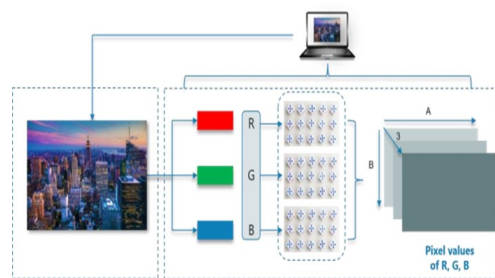


Fig. 2. Applying Haar Cascade

Adaboost is a model which selects the best features as well as trains the classifier and use them. It is used to select the best feature among 16000+ features. In this approach, weighted weak classifiers are linked linearly to create a strong classifier. The target size window is then dragged over the input image in the detection stages. For each part of image, Haar features are generated. After that the difference is compared with the threshold for differentiating non-objects from objects.

CASCADE CLASSIFIER-

Each level of a cascade classifier is consisting a small bunch of weak learners. Decision stumps are these sluggish learners. These are called as simple classifiers. Boosting is a technique which is applied to train each state by taking a weighted average of the decision made by weak learners. High accurate classifiers are trained by boosting. Positive or negative labels are classified by sliding windows position. A positive value indicates that an object was discovered, in the case of a negative label the detector moves the window to next place and in case of positive label the detector advances the region to the next stage. The stages are so arranged that if any negative

sample is found, it is rejected at the same time. An assumption is made, that in most of the windows, the object of interest is not contained. In contrast, true windows are quite uncommon and worth investigating. After classifying a positive sample to be correct, it is marked as a true positive.

- If a sample which is negative if classified as positive, it marks a false positive.
- If a sample which is positive if classified as negative, it marks a false negative.

FACE DETECTION-

One of the effective object identification technique was introduced by Viola and Jones, who make use of Haar feature-based cascade classifiers in their paper "Rapid Object Detection with a Boosted Cascade of Simple Features" in 2001. It is a machine learning-based method. It includes training a cascade function by using a large number of negative and positive photos. Lastly it is utilized to find items in other photos. As illustrated in fig.3, the Viola-Jones method for Face Detection works in four steps.

- 1) Pre-processing
- 2) Run sliding window
- 3) Determine features
- 4) Classify

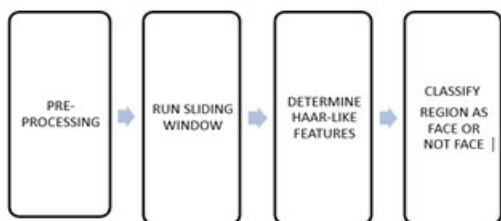


Fig. 3. Outline of Viola-Jones Algorithm

PRE-PROCESSING: In this phase images are prepared for the classifier to run on. this stage includes creating an image from alive video, turning it to Gray scale and then down sampling it for face detection.

RUNNING SLIDING THE WINDOW: The size of sliding window each 24/24 is fixed. This window travels the image pixel by pixel. It applies various filters to the region which it convert. these filters disclose some properties that are used to classify the a region as a face or non face later

HAAR FILTERS: The image region bound by the sliding window is subjected to several filters. These filters are horizontal and vertical visual features that are revealed by these filters. A Haar-like feature evaluates neighboring rectangular sections in a detection window at a specified point, it sums the pixel intensities in each region, and then calculates the difference between these sums. This difference is then used to differentiate the image subsections.

CASCADE CLASSIFIER: A bunch of Haar like features is assembled into a single large classifier, which is pragmatic to each sub-window. A large no of positive images are required by this method (images of faces) and negative images (images without faces) to train the classifiers. From it, then we pull out these features. haar features designated in fig. 4 are working for this. They're really analogous to our convolution kernel.

Each feature is a single value intended by subtracting the sum of pixels in a white rectangle from the sum of pixels in a black rectangle

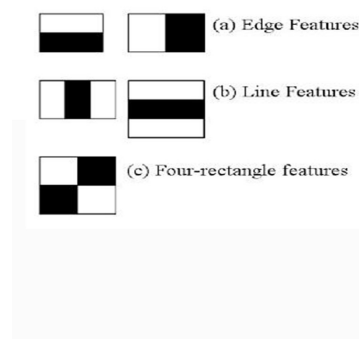


Fig. 4. Haar Features

However, the popular of the traits we calculated are not related. Take a appearance at the design below. In the top row two good quality are shown in this. The first quality selected appears to be the fact that the area around the eyes is usually darker than the area around the other parts like nose and cheekbones. The second feature is selected on the fact that the eyes are darker than the nasal bridge. Though, the application of the same windows to the cheeks or any other location is immaterial. Adaboost is cast-off to pick the best structures among 160000+ features. Evaluating the variety of weak classifiers on the given location is done by the machine learning that ADA and selected the best one. A weighted sum of these weak classifiers produces the final classifier. It creates a strong classifier in a combination method. Even 200 characteristics are precise enough to notice 95% of the time. Around 6000 characteristics were encompassed in their final arrangement. Somewhat than applying all 6000 characteristics to a single window, divide them into distinct stages of classifiers and put on them one by one. It should be discarded in the case of first test fails the window they can't be considered. Smear the second stage of features and endure the procedure if it passes. A face region is a window that permits by all the stages.

IV. DETECTION OF HAAR CASCADE IN OPENCV

A trainer and detector both are included in open CV. Open CV devoped a classifier for any object like as vehicles, planes, and objects. In open CV, many already trained classifiers such as face, eyes, grin and other facial features are already included. The OpenCV/data/ haar cascades/ directory

these XML files may be found in this-

Steps to be followed:

- load the required XML classifiers.
- Generate image using live video stream.
- Input image are converted to grayscale mode.
- The image of the faces is found out. If faces are found, it detected as a positions of Rect(x,y,w,h).
- Once we get these locations , we create a region of interest (ROI) for the face.
- Record data till exit key q is pressed.
- Save data generated using NumPy array.

FACE RECOGNITION-

Recognition of a face is a method to detect the faces of persons whose photographs are saved in a dataset. Recognition of a face is a main aim of research, rather than the other techniques of identification of faces can be more accurate. The main reason of this is that it is a non-intrusive nature and also the persons prefer this method of personal identification. The k-nearest neighbor is one of the machine learning methods. It is most Basic but is a crucial categorization algorithm. A distance measured between two points is used to define similarity. Euclidean distance is a frequent option.

ALGORITHM: K NEAREST NEIGHBOURS

KNN belongs to the category of supervised learning algorithm. This is used in various applications like pattern recognition, data mining, and intrusion detection.

- Non-Parametric
- Supervised learning
- Instance-based learning

KNN belongs to the supervised learning algorithm category. Here we gave a labelled dataset with training observations (x,y)(x,y) and its aim is to find the connection between xx and yy. In technical terms, we want to develop a function $h:XY \rightarrow Y$ that can safely predict the appropriate output yy given an unknown observation xx. The KNN-classifier is a non-parametric instance base learning algorithm. It's worth mentioning that KNN's limited training phase incurs both a memory cost (because to the need to keep a potentially large data set) and a computational cost (due to the fact that classifying a specific observation necessitates a rundown of the entire data set) during testing.

Take a positive integer K, an unseen observation xx, and a metric called as similarity metric dd, the The following steps are performed by KNN classifier:

- 1) It runs through the whole dataset computing dd between xx and each training observation. Well call the K points in the training data that are closest to xx the set AA. Note that K is usually odd to prevent tie situations.
- 2) Label of class is then decided through majority votes.

K: HYPERPARAMETER

The hyperparameter K in KNN is one that we must choose to acquire the greatest feasible solution to fir for the dataset.

K is considered as a regulating the shape of the decision boundary intuitively.

As the value of k is high, than it is more favorable as it minimizes the total noise, there is no certainty. To determine the value of k, Cross-validation is another method. In this method, we validate the k value with an independent dataset. The ideal value of K lies between 3 to 10, for most of the datasets.

ALGORITHM:

Consider m as number of training data samples and p denotes an unknown point. These are the steps need to be followed and results in as shown in fig.5.

- 1) The training samples are collected and sorted using an array data structure. [] is used to denote data points in array. An element in the array is referenced and indexed as (x,y).
- 2) To find Euclidean distance $d(arr[i],p)$, run loop from $i=0$ to $m-1$
- 3) smallest distances (k) forms a set S
- 4) Finally return the majority label among set S.

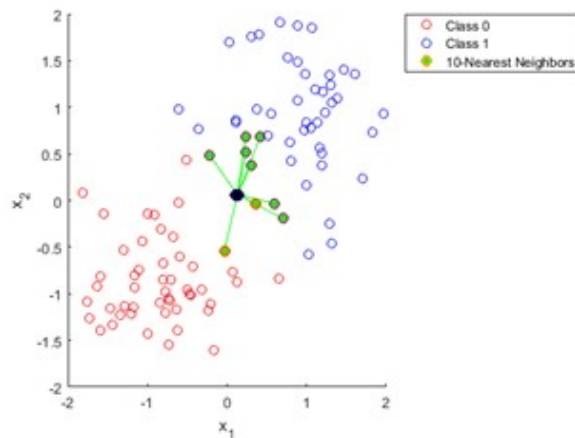


Fig. 5. Data with Normalization

STEPS FOLLOWED DURING FACE RECOGNITION:

These are the steps need to be followed for the face recognition as shown in fig. 6.

- load the required XML classifiers.
- load saved training data
- Save data in form of list and maps data names to labels, convert that list to NumPy array
- Generate image using a live video stream
- Convert input image to grayscale mode.
- Detected faces position are returned as Rect(x,y,w,h).
- After getting these location, we mark it as region of interest (ROI) of that face.
- Save data generated using NumPy array.
- Then Apply KNN to find the label,till q is pressed to exit.

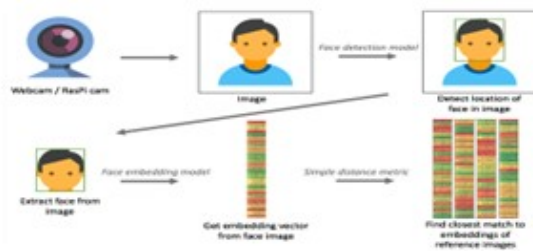


Fig. 6. Process of Image Recognition

The challenges associated with detection of face can be attributed with the following factors:

- A POSE of head: as the human head in 3D space is like a sphere shaped, so it is difficult to keep the face facing image in front of the viewer and in the centre at all times. As a result, one eye or a portion of the nose may become obstructed. As a result, the face is visible in half profile, making it harder to separate the traits that would otherwise make a face easy to discern.
- B FACIAL EXPRESSION: A preset face pattern may not always match the present facial expression in face recognition. The uncertainty stems from a tiny difference in face expression.
- C OBSTRUCTION IN FRONT OF FACE: Viola Jones' method uses haar characteristics to determine if the detected object is a face or not based on the intensity level differences between the various portions of the face. As a result, in order to improve the efficacy of the basic face identification approach, new features with more data points are integrated.
- D ILLUMINATION: It is the most important component in determining the image quality and the time it takes to detect a face. Bright images hamper the identification of facial features. A dark image, meanwhile, generates a low contrast image, making it harder to identify variations in intensity level throughout the face.
- E TO COMPUTE TIME AND SPEED: It plays a vital role to find out image quality and time to detect a face. It is the most important aspect in determining the image quality as well as the time it takes to detect a face. It is difficult to recognize the facial features of a bright image. Whereas, a dark image generates a low contrast image making it harder to identify variations in intensity level throughout the face. When using the established technique to detect faces, the distance between each testing point must be determined for each face to be detected, which takes time.

V. REMEDIES

- Neural networks can be utilised to improve algorithm accuracy and detection speed.
- Faces in various positions and inclinations may be detected using appearance-based characteristics.

VI. CONCLUSION

In the earlier two decades, technology of face-recognition has progressed appreciably. Machines now, can authenticate identify information for secure transactions. Surveillance, security jobs, and building access control. To run these applications a controlled environment is required. Next-generation facial recognition systems will be extensively used in smart environments where computers and machines serve as helpful assistant.

The face-detection and identification technology lacked the steadiness required to attain high recognition accuracy. This happened because the face recognition subsystem was immune even to a smidgeon of invariance to the segmented face image's scale, rotation, or shift problems. However, if further processing is used to further normalise the segmented face image, such as an eye detection technique, performance will be comparable to that of a manual face detection and recognition system.

Because the values for the parameters must be specified by the user, the code does not automatically detect the faces. Nobody will receive consistent results; it will all depend on the scaleFactor, minNeighbors, and minSize parameter values. Detecting the number of faces has no precise value. To come up with face detection, the user will have to employ arbitrary values. Although the code can recognise faces, user verification is still required. As a result, this is not a fully intelligent system because it requires user intervention. To achieve this goal, computers must be able to consistently recognise surrounding individuals in a way that is consistent with regular human interactions. They shouldn't necessitate any particular interactions, and they should follow human intuitions about when recognition it is most likely. This means that future smart setting will use the same modalities as humans and will have similar constraints. These objectives appear to be within reach; nevertheless, further study is needed to ensure that person recognition technology works reliably in a wide range of situations, employing single or multiple modalities.

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THE ANALYSIS OF ELASTIC PROPERTIES OF COMPOSITE LAMINATE PLATE IN TERM OF MATHEMATICAL METHOD

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ABSTRACT

The Analytical expressions of elastic constants for a composite laminated plate has been derived in the terms of elastic constants of individual ply. The in-plane and out - plane i.e. bending and twisting constants have been derived in terms of properties of elasticity of individual laminate and its thickness. The staking sequence and its orientation also play a role. Thus knowing the elastic property ,the thickness and orientation of individual ply we can get the elastic properties of composite laminate.

I. INTRODUCTION

The composite materials are typically a combination of usually light, weak and flexible binding material with a more dense, strong and high strength-to-weight and stiffness-to-weight ratios are reliably obtained.

In electronics applications the circuit boards typically have two or more different materials in laminated form. The coupling between in plane and out of plane

displacements in common in these materials.

These coupling reduces the effective strength of stiffness of composites.

Whitney and Leissa [1] has shown that the coupling may be reduced in anti-symmetrically laminated plate by increasing the stacking of plies.

Abrams and Scheyhing [2] presented numerous configurations for which the elastic behavior of the laminate is similar to that of a homogeneous orthotropic or an isotropic material. The stiff reinforcing materials in fibrous or whisker form. Their constitutive equations of this multi layered plate or shall element is solved and compared with its counter parts for homogeneous media in order to determine the mathematical relations to ensure composite orthotropic and isotropic elastic behavior. Bartholomew [3] has shown that selection of a suitable ply stacking order for uncoupled, orthotropic laminates enables orthotropic in bending, as well as inplane, to be achieved.

All the individual ply should be identical in the form of thickness and material properties, and the fibre directions lie in proportion about the

orthotropic axes for the laminate. After achieving in-plane orthotropy, the remaining requirements for designing a specially orthotropic laminate are achieved by managing ply stacking sequence.

In the following lines are going to give mathematical analysis in section 2, section 3 will give relation between stiffness coefficients.

II. ANALYTICAL ANALYSIS

Following the notation of Bartholomew the matrix of elastic stiffness coefficients, Q_{ij} , for a ply is given as

$$Q = \begin{bmatrix} Q_{11} & Q_{12} & 0 \\ Q_{12} & Q_{22} & 0 \\ 0 & 0 & Q_{66} \end{bmatrix}$$

with

$$Q_{11} = \frac{E_1}{\eta_0}, \quad Q_{12} = \frac{\eta_{12}E_2}{\eta_0} = \frac{\eta_{21}E_1}{\eta_0}, \quad (2.2)$$

$$Q_{22} = \frac{E_2}{\eta_0}, \quad Q_{66} = G_{12}, \quad \eta_0 = 1 - \eta_{12}\eta_{21}, \quad (2.3)$$

Where $E_1, E_2, \eta_{12}, \eta_{21}$ are Young's modulus and Poisson ratio. These elastic stiffness coefficients we referred to orthotropic axes.

If the fibre of such ply are taken to be inclined at an angle θ respective to x- axis of the reference plane, then stiffness \bar{Q} is given as

$$\bar{Q} = \begin{bmatrix} \bar{Q}_{11} & \bar{Q}_{12} & \bar{Q}_{16} \\ \bar{Q}_{12} & \bar{Q}_{22} & \bar{Q}_{26} \\ \bar{Q}_{16} & \bar{Q}_{26} & \bar{Q}_{66} \end{bmatrix} \quad (2.4)$$

$$2\bar{Q}_{11} = [Q_{11} \cos^2 \theta + (Q_{12} + Q_{66}) \sin^2 \theta](1 + \cos 2\theta) + [(Q_{12} + Q_{66}) \cos^2 \theta + Q_{22} \sin^2 \theta](1 - \cos 2\theta) \quad (2.5)$$

$$8\bar{Q}_{12} = (Q_{11} + Q_{22} - 4Q_{66})(1 - \cos 4\theta) + 2Q_{12}(3 - \cos 4\theta) \quad (2.6)$$

$$2\bar{Q}_{22} = [Q_{11} \sin^2 \theta + (Q_{12} + Q_{66}) \cos^2 \theta](1 - \cos 2\theta) + [(Q_{12} + Q_{66}) \sin^2 \theta + Q_{22} \cos^2 \theta](1 + \cos 2\theta) \quad (2.7)$$

$$2\bar{Q}_{16} = \sin^2 \theta [(Q_{11} - Q_{12} - 2Q_{66}) \cos^2 \theta + (Q_{12} - Q_{22} + 2Q_{66}) \sin^2 \theta] \quad (2.8)$$

$$2\bar{Q}_{26} = \sin^2 \theta [(Q_{11} - Q_{12} - 2Q_{66}) \cos^2 \theta + (Q_{12} - Q_{22} + 2Q_{66}) \cos^2 \theta] \quad (2.9)$$

$$8\bar{Q}_{66} = (Q_{11} + Q_{22} - 2Q_{12} - 2Q_{66})(1 - \cos 4\theta) + 2Q_{66}(3 - \cos 4\theta) \quad (2.10)$$

III. RELATION BETWEEN IN BENDING MOMENTS, TWISTING COUPLES WITH STRAINS AND PLANE STRESSES

We assume that small deformation occurs for this we take thin plate theory. The assumption gives that reaction of laminates of applied membrane stresses and bending moments is linear. Elastic behavior is given by

$$\begin{bmatrix} N \\ M \end{bmatrix} = \begin{bmatrix} A & B \\ B & D \end{bmatrix} \begin{bmatrix} \epsilon^0 \\ k \end{bmatrix} \quad (3.1)$$

In above N & M are membrane and bending stress resultant and twisting couple.

$$N = [N_x, N_y, N_{xy}] \quad M = [M_x, M_y, M_{xy}] \quad (3.2), (3.3)$$

Where ϵ^0, k are strains of middle plane and curvatures, respectively and given as

$$\epsilon^0 = [\epsilon_x^0, \epsilon_y^0, \epsilon_{xy}^0] \quad (3.4)$$

$$k = [k_x, k_y, k_{xy}] \quad (3.5)$$

Now we consider a laminate of 4 plies as shown below and measured z_k from top to bottom

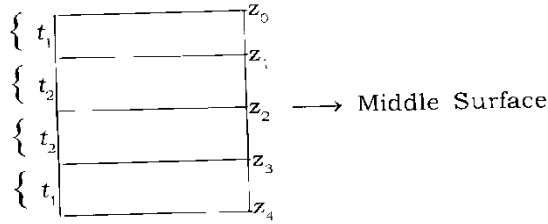


Figure-1 : Geometry of 4-Layered Composite

The matrices A, B and D are defined below. k^{th} ply of the laminate lie between Z_k and Z_{k-1} . t_1, t_2 etc. are ply-thickness. We consider 4-layered composite as shown in figure 1.

IV. RELATION BETWEEN REDUCED STIFFNESS CONSTANTS OF FOUR LAYERED COMPOSITE AND MATRICES OF COEFFICIENTS

The components of membrane stiffness matrices A, coupling matrices B and bending stiffness matrices D are given in terms of reduced-stiffness coefficients as

$$Q_j = \sum_{k=1}^4 \bar{Q}_j(\theta_k) (Z_k - Z_{k-1}) = \bar{Q}_j(\theta_1) (Z_1 - Z_0) + \bar{Q}_j(\theta_2) (Z_2 - Z_1) + \bar{Q}_j(\theta_2) (Z_3 - Z_2) + \bar{Q}_j(\theta_1) (Z_4 - Z_3) \quad (4.1)$$

We consider fibre directions aligned at $+\theta_1$ and $+\theta_2$ of the co-ordinate system in the direction of x-axis.

$$A_{ij} = 2 \bar{Q}_{ij}(\theta_1) \langle t_1 + \alpha_{ij} t_2 \rangle \quad (4.2)$$

$$\alpha_{ij} = (\bar{Q}_{ij}(\theta_2) / (\bar{Q}_{ij}(\theta_1))) \quad (4.3)$$

where $\bar{Q}_{ij}(\theta)$ is reduced stiffness evaluated at an angle of orientation of fibre, θ . For an antisymmetric angle ply plate

$$\alpha_{ij} = 1 \Rightarrow \theta_1 = \theta_2$$

Then extensional stiffness, A_{ij} , is given as

$$A_{ij} = 2 \bar{Q}_{ij}(\theta_1). \text{ Thickness of plate is } t.$$

$$\text{Then, } A_{ij} = \bar{Q}_{ij}(\theta) t \quad (4.4)$$

Coupling matrix is defined as

$$B_j = \frac{1}{2} \sum_{k=1}^4 Q_j(\theta_k) (z_k^2 - z_{k-1}^2) = \bar{Q}_j(\theta) [t_2^2(1 + \alpha_j) - (t_1 + t_2)^2] \quad (4.5)$$

where $\alpha_{ij} = \bar{Q}_{ij}(\theta_2) / \bar{Q}_{ij}(\theta_1)$. If we want that there should not be coupling, then we take

$$t_2^2(1 + \alpha_{ij}) - (t_1 + t_2)^2 = 0,$$

$$\text{Or } 1 + \alpha_{ij} - (1 + R_1)^2 = 0, \quad R_1 = t_1 / t_2, \quad (4.6)$$

$$\text{Or } R_1^2 + 2R_1 - \alpha_{ij} = 0, \\ R_1 = -2 \pm \sqrt{1 + \alpha_{ij}}, \quad (4.7)$$

If we take $\alpha_{ij} = 1$ i.e., the reduced stiffness coefficients of outer and inner ply are same than, $R_1 = .4$ approximately

Above gives that inner ply should be thicker than the outer one. If so coupling will not occur. Thus, $B_{ij} = 0$

Similarly for D_{ij} with $\alpha_{ij} = 1$

We get

$$D_{ij} = \begin{cases} 8/3 \bar{Q}_{ij}(\theta_1) t^3, & j \neq 4 \\ 0, & j = 4 \end{cases} \quad (4.8)$$

Thus we see that bending stiffness coefficients depend upon total thickness of plate and not on the thickness of independent ply.

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Role of Investor Awareness and Motivation behind Investment on Investor Purchase Decision: A Study of Moradabad Region

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Abstract - Financial institutions provide their clients with a range of financial goods and tools. The alternatives of the choices, an investor has an impact on their purchasing behaviour. Numerous factors frequently influence investment decisions, but the focus of this study is on determining the influence of investor awareness and motivation on the buying decision. The benefit that the security provides to the investor serves as motivation to invest in that security. The fundamental knowledge that an investor has regarding financial goods and instruments is known as awareness. To conduct the study, a quantitative research technique was used. In order to gather the primary data, the researcher personally handed 180 questionnaires to the respondents. Regression modelling, correlation, and independent sample t-tests have all been used to evaluate the hypothesis. According to the survey, male and female investors are equally knowledgeable about financial securities. They also share the same preferences when it comes to choosing financial products based on their goals or justifications for making investments. Additionally, the study discovered a favourable effect of investor awareness and investor motivation on their buying choice.

Keywords- financial instruments, financial securities, investor awareness, investor motivation, investor buying behaviour.

I. INTRODUCTION

Financial institutions provide a steady stream of savings in the form of cash into the market, which makes them the foundation of every economy. The retail investor has grown more knowledgeable and autonomous in recent years, which is assisting with the efficient use of the investor's wealth. Indian investors already have access to a wide variety of financial instruments, ranging in risk from very high to nearly zero. The precise necessity for the investment, the investor's risk tolerance, and the expected return all are the major factors affecting the choice of investment. The two main categories of investing opportunities are financial and economic.

The acquisition of any tangible asset, such as a house, a building, or any equipment, is referred to as an economic investment, whereas purchasing any financial security, such as shares, debentures, mutual funds, insurance policies, etc., is referred to as a financial investment. Investments are always subject to risk, which varies depending on the type of financial asset. A person's

investment behaviour mostly consists of buying the securities of his choice.

This decision is influenced by a number of factors like the need of investment, investor awareness about the financial products available in the market, the capability of investor to take risk, perception of investor towards risk, return expectation [13] profitability variables attached to the financial security like dividend, rapid growth of funds invested, quick profit, attitude of investor [11] & [1], corporate reports issued by the companies [2] & [5], personal demographic factors associated to the investor like age, gender, education, family type, occupation, awareness, preference [6], [7] & [8]. Some of these influential factors are intrinsic and other is extrinsic to the investor.

The types of investors—individual or retail investors, and corporate investors—have different influencing influences. The elements to be taken into consideration before making investments will change for both types of investors due to differences in both investor attitude and investment psychology for individual and corporate investors. [7]. This study is concerned about the individual investor. The researcher has examined the motivation, preference, and awareness aspects for investments. The goal of the study is to determine how male and female investors differ in terms of awareness, preferences, and motivating factors. The study has examined if the demographic component of gender has any bearing on investor purchase decisions. The researchers in the current study have also found the influence of investor awareness and motivating element on investor buying decision.

II. LITERATURE REVIEW

The researchers [9] conducted research on investor awareness of financial investments in the IT sector and discovered that most investors had average knowledge of financial securities. They demonstrated that other demographic characteristics, such as age, education, social position, annual income, and saving capacity, were strongly connected with the knowledge of the investors whereas gender was not. In their study, [13] found a statistically significant correlation between the demographic characteristics of salaried investors and their level of investment awareness and satisfaction. In a

study on individual investor behaviour and preference toward mutual fund schemes conducted in Delhi in 2013, [10] found that investors preferred direct communication with the company's agent or advisor before making any purchase decisions and that they avoided buying financial securities online. In another study [3] the researchers conducted research on investors' perceptions of tax-saving mutual fund schemes and found that Indian households are more cautious and understand when to save and invest in the proper securities. More over 40% of the respondents, they found, were able to set aside and invest between 10% and 20% of their income. According to the study's findings, traditional routes including PPF, bank deposits, and post office schemes are the investors' first options. Low risk and tax benefits are the key influencing reasons to buy any financial security, and financial experts and family members are the primary sources of knowledge regarding investments. Investor preferences for capital market instruments, the types of risks that investors examine before making investments, and the steps they take to reduce such risks were identified by [4]. Financial institutions should launch awareness campaigns because, according to [12] study on investor knowledge of stock market instruments, investors are not well-informed or aware of the financial products offered on the equity market. Brokers should be available to assist and direct investors in order for them to buy the shares of their choosing.

III. OBJECTIVES OF THE STUDY

1. The primary objective of this study is to identify the role of gender as a demographic variable on investor's awareness, preference and motivational factors on their purchase decision.
2. To know the impact of investor's awareness and motivational factors on investor purchase decision (IPD).

IV. HYPOTHESIS OF THE STUDY

For the fulfilment of the objectives the following hypothesis has been framed by the researcher;

Null Hypothesis 1 - There is no significant difference in the awareness, preference and motivational factors of male and female investors towards the financial instruments

Null Hypothesis 2 - There is no significant impact of investor awareness and motivational factors on investor purchase decision.

V. RESEARCH METHODOLOGY

The study is descriptive and exploratory in nature and identifies the role of gender on investor awareness, preference and motivational factors. Primary data has been collected via questionnaire and secondary data has been collected via journals, magazines, books and online documents. Simple random sampling method has been

used to select the sample. A total of 180 respondents are included in the study of Moradabad region of Uttar Pradesh (India). Data collection is done via personal interview method. The data has been collected from March 2022 to May 2022. The questions under the instrument were ranging from 1 to 5 on a five point based Likert scale ranging from strongly disagree to strongly agree. The data has been coded by the researcher and analysed with the help of SPSS 20 version. The effects of the factors have been analysed with the help of independent sample – t test and ANOVA, correlation and regression method.

VI. DATA ANALYSIS AND FINDINGS

The following table I gives a descriptive statistics of the study sample. It can be seen from the table that 68% of the total respondents were male and 32% respondents were female, 61% of the respondents were married while 39% were unmarried, 61% of the respondents belonged to 31 – 40 years age group and majority of the respondents 58% were from joint family type under the studied sample.

TABLE I
DESCRIPTIVE STATISTICS OF DEMOGRAPHIC FACTORS
OF THE PARTICIPANTS (N = 180)

Demographic Factor		Percentage (%)
Gender	Male	68
	Female	32
Marital Status	Married	61
	Unmarried	39
Age Group	21-30	24
	31-40	61
	41-50	15
Family Type	Joint	58
	Nuclear	42

Hypothesis Tests

Analysis of investor awareness, preference and motivational factors towards the financial instruments with respect to gender

Initially, the demographic data and main variables of the study including Investor awareness (IA), Investor preference (IP) and motivational factors behind investments (IM) were described. In this part a description has been given of the variables on the basis of gender.

TABLE II
MEAN AND SD OF IA, IP AND IM ON GENDER BASIS
(N=180)

Gender of respondent		Mean	Std. Deviation
Investor Awareness	male	24.43	3.01
	Female	24.35	3.03

Investor Preference	male	20.49	2.81
	Female	20.65	2.78
Investor Motivation	male	24.83	3.38
	Female	24.98	3.56

It is evident from the table II, that no significant difference exists in the mean values of male and female for all three variables IA, IP and IM. The mean values are quite close to each other. For statistically checking the data set independent sample t-test has been applied here, following are the results of the test;

TABLE III
Results of Independent sample t-test

		t	Sig. (2-tailed)
IA	Equal variances assumed	-.191	.849
IP	Equal variances assumed	-.382	.704
IM	Equal variances assumed	.363	.717

It is evident from the above table III, that the p value for all three variables IA, IP and IM is $>.05$ so it can be said that there is no statistical difference exists in the IA, IP and IM of males and females investor. So in this case the entire formulated null hypotheses are accepted. We can say that no significant difference exists between the awareness of male and female investors towards the financial instruments. No significant difference found in the preference of the financial instruments of male and female investors. No significant difference has been found in the motivation factors towards the financial instruments of male and female investors.

Analysis of impact of investor's awareness and motivational factors on investor purchase decision

Correlation analysis is used to understand the nature, direction and strength of relationships between two variables. Correlation shows that the two variables are linked together and a change in one variable can cause a change in another one. Following table no IV, gives the result of correlation analysis

TABLE IV
Correlation between IA, IM and IPD

Variable	Investor Purchase Decision	P-Value
Investor	.706**	.000

Awareness		
Investor Motivation	.669**	.000

** Correlation is significant at the 0.01 level (2-tailed).

The value of correlation coefficient for IA and IPD in the table 4, is .706 which shows a high positive correlation exists between investor awareness and investor purchase decision This means that the investors purchase decision is highly effected by the awareness they have about the financial products. The p-values is .000 which is less than the significant value i.e. 0.05 that means the relationship is statistically significant. Hence we reject the null hypothesis and we can say that there is a positive impact of investor awareness on their purchase decision.

The value of correlation coefficient for the IM and IPD in the table 4, is .669 which shows a moderate positive correlation exists between investor motivation and investor purchase decision. This means that the investors purchase decision is effected by the motivational factors behind the investments. The p-values is .000 which is less than the significant value i.e. 0.05 that means the relationship is statistically significant. Hence we reject the null hypothesis and we can say that there is a positive impact of investor motivation behind the investment, on their purchase decision.

Regression Analysis

The prediction of independent variables towards the dependent variables can be done with the help of regression analysis. The following table no V, shows the value of R square is .536 which shows that the independent variables have an influence of 53.6% on the dependent variable. Here we can say that investor awareness and investor motivation behind the investments have 53.6% influence on investor purchase decision.

TABLE V
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732	.536	.527	2.314

TABLE VI
ANOVA value

Model	F	Sig.
1 Regression	56.102	.000

As per table VI, the ANOVA value of the significance model is .000 which is less than the significance level of .05. This represents that the overall regression model of this study is statistically significant and a good fit for the data.

TABLE VII
Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
	(Constant)	4.973	1.878		.009
	IA	.509	.118	.469	.000
	IM	.302	.106	.308	.006

In table VII, the significance values for each independent variable (IA, IM) determines its impact on the dependent variable i.e. IPD. The independent variables are represented for example; Investor awareness as X1 and investor motivation as X2. Following is the regression equation:

$$Y=4.973 + 0.509X1 + 0.302X2$$

VII CONCLUSION

This study is conducted in Moradabad district of Uttar Pradesh and observes the behaviour of investors in connection with their awareness, preferences towards different securities available and the motivational factors which influences their decisions. It has been found that male and female investors are equally aware about the financial instruments available. Their preferences for selecting the best suitable investment option are also not different among male and female investors. The motivational factors to invest in a particular security are also not different for male and female investors. The present study also concludes a significant correlation between investor awareness and purchase decision and also between the motivation to invest and purchase decision. The higher the investors are aware about the available financial avenues, about the pros and cons of the options, the better they will in a position to invest in the needed portfolio. The motivational factors motivate the investor to invest in a particular security. The study concludes that the investor looks for the needed benefit of the investment before making any choice. The cost of the financial product and benefit of the financial product is equally important for the investors and equally analysed by the investor before making any investment. Further study can be done to identify the major motivational factors which influence the investor to invest.

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