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3.3.2 Number of research papers per teachers in the Journals notified on UGC website

Sr. No.	Evidences
1	List of papers
2	Copy of paper/Certificate

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Principal

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3.3.2 Index Number of research papers per teachers in the Journals notified on UGC website during the year

Criteria	Key Aspects	Assessment Indicators	Total Publications
3.3.2	Index Number of research papers per teachers in the Journals notified on UGC website during the year	Research papers per teachers in the Journals notified on UGC website during the year	14

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Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal
An Optimization Framework of Adaptive Computing-plus-Communication for Multimedia Processing in Cloud:A Review	Prof.C.M.Mankar	Computer Science and Engineering	International Journal for Research in Applied Sciences and Engineering Technology,Paper ID:IJRASET42887.	2021-22	ISSN No:2321-9653	https://www.ijraset.com/research-paper/optimization-framework-of-adaptive-computing-plus-communication-for-multimedia-processing-in-cloud
Diabetes Prediction Using AWS SageMaker	Prof.C.M.Mankar	Computer Science and Engineering	Journal of Information and Computational Science,UGC-Care Group II Certified Journal,Volume 12,issue 5,May 2022.	2021-22	ISSN No:1548-7741	https://drive.google.com/file/d/1puAFv1-sz2CubElYNf49XaTSHsgqQ3nm/view
BART Model for Text Summarization: An Analytical Survey and Review	Prof.C.M.Mankar	Computer Science and Engineering	International Journal of Advanced Research in Science,Communication and Technology,Volume	2021-22	ISSN No:2581-9429.	https://ijarsct.co.in/Paper4035.pdf

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			2,Issue 5,May 2022,Certificate No:052022-A2021,			
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Review on Sentimental Analysis of Marathi Language	Prof. K.P.Sable	Computer Science and Engineering	Journal of Information and Computational Science,Volume 11 issue 12,May 2022,ISSN No 1548-7741/web:joics.org	2021-22	ISSN No 1548-7741	https://drive.google.com/file/d/1-CAlEPdpCWKMuCEkKtGbepl8R-8MSxYe/view
Machine Learning –Based Prediction of Big Mart Sales	Prof. J. M. Patil	Computer Science and Engineering	Journal of Information and Computational Science,Volume 11 issue 12,May 2022,ISSN No 1548-7741/web:joics.org.	2021-22	ISSN No 1548-7741	https://drive.google.com/file/d/1yLoHicLzOjVd-YjZ-e0TF5M5PbF129Du/view,https://joics.org/VOL-12-ISSUE-5-2022/
Implementation Analysis of Data	Prof. J. M. Patil	Computer	International Journal for Research in	2021-22	ISSN: 2321-9653	https://www.ijraset.com/fileserve.php?FID=36613

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Classification Approach for Scientiment Classification		Science and Engineering	Applied Science & Engineering Technology,Volume 9,Issue VII,July 2021			
Classification Approach and Analysis for Predictive Social Emotion on User Review	Prof. J. M. Patil	Computer Science and Engineering	International Journal for Research in Applied Science & Engineering Technology,Volume 9,Issue IV,April 2021	2021-22	ISSN:2321-9653	https://www.ijraset.com/print-certificate.php?member=33584
Sentiment Analysis of Customer Product Reviews	Prof. P. V. Deshmukh	Computer Science and Engineering	Journal of Information and Computational Science,Volume 11 issue 12,April 2022,ISSN No 1548-7741/web:joics.org.	2021-22	ISSN: 1548-7741	https://joics.org/VOL-12-ISSUE-4-2022/,https://drive.google.com/file/d/1NzD0tD-C50nTSF7aFmCfe-N37DLxpmfP/view
Effective Machine Learning Approach in Breast Cancer Detection	Prof. P. V. Deshmukh	Computer Science and Engineering	Journal of Information and Computational Science,Volume 12 issue 4,April 2022,ISSN No 1548-7741/web:joics.org.	2021-22	ISSN: 1548-7741	https://drive.google.com/file/d/1CMGUQDtp6bhivZH7l5Ql9fIIG8P8xA87/view,
Deep Nueral Network Based Smart	Prof. A. K. Shahade	Computer Science	Monitoring Sytem in International Journal of Interdisciplinary	2021-22	ISSN: 2456-236X	http://ijiird.com/wp-content/uploads/060216.pdf

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Real time Hand Gesture Recognition System	Prof. A. K. Shahade	Computer Science and Engineering	International journal of advanced research in Science,Communication and Technology,Volume 2,Issue 5,May 2022.Certificate No 052022-A2084	2021-22	ISSN (Online) 2581-9429	https://ijarsct.co.in/mayi5.html,https://ijarsct.co.in/Paper4049.pdf
E-Lib Digital Library Management System using Flutter and Dart	Prof. A. K. Shahade	Computer Science and Engineering	International journal of advanced research in Science,Communication and Technology,Volume 2,Issue 6,May 2022.Certificate No 052022-A3239	2021-22	ISSN (Online) 2581-9429	https://ijarsct.co.in/mayi6.html,https://ijarsct.co.in/Paper4253.pdf

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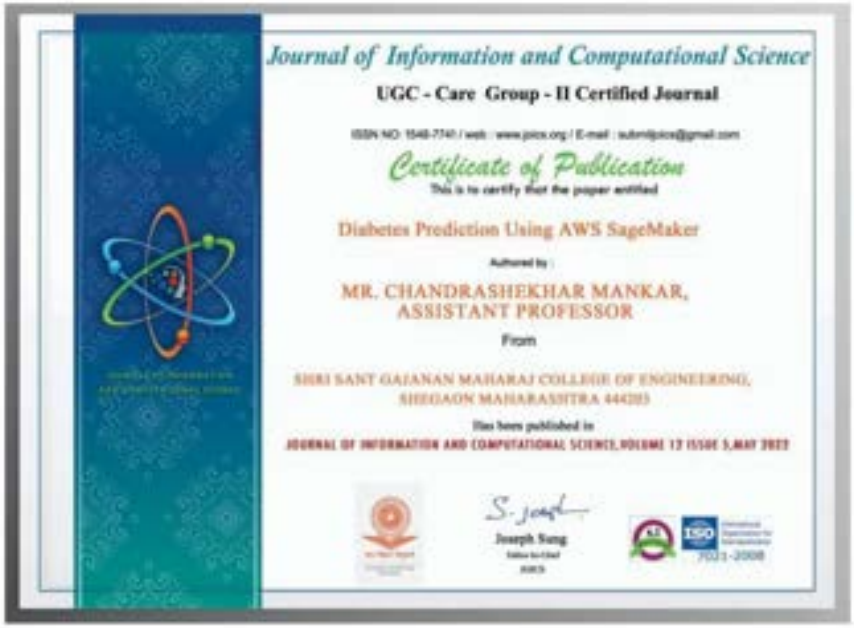

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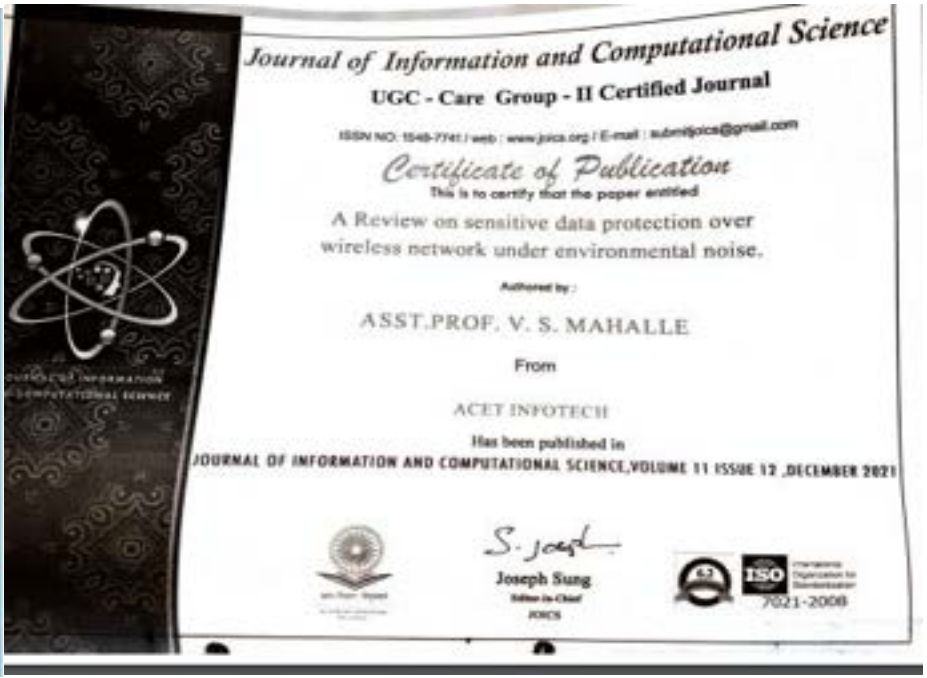

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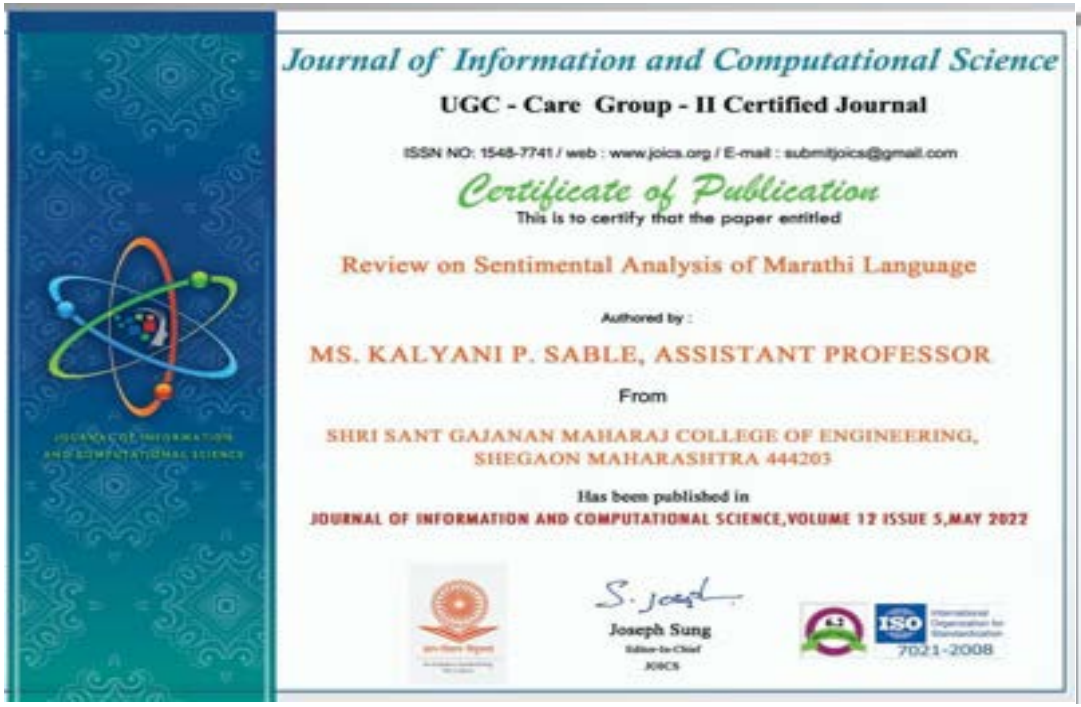

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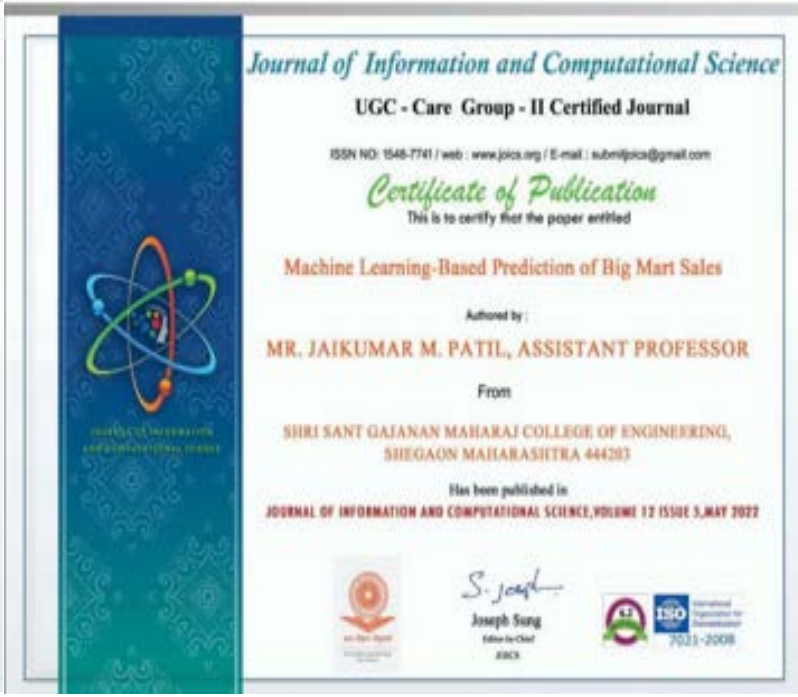

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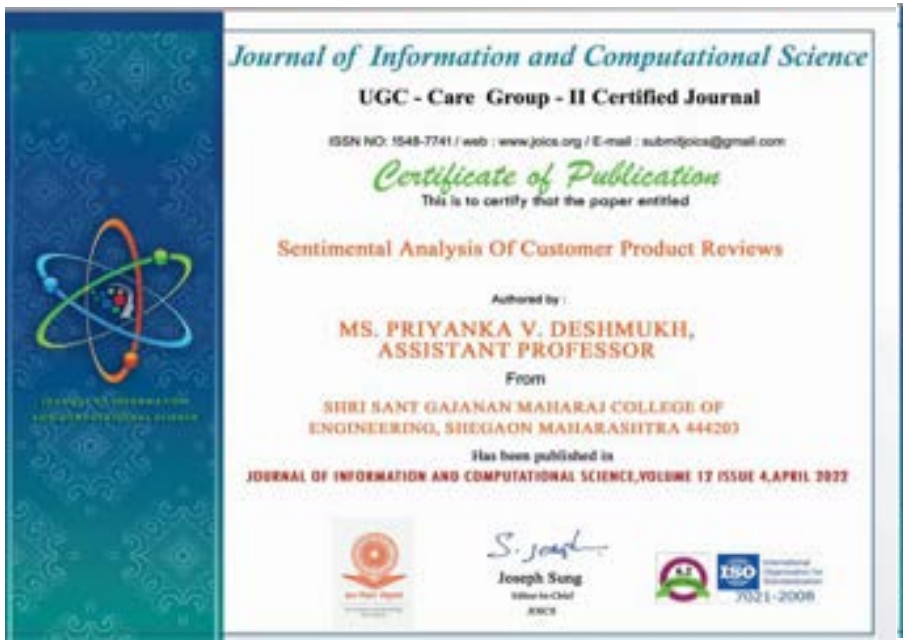

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for presenting the research paper entitled "**A Novel Deep Learning Approach Based Multilingual Opinion Mining**" in the IEEE sponsored First International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT 2022) organized by the Department of Electrical and Electronics Engineering, K. Ramakrishnan College of Engineering, Tiruchirappalli, Tamil Nadu, India during 16 – 18, February 2022. The conference has been organized in HYBRID MODE.

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Review on detection and classification of underlying causes of power quality disturbances using signal processing and soft computing technique

G.N. Bonde *, S.R. Paraskar, S.S. Jadhao

Shri Sant Gajanan Maharaj College of Engineering, Shegaon 444203, India

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ABSTRACT

The new age power system is highly subjected to PQ disturbances that require proper attention and address. The research in this field is mainly categorized into different parts such as mathematical modeling, basic PQ principles, standards, impact and solutions, sources, and analysis. There are several underlying causes behind the occurrence of the PQ disturbance. Therefore, it is important to address the exact underlying cause for proper mitigation of the PQ disturbance. There are several methods available in the literature, which concentrated on to detection and classification of power quality events rather than the root cause of the PQ events. An effective method for root cause identification of PQ events is the need of the day. This article covers a broad review of signal processing and soft computing techniques used for the detection & recognition of the underlying cause of it. This will help the researcher, engineers, designers working in the field of detection, recognition, and monitoring of power quality. The comparative study of existing methods used in the literature is tabulated. The major concerns and obstacles in categorizing the recognition of power quality disturbances are thoroughly examined and discussed. The potential for new researchers in the field of power quality disturbance detection and recognition of underlying causes is further explored in this review.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Artificial Intelligence & Energy Systems.

1. Introduction

The utility goal is to provide high-quality electric power to the loads continuously at a low cost and with great reliability. The several factors contribute to power quality problems in the power system their causes and effects as shown in Table 1. Identifying the cause of PQ disturbance is logical in the area of PQ, given that the categorization of PQ-based disorders (e.g. voltage-sag, voltage swell, and transient) is the main objective of many classifiers rather than underlying reasons. As a result, an effective technique is required today to identify the fundamental causes of all PQ problems. Instead of relying on voltage and duration of power quality disturbances, the methodology depends on characteristics like Phase Angle Jump (PAJ) is extracted using stockwell transform (ST). This feature is proposed for linking the cause of different power quality disturbances due to different faults such as symmetrical, unsymmetrical, and different energization events like induction motor starting, capacitor bank energizing and transformer energization [1].

The method based on the mixed features of Stockwell transform and Hilbert transform has been presented for the recognition of single-stage PQ disturbances as well as complex power quality disturbances. The voltage signal is decomposed using stockwell transform and s-matrix is determined. The absolute value from S-matrix is determined. Similarly, a voltage signal is decomposed using the output of the decomposed voltage signal absolute value is obtained. Then power quality index (PQI) is obtained simply by multiplying the absolute values from the stockwell transform and the Hilbert transform. The PQ disturbances are detected and localized with this PQ index. The maximum values of the suggested PQ index were used to categorize the PQ disturbances. Voltage sag,

Abbreviations: PQ, Power Quality; ST, Stockwell Transform; PQI, Power Quality Index; WT, Wavelet Transform; HT, Hilbert Transform; KNN, K-Nearest Neighbour; SVM, Support Vector Machine; ELM, Extreme Learning Machine.

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Classification of Power Quality Disturbances in Emerging Power System Using Discrete Wavelet Transform and K-Nearest Neighbor

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This paper presents a wavelet and machine learning-based approach for the classification of power quality disturbances (PQDs) in emerging power systems. Renewable energy resources-based distributed generation (DG) is rapidly being used in the emerging power system to address the ever-increasing energy demand. PQDs are thought to be caused by the power electronic converters used in DG systems, DG operating conditions, and other common factors such as faults, switching activities, and non-linear loads. These PQDs must be detected and classified since they can create a variety of difficulties in end-user equipment. The proposed algorithm comprises the simulation of the emerging power system with a solar PV system, creating PQDs cases such as voltage sag, voltage swell, and voltage interruptions, capturing voltage signals which will be further processed using a discrete wavelet transform for feature extraction. The features extracted from DWT analysis are further used to develop the machine learning-based classifier for classification of PQDs. The proposed algorithm has been tested on a variety of PQDs. The simulation result shows that the proposed algorithm is efficient and it outperforms in the classification of PQDs.

Introduction

Power quality becomes a highly important issue in the power system operation due to the increasing use of power electronic devices. Waveform distortions are frequently caused by the power quality disturbances such as sag, swell, interruption, harmonics, flicker, transients, and notch. These disturbances cause malfunctions, instabilities, and failure of end user equipment's (1).

It is important to select appropriate features for the classification of PQDs. In order to extract features from the captured signal, signal processing techniques are used. These features are further fed to the classifier. The feature extraction is done in two steps. To begin, the time domain voltage signal is processed using signal processing techniques. Second, extraction of appropriate feature is done using the processed signal. A well selected feature vector reduces the classifiers load (2). Features can be directly extracted from the original time domain signals, and from the transformed frequency domain signals. To convert the time domain signal into a frequency domain signal, signal

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Discrimination Between inrush and fault Condition in transformer : A Probabilistic Neural Network Approch

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Abstract: In this paper, an algorithm has been developed around the theme of the conventional differential protection of the transformer. The proposed algorithm is based on probabilistic neural network (PNN) and use of the spectral energies of detail level wavelet coefficients of differential current signal for discriminating magnetising inrush and fault condition in the transformer. Performance of the proposed PNN is investigated with the conventional backpropagation feed forward (BPFF) multilayer perceptron neural network. To evaluate the developed algorithm, relaying signals for various operating condition (i.e., inrush and fault) of the transformer, are obtained from a custom-built single-phase transformer in the laboratory.

Keywords: differential protection; discrete wavelet transform; DWT; inrush current; internal fault; probabilistic neural network; PNN.

1 Introduction

What is a Power Transformer?

The Power transformer is one type of transformer that is used to transmit electrical energy in any component of the electronic or electrical circuit between the distribution primary circuits and the generator. These transformers are utilized in distribution networks to interface step down and step up voltages. The usual form of power transformer is fluid immersed, and the life cycle of these instruments is approximately 30 years. Power transformers can be divided into three types according to the ranges. They are large power transformers, medium power transformers, and small power transformers.

- The range of large power transformers can be from 100MVA and beyond
- The range of medium power transformers can be from -100MVA
- The range of low power transformers can be from 500-7500kVA

These transformers transmit the voltage. It keeps a low voltage, a high current circuit at one section of the transformer, and on the other side of the transformer, it keeps a high-voltage low current circuit. A Power transformer works based on the principle of Faraday's induction law. It explains the power network into areas where every gear attached to the system is designed per the rates set by the power transformer.

A power transformer is a static device employed for transforming power from one circuit to another without varying the frequency. This is a very simple definition of a transformer. Because there is no moving or rotating component, so a transformer is introduced as a static device. Power transformers perform based on an AC supply. A transformer operates on the rules of mutual induction. Power transformers are generally constructed to use the core part for maximum and will perform very much near to the apex of the B-H curve (Magnetic Hysteresis Loop). This takes down the mass of the core exceedingly. Typically, power transformers have the corresponding copper and iron loss. The electrical equipment and circuits in a substation must be protected in order to limit the damages due to abnormal currents and over voltages. All equipment installed in a power electrical system have standardized ratings for short-time withstand current and short duration power frequency voltage. The role of the protections is to ensure that these withstand limits can never be exceeded, therefore clearing the faults as fast as possible.

Power transformers are important elements of power system. So it is very important to avoid any maloperation of required protective system. For many years, differential protection has been used as the primary protection of power systems. It contains the differential relay, which operates for all internal fault types of power transformer and block due to inrush current. The major drawback of the differential protection relays stem from its potential for maloperation caused by the transient inrush current, which flow when the transformer is energised. The inrush current contains a large

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8 Conclusions

This paper presents a novel approach to discriminate between transformer internal fault and magnetising inrush condition based on PNN in digital differential protection scheme. The proposed PNN algorithm is more accurate than traditional harmonic restraint-based technique, especially in the case of modern power transformers which use high-permeability, low-corrosion core materials. The conventional harmonic restrain technique may fail because high second harmonic components are generated during internal faults and low second harmonic components are generated during magnetising inrush with such core materials. PNN overcomes the shortcomings of entrapment in local optimum; slow convergence rate corresponds to BP algorithm. Because of the fast training rate, the training samples can be added into PNN at any time. So, PNN is fit to diagnose the fault of power transformer and has auto-adaptability. The algorithm has an acceptable accuracy in the recognition of unused patterns for learning. This fact highlights the on line practical importance of algorithm.

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Mitigation of Power Quality Event Using FACT'S Device

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Abstract—This paper introduces a novel method for the mitigation of the voltage sag and voltage flicker by using Kalman filter and its derivatives (adaptive, and extended). The Kalman filter is used as a tool to extract both the instantaneous envelope of the voltage sags, and to extract the Instantaneous Flicker Level (IFL) of the voltage flicker. Also, this paper demonstrates the advantages of using the Kalman filter instead of the existing tools for tracking and extracting voltage disturbances. Digital simulation results are presented to illustrate the mitigation of unbalanced voltage sags, and the compensation of the cyclic and noncyclic voltage flicker by employing the proposed algorithm.

Index Terms—DSTATCOM, Kalman filter, unbalanced voltage sags, voltage flicker.

I. Introduction

IN THE deregulated power market, complying with the Power Quality (PQ) standards is becoming a major issue for the competing power distribution utilities. The revenue losses to US businesses due to poor PQ are estimated to be of 4 billions annually [1]. Voltage sag is a vital issue for system performance. Usually, voltage sags cause the malfunction of the modern process control, programmable logic control, and variable speed drives; in addition, sags can initiate significant tripping off for voltage-sensitive loads. Another critical issue is the voltage flicker, which is the most difficult PQ problem from the mitigation prospective, because of the chaotic char-acteristics of voltage flicker. This problem has increased in the industrial distribution systems because of the proliferation of nonlinear varying loads such as arc furnaces, arc welders, spot welders, and shredder motors [2].

Recently, the mitigation of the voltage sags has become the focus of PQ research to minimize its severe economical impact [3]. Many techniques have been introduced in the literature to track and extract voltage sags. The - technique has been used to extract the voltage sags, but it does not give satisfac-tory results for unbalanced voltage sags [4], [5]. The instanta-neous power theory (pq theory) has been also utilized to extract voltage sags [6], but it requires pure sinusoidal waveforms for its voltage and current; otherwise, the results are not accurate [7]. Fast Fourier Transform (FFT) and Phase Locked Loop (PLL) have been often employed to mitigate voltage sags, but these techniques do not yield accurate results if a voltage sag is asso-ciated with a phase angle jump [8].

In addition, the adaptive perceptron has been applied to track voltage sags, and it does give satisfactory results [9]. Different topologies have been mentioned in the literature for sag mitigation. The most efficient mitigating device for voltage sags has continued to be the Dynamic Voltage Restorer (DVR), because of its fast response, simple control, and fewer tran-sients [10]. Recently, the Distribution STATic COMpensator (DSTATCOM) has become widely adopted as an efficient mitigating device. It has the advantage of optimized energy which the DVR does not have, since the DVRs are mostly connected to the source of energy because the DVR usually injects active and reactive power to restore the load voltage [11], [12].

Voltage flicker is another PQ problem that has attracted attention recently. From the mitigation prospective, voltage flicker is the most difficult voltage challenge because of its random-ness which hinders tracking. The mitigation of voltage flicker will definitely limit the effect of voltage flicker on end-line customers. Most of the existing extracting techniques for voltage flicker depend on the FFT and its derivatives [13], [14], but FFT comes with some drawbacks such as slow response, picket fence, and leakage [15]. The p-q theory can also be used as a technique for flicker extraction and it gives satisfactory results for flicker mitigation [16]–[18]. The traditional mitigating de-vice for voltage flicker depends on the Static VAR Compensator (SVC) which plays a crucial role for mitigating flicker produced by arc furnaces [14], and [19]. However, SVC has a low control update rate (it is about half a cycle), and its limited capabilities for (Instantaneous Flicker Level) IFL mitigation [14]. As a result of the SVC's pitfalls, the DSTATCOM has come into the market as a substitute for the SVC [16], and [20]. The DSTATCOM gives a much better performance than the SVC, but is still not widely used because of its costs and the complexity of the con-trol circuit [14].

This paper introduces a modular approach mitigating device in which the DSTATCOM is the proposed mitigating device for voltage sags and flicker voltage (the modular approach consists of three DSTATCOMs, one DSTATCOM for each phase). The privilege of the modular approach is that it is capable of mitigating voltage disturbances of each phase individually, if three-phase disturbances are uncorrelated. The proposed algorithm for voltage disturbance extraction is the Kalman Filter (KF). It is an accurate algorithm for signal tracking, and has been utilized in the power sector for disturbance extraction [21]–[23]. The pro-posal in this paper is that the KF and its derivatives, adaptive and extended, are used as a unified approach to extract the instantaneous unbalanced voltage sags, and the instantaneous modulating signal of voltage flicker. Consequently, voltage sags and voltage flicker can adaptively and efficiently be mitigated using only one unified mitigating device.

For Fig. 6(b)
The modulating signal is expressed by:

$$S_m = 0.1 \times \sin(2 \times pi \times 15 \times t)$$

FFT = 15 Hz
Base frequency for
For Fig. 7(a)
The modulating signal is a square signal
Modulating signal amplitude = 15 Hz
Modulating signal frequency = 50%
Modulating signal deviation = 5 Hz
Base frequency for
The modulating signal is expressed by 5 terms of the Fourier series.

APPENDIX V
EXTENDED KALMAN FILTER ALGORITHM

1) Time update stage:

a) Project the state ahead

$$\hat{x}_k = f(\hat{x}_{k-1}, u_k) \tag{29}$$

b) Project the error covariance ahead

$$P_k^- = A \times P_{k-1} \times A^T + Q \tag{30}$$

2) Measurement update stage:

a) Compute the Kalman gain

$$K_k = P_k^- H^T \times (H \times P_k^- \times H^T + R)^{-1} \tag{31}$$

b) Update estimate with measurement Zk

$$\hat{x}_k = \hat{x}_k^- + K_k \times (z_k - h(\hat{x}_k^-, 0)) \tag{32}$$

c) Update the error covariance

$$P_k = (I - K_k \times H) \times P_k^- \tag{33}$$

where A is defined as $A_{[i,j]} = \dfrac{\partial f_{[i]}}{\partial x_{[j]}}(\hat{x}_k, u_k)$

A for the presented case is expressed as

$$A = \begin{bmatrix} \cos(2\pi x_{23} * \Delta t) & -\sin(2\pi x_{23} * \Delta t) & a_{13} & 0 \\ \sin(2\pi x_{23} * \Delta t) & \cos(2\pi x_{23} * \Delta t) & a_{23} & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{34}$$

$$\begin{aligned} a_{13} &= (2\pi\Delta t) \times (-x_{21} \times \sin(2\pi x_{23} \times \Delta t) \\ &\quad - x_{22} \times \cos(2\pi x_{23} \times \Delta t)) \\ a_{22} &= (2\pi\Delta t)(x_{21} \times \cos(2\pi x_{23} \times \Delta t) \\ &\quad - x_{22} \times \sin(2\pi x_{23} \times \Delta t)) \end{aligned} \tag{35}$$

$$H_{[i,j]} = \frac{\partial h_{[i]}}{\partial x_{[j]}}(\hat{x}_k)$$

and for paper's case the H is defined as

$$\begin{aligned} H = [&\cos(2\pi x_{23} \times \Delta t) \\ &\times \sin(2\pi x_{23} \times \Delta t) \\ &\times 2\pi\Delta t(-x_{21} \times \sin(2\pi x_{23} \times \Delta t) \\ &+ x_{22} \times \cos(2\pi x_{23} \times \Delta t))] \end{aligned} \tag{37}$$

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Grid interconnected PVA interfaced high efficiency water pumping system with sensorless FOC PMSM drive

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Abstract—

In this paper a grid interfaced PVA system is utilized for water pumping application achieved through constant speed control of PMSM drive. The DC voltage at the DC link is maintained constant even during variable solar irradiation with power compensation from grid. The exchange of power from grid and PVA ensure the operation of PMSM. The speed of the PMSM is controlled by sensorless FOC structure. In the presence of grid, the SWP system provides an uninterrupted water flow irrespective of available solar irradiation. In condition of grid failure, the output water flow is a function of available solar irradiation. A boost converter is used on the grid side to facilitate power transfer from the grid and enabling the unity power factor (UPF) operation using unit vector template (UVT) theory. The complete design is modeled in MATLAB Simulink module with graphical analysis using powergui toolbox with time domain comparison.

I. INTRODUCTION

As the energy demand increases, the need for energy-saving measures have been rapidly increasing. The Permanent magnet synchronous motor (PMSM) play a vital role, being an energy efficient motor, in this trends [1]. In comparison with an induction motor which is widely used in a solar photovoltaic (PV) based water pumping, the PMSM have a high power density, high efficiency, high torque/inertia ratio and a high power factor [2-3]. Besides these, unlike an induction motor, the speed of a PMSM is not limited by power frequency. This leads to a reduced size and an increased capacity of the motor [3].

Among the most promising and significant renewable energy sources, the development of a solar PV technology is reaching its mature stage [4]. Towards an energy saving, this technology plays an increasingly important role. Therefore, the solar PV fed PMSM drive indeed emerges as a worth combination of source and drive for an application such as water pumping [5-6]. Despite an innumerable encouraging aspects, being an intermittent in nature, is the serious issue with PV generation technology. This demerit results in an unreliable water pumping with a PV based pumping system. In the course of bad climatic condition, the water pumping is severely interrupted. Moreover, the system is underutilized as the pump is not operated at its full capacity. Furthermore, an unavailability of sunlight (at night) leads to shutdown of an entire water pumping system. To overcome these shortcomings, an external power backup in the form of a battery storage is provided in a PV-PMSM-pumping system [7]. However, a battery storage reduces the service life, and increases the installation cost and maintenance requirements [8]. To get over this complications with a battery technology, an alternate solution is reported in [9-11] wherein a utility grid is used as the backup source in a PV based induction motor driven water pumping. These recently recognized technologies, in reality, interface a PV generating unit into a utility grid. The prime attention is to

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An Overview of Fuel Cell Technology

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Abstract:-Day by day the demand of energy is increased substantially but the fossil fuels are decreased progressively. The research shows that fuel cell is an alternative for these energy crises. The Fuel cell provides a safe and environment friendly solution.
In this paper the fuel cell types principle of operation of an acidic fuel cell, technical parameter of a fuel cell, operating characteristics of fuel cells, energy output of a fuel cell Efficiency and emf of a fuel cell,hydrogen fuel cell analysis with thermodynamic potentials, classification of losses in an actual fuel cell activation losses,voltage efficiency of a fuel cell,thermal efficiency of a fuel cellare discussed.
Keywords:-Alkaline fuel Cells (AFC), Proton exchange Membrane Fuel Cells (PEMFC) Phosphoric Acid Fuel Cells (PAFC),Fuel Molten Carbonate Cells (MCFC),Solid Oxide Fuel Cells (SOFC)

Introduction:-The principle of the electric cell was discovered by the German Scientist Christian FriendrichSchonbein in 1838. The primary electric cell was demonstrated within the year 1839 by Welsh Scientist and Barrister Sir William Robert Grove in thephilosophical magazine and journal of science. Though it absolutely was discovered way back in 1838, the concept was commercially used nearly after 117 years. . NASA used electric cell developed by UTC in Gemini space mission in 1962 [2]. In 1980's USN used electric cell in submarines and it absolutely was only in 2007 when electric cell were sold as Auxiliary electromagnetic unit (APU) for backup power.Demand of energy worldwide is increasing hence there is progressive decrease of fossil fuel.During these energy crises; the fuel cell provides one of the best solutionsto bridge the gap between supply and demand. Fuel cell is an alternative proving itself an efficient with respective to safe production of energy and eco-friendly to retain the development of environment. Fuel cells are used in various sectors –commercial, industrial and residential.Research is going on that way to fulfill the need in these sectors as fuel cell power plants are environment -friendly, noiseless, no rotating components are present. In contrast, in coal-based stations, ash slurry, discharge of smoke through chimney adversely affects the environment.This plant can be used for military and hospitals as here noise and smoke is not allowed. Besides, full power is utilized in transmission and distribution hence no power wastage. Efficiency of Fuel cell power sources is high up to 55% whereas conventional thermal plants operate at 30% efficiency.

FUEL CELL TYPES

Fuel cells are broadly classified on the basis of the electrolyte used. There are five types of fuel cells:

- Alkaline fuel Cells (AFC)
- Proton exchange Membrane Fuel Cells (PEMFC)
- Phosphoric Acid Fuel Cells (PAFC)
- Fuel Molten Carbonate Cells (MCFC)
- Solid Oxide Fuel Cells (SOFC)

Alkaline Fuel Cells (AFCs):-Alkaline fuel cells use KOH as electrolyte with porous electrodes of carbon having nickel because the electro catalyst. Here as a fuel Hydrogen is used and as oxidant oxygen is used. Its operating temperature is about 800C. At anode, the

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POWER QUALITY IMPROVEMENT USING MODIFIED SYNCHRONOUS REFERENCE FRAME THEORY

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ABSTRACT

This Paper describes the development of mathematical modeling and analysis of modified Synchronous Reference Frame (MSRF) theory for mitigation of harmonics injected in power system due to employment of non- linear loads. The Use of non-linear loads is increasing manifolds due to the advancement in power electronic technology. Though this improves life quality, it also contributes substantially to the injection of harmonics in to the Power System. This, in turn, has severe effects on power quality of the system. It, thus, becomes necessarily essential to mitigate the harmonics & improve the power quality of System. This paper focuses on mitigation of power system harmonics using MSRF theory approach for generation of reference current signal. The MSRF technique is Modeled & analyzed using MATLAB Simulink.

Keywords: Non-Linear Loads, Harmonic Mitigation, Power Quality, Reference Current Generation, MSRF Theory.

I. INTRODUCTION

Over the recent years, power quality has been given tremendous attention. The reason behind this is intensive use nonlinear loads such as power electronic controlled application. Due to the benefits posed by the non-linear loads, its use is increasing day by day. Though the power electronics applications make our life convenient, they inject harmonics into power system. The harmonic generated by the most common nonlinear loads affect the amplitude and nature of source current and hence performance of system. The Power Quality problem has, thus, become a very serious issue. The connection of a nonlinear load, such as rectifiers, thyristor converters to the system, draws a current that is non-sinusoidal in nature [1-3]. This is due to the presence of harmonics.

The harmonics generated due to nonlinear loads affect the amplitude and nature of source current, and hence the performance of system is affected. The presence of harmonics in the system can cause problems like heating, losses, failure of electrical equipment and interference with communication system. So, elimination of harmonics is an important issue. Several algorithms to extract reference current signal have been proposed [1-5].

II. POWER QUALITY AND ITS EFFECT ON POWERSYSTEM

Any power problem manifested in voltage, current, or frequency deviation that results in failure or maloperation of customer equipment is referred as power quality. The term electric power quality broadly refers to maintaining a nearly sinusoidal power distribution at rated magnitude and frequency. In addition to this, the energy supplied to the consumer should be reliable and uninterrupted. With the increasing use of sophisticated controls and equipment in industrial as well as commercial facilities, the continuity, reliability and quality of electrical service has become extremely crucial to many power users. Electrical systems are subjected to wide variety of power quality problems which can interrupt production process, affect sensitive equipment, and cause down time scrap and hence capacity losses. Power Electronics are the most important cause of harmonics, inter-harmonics, notches etc. Harmonics are also produced due to rectifiers, ASDs, soft starters, electronic ballast for discharge lamps, switched-mode power supplies etc. Due to their nonlinearity, all these loads ,cause disturbances in the voltage waveform. Equipment affected by harmonics includes transformers, motors, cables, interrupters, and capacitors. Notches are produced mainly by converters, and they affect electronic control devices. Neutral currents are produced by equipment using switched mode power supplies such as PCs, printers, photocopiers and it seriously affects the neutral conductor temperature and transformer capability. Inter-harmonics are produced by static frequency converters, cyclo-converters, induction motors and arcing devices. There are economic impacts on utilities, their customers and suppliers of load equipment due to the harmonics. Thus, when any power quality problem occurs, huge financial loss may

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DESIGN AND SIMULATION OF BLDC MOTOR

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ABSTRACT

This paper refers to the topic of designing the permanent magnet brushless DC motor. As we know that electric vehicles are in very high demand these days. So, keeping in mind this thing, a brushless DC motor was picturized for use in electrical vehicles as the hub of the wheel. Some software was used for the simulation and we have obtained some specific results that we compared with the electromagnetic results. Some graphs are enlisted in this paper referring to various motor simulations and the nature of the graph is described in the results and discussion part.

The main aim of this project is to present the idea of designing an E-bike BLDC HUB motor with minimum cost, greater efficiency, and fewer electrical and mechanical losses. Electric vehicles make use of BLDC Motor as an Engine. This motor has its wide applications in washing machines, hard drives, hybrid vehicles, compressors, dryers, etc.

This project works in two flows, the first goes with the MOTOR design and simulation part and the other with the CONTROLLER design and simulation part. Based on this design and simulation results, a prototype of the BLDC Hub motor is built. In the motor design and simulation part, we have divided it into Mathematical modeling and Simulation on Software (Motor-solve and Ansys Maxwell software). And the controller design will be divided into further two parts of Simulation of the Controller using PROTEUS VSM software and the PCB manufacturing work. On the Proteus software, we have designed the PCB and the controller part, whereas on the Ansys Maxwell software we have designed and simulated the Motor.

Keywords: BLDC Motor Design, Motor Simulation, Ansys Maxwell, Integrated Power Module, ESC (Electronic Speed Controller)

I. INTRODUCTION

The BLDC motor has found its use majorly in industries of the automotive field. E vehicles are currently in huge demand thus it has surged the production for BLDC motor. BLDC motor is majorly categorized into two types Mainly permanent magnet synchronous motor (PMMS) and PMBLDC motor. Some advantages of this motor are high performance, higher value of torque per volume, the capability of high-speed applications, and electronic-driven commutation.

The construction and design of BLDC motor are similar to AC motor also known as permanent magnet synchronous motor. The rotor has one or more permanent magnets. In the BLDC motor, there is a facility of sensors, due to which the proper rotor position (or magnetic poles) can be detected. The most common sensor used for this purpose is the Hall element and optical sensors.

The key dimensions of BLDC motor while designing are Stator outer diameter, Stator inner diameter, Rotor outer diameter, Rotor inner diameter, type of magnet, magnetic thickness, and air gap.

The Electronic Speed Controller used in the BLDC motor is an electric circuit used to change the speed of an electric motor, for commutation, and also to perform as a dynamic brake. An ESC can be designed with essential components like a voltage regulator, processor, and FET. An intelligent power module (IPM) is a power semiconductor module that integrates into a single package all the circuitry required to operate IGBTs. In this way, the best possible performance can be achieved from an available IGBT technology.

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Development of Smart Emergency Detection System for Hospital

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Abstract: *The system deals with basic security and helps to detect and avoid accidents at the health care center by alerting about the presence of smoke particles, harmful gases, changes in temperature, and noise levels while an emergency. It works on solar power so it is eco-friendly. It contains lots of scope in the future to enhance and encourage the use of non-renewable energy*

Keywords: Arduino Uno, IoT Sensors, Relay, Wireless communication, PV solar module.

I. INTRODUCTION

The aim of this project is to avoid accidents in the health care center. The system deals with basic security and helps to detect and avoid accidents at the healthcare center by giving an alert about accidents. Generally, in this project, using sensor devices to detect smoke particles, harmful gases, and high temperature and noise levels for avoiding further casualties. The Arduino acts as the base regulator of the system. The whole system is powered through PV solar module so that a hamstrung force of electricity cannot be a problem in pastoral areas and hospitals. With the help of this system, a solution for the accidents at the health-care center and public domestic sector industry. This project is to design and develop a system that gives real-time alerts at the time incidents. To detect the presence of smoke particles and give an alert about the indication of fire. To measure the temperature levels and give a real-time alert about high-temperature levels in the environment. To detect noise/sound levels and give an alert about high noise levels. The Whole System gets power from Solar PV Module. The Energy generated by PV Module is stored in the energy storage device. The energy is distributed through a charge controller to the energy storage device and module.

II. LITERATURE REVIEW

To propose a solution for the accidents at the health-care center and public domestic sector industry. This project is to design and develop a system that gives real-time alerts at the time of incidents. To detect the presence of smoke particles and give an alert about the indication of fire. To measure the temperature levels and give the real-time alert about high-temperature levels in the environment. To detect noise/sound levels and give an alert about high noise levels. The Whole System gets power by Solar PV Module. The Energy generated by PV Module is stored in the energy storage device. The energy is distributed through a charge controller to the energy storage device and module.

III. HARDWARE SETUP

The data read from the device is passed to the microcontroller after that microcontroller processes the data and then it is passed to the transmitter. In fig 1. the transmitter will transmit the data through a wireless transmission system. After that, data is received by the receiver system then it will be procced through a micro-controller to give alerts about emergency incidents.

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Development of Solar Based E-Bicycle

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Abstract: *Electric vehicles (EVs) stand out enough to be noticed attributable to their utilization of clean energy. Huge advancement in lithium-particle battery has pushed the improvement of EVs. In any case, the test is that developing number of EVs prompts gigantic interest in electric power, which will irritate the power framework load. This prompts an investigation for option and clean wellsprings of energy to charge EVs. This venture executes solar based energy framework to raise a charging station for EV application. The charging station utilizes multi-port charging. The charging regulators are worked in light of the idea of force equilibrium, and constant current/constant voltage charging.*

Keywords: Sola PV Module, Charge Controller, Energy Storage Device, ELDC Hub Motor

I. INTRODUCTION

This project is about the usage of solar energy to power up the vehicle. In order to achieve the required voltage, the Photo Voltaic (PV) Module may be connected either in parallel or series, but it's costlier. In many developing nations like India petroleum is imported at very large scale and very excessive subsidy is furnished by using authorities to the people, which purpose losses of cost-effective growth. A proper energy management system is needed to control the energy uses, every single watt of stored energy have importance in electrical vehicle. The voltage is then boosted up using the boost power converter, ultimately running the BLDC motor which is used as the drive motor for our vehicle application. In the course work, the characteristic features of the components, solar panel, charge controller, battery, power converter and BLDC motor required for the vehicle application. The demand for energy is increasing due to the increase in population and the economic conditions of many countries. Recent research works reported that fossil fuels have limitations such as global warming, limited resources and economical issues. The energy crisis is expected in the near future and the utilization of renewable energy is to be explored to the maximum possible extent to overcome the problems that arise out from fossil fuels. Many researchers suggested the use of renewable energies considering many environmental aspects. Renewable energy such as solar energy can be an effective alternative in terms of its availability, cost-effectiveness and environmental friendliness. The team's research indicated a benefit to the campus for such a structure and also for improvement on other existing charging stations.

II. METHODOLOGY

The primary block of this flowchart involves four PV Module which is fundamentally a multicrystalline PV module. Every module has the rating of 12V, 50W so according to our need we interface them and get the expected result for the application. The result coming from PV module is then given to Distribution board which will give the expected voltage level to satisfy our necessities. Then the following and most significant block of this flowchart who is answerable for assuming command over engine and energy stockpiling gadget. The different capacity of regulator is to screen battery voltage and gave expected contribution to the engine.

2.1 PV MODULE

It is 50W, 12V multicrystalline solar powered PV module, additionally it is made by associating photovoltaic (PV) cells. They are comprised of semiconductor material like translucent silicon.

Solar powered PV modules convert light energy from sun into electrical energy. Ordinarily, solar based PV module appraised at 50W to 350W. Sunlight based PV modules are utilized for supporting the power result of PV cells by associating them.

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Discrimination Between Inrush Current from Interturn Fault Current in Transformers based on the Non-Saturation Zone

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Abstract: *When we give a supply to a transformer, the occurrence of magnetizing inrush current occurs. The magnitude of inrush current as high as ten times or more times of rated current which may lead to malfunction of the differential relay causing the problem of unnecessary disconnection of the transformer from the supply mains. So, for safe running of a transformer, it is necessary to discriminate inrush current from fault current in order to avoid malfunction of the differential relay and for the proper operation of the transformer. The second harmonic restraint relay is used usually but as size of power system network is becoming so huge & more and more convoluted and some drawbacks of usual system are slowly recognized. So, to shield the evolving power system and its important components like a transformer, we need fast-stable & dependable protection system. Current transformer saturation and large inrush current are the most notified cause of the discrimination algorithms malfunction. This paper deal with structured way to discriminate internal faults from switching conditions in the power transformers which can solve these problems. Therefore, the ongoing research is now concentrated on evolving new algorithms for proper discrimination between inrush current and internal fault current which increases the efficiency in Electrical Power system.*

Keywords: Transformer, Internal Fault, Inrush Current, Differential Protection, etc.

I. Introduction

Transformer protection is always a difficult problem for protection engineers. It is a highly structured static electrical machine that plays an important role in the power system. It is important component of power system, so it is necessary to have a fast and proper operating protection scheme for the safety and appropriate functioning. There are two types of faults occur in a transformer that is internal faults and external faults. The faults, which occurs inside the transformer are known as internal fault Winding short circuit also called as the internal faults, generally result from failure of insulation due to temperature increase or decrease of transformer. The faults which occur outside the transformer or at the terminals of the transformer are called as external faults.

Internal faults cause serious damage to the transformer winding within a short duration if appropriate care is not taken by the protection system Protection system of transformer depends upon the transformer rating, working condition, tap changing scheme and loading condition of the transformer. In small rating distribution transformers high voltage fuses are used for the protection. Buchholz relay protection is used for transformer having rating above 500kVA.Buchholz relay provides the protection against the fault occur in the transformer. The traditional method used for transformer protection is current differential protection, which is used for protecting the transformer windings against internal faults based on the simple property that the ratio of current entering and leaving the transformer is equal to the inverse of the transformation ratio. The ratio is affected either by internal fault or inrush current during transformer magnetization. Differential protection is an equipment protection. The primary and secondary current of the power transformer is compared by the differential relay and if any difference found in the current then the relay will give trip signal to both primary and circuit breakers. The magnitude of magnetizing inrush current is as high as compared to the internal fault current of transformer.

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Whiteboard Cleaning Mechanism for Classrooms

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Abstract: *Now-a-days white boards are widely used in almost every educational institute. About 70-80% educational institute around the world uses white board as the writing medium in their class room. They are large in size, for that reason it is very time consuming process to erase the writings from the board with duster. Using duster also reduce the visual quality of the board. If a class continue about one hour then about 8-10% time become waste because of cleaning the board using duster. Considering this "The board wiper", an cleaning system can solve these problems. The board wiper will shorten the time and also the effort. It takes around 8 sec to clear the board without destroying the quality. The wiper has horizontal movements and it wipes the board twice at a short time. The wiper consists of electric motor, supports, a wiper bar and a without microcontroller switching technology to give that an automation figure.*

Keywords: Whiteboard, Wiper, Motor.

I. INTRODUCTION

In this project we are working on automated whiteboard cleaning mechanism for classrooms. White board have become a central tool by which corporate organization, institution and other professional use as a mean of proper education and training. In that system we are going to used bored wiper which consists of electric motor, supports a wiper bar and without microcontroller switching technology. It is possible to control the wiper by a remote control system and this allows the controller to wipe the board from a reasonable distance. And it has an advantage to remove the wiper if it's necessary to clean and the whole wiper system can be established at a very low cost. So, "The Automate white board cleaning mechanism" is a spectacular replacement of "duster" and it can be suggested to use this to reduce the effort of the board user as well as to introduce the classroom with an automation system.

II. METHODOLOGY.

2.1 Construction

- In this White Board cleaning mechanism for classrooms a white board is fitted on a metallic square pipe stand. Two plastic or nylon racks are provided at the either horizontal sides (upper side and lower side) of the board. Two gears are arranged on the both racks through a shaft which is coupled to a geared D.C. motor.
- This motor works on 12 volt dc. As the motor is fitted on the moving rack system it moves to and fro on the board if it is supplied power. Long shaft of the motor is attached to a long foam eraser sliding on the board. This eraser foam faces towards white board for cleaning purpose.
- Connection of motor is made with control panel. This control panel consists of Power supply, Motor direction Control Relay, Eraser Forward Movement relay, and a Light Activated relay switch.
- A Push to on Normally open Push button is provided near board at the lower left side to start the cleaning of the board. A N/O push button which is known as "Reverse Movement Control Push Button" is provided on the right middle of the board.
- In a light activated relay system a LDR is situated in front of a continuously glowing white LED provided at the left middle of the board. Near by this LDR switch a N/C micro push button is provided. This N/C/ push button is known as Forward Displacement switch. A flap is provided at the left center of the eraser pad.
- This flap obstruct the LED light incident on LDR when eraser pad slides at the most left end position. Below this flap a notch provided on the eraser to push a "forward Displacement Switch" (N/C). At the middle right of the eraser a notch is provided to push "Reverse Movement Control Push (N/O) button"

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Transmission Line Parameters Monitoring system using IoT

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ABSTRACT

Electrical power is transmitted from the generation plants to end-users at distant locations through the transmission lines. These lines are exposed to various environmental conditions and faults may occur causing power interruption to end users, damage to the power system. The fault detection has been a main objective of power sy: tem engineers, in transmission and distribution systems. Identification of fault source is tedious task; fast fault detection can help to protect the equipment before any significant damage of the equipment. The exact fault detection can help service man to remove persistent of the faults and type the faults occur regularly, thus reducing the occurrence of fault and minimize the time of power outages. This paper is intended to detect the of fault in transmission line using an Node MCU and the same is transmitted to control center using IoT device.

Key words: Transmission line, IoT, Node MCU.

1. INTRODUCTION

The internet of things is a system that connects analogue, mechanical, and digital equipment, as well as items and unique identifiers, to convey data without human intervention. Transmission lines must be monitored in order to assess their performance and assure their safety. The domestic, industrial, and defence sectors are among the world's IOT users. In transmission lines, IoT is used to monitor parameters and detect faults. When a fault occursin an overhead transmission line system, frequent variations in voltage and current occur at the point of fault, resulting in high frequency. IoT technology allows physical items to be connected to the internet, allowing them to be monitored and controlled from any location. With the use of IoT, we will be able to monitor all types of transmission line failures as well as transmission line parameters. [5]

2. IoT

The internet of things, or IoT, is a network that connects devices, analogue, mechanical, and digital machines, items, and people with unique identifiers (UIDs) and the ability to exchange data across a network without the need for human-to-human or human-to-computer interaction. "A network of Internet-connected items capable of collecting and transferring data" is how the Internet of Things is defined. The concept of connecting any item with an on/off switch to the internet and then delivering a suitable output is known as the internet of things (IoT).

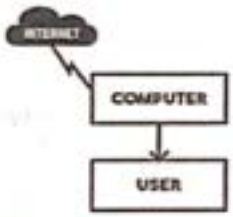

Fig -1 Internet of Things (IoT).

2.2 Node MCU

NodeMCU is an open source platform with an open hardware design that anybody may edit, adapt, or construct. The ESP8266 wifi enabled chip is used in the NodeMCU Dev Kit/board. The ESP8266 is a low-cost Wi- Fi chip with TCP/IP protocol designed by Espressif Systems. The ESP8266 Documentation has further information. The SPIFFS (Serial Peripheral Interface Flash File System) file system is used by NodeMCU. The Espressif NON- OS SDK is used to layer NodeMCU, which is written in C. The firmware was originally created as a companion project to the popular ESP8266-based NodeMCU development modules, but it is now community-supported and may be used with any ESP module. In general, NodeMCU Dev boards from Amica, DOIT, Lolin, and D1 mini/Wemos are available on the market. Amica manufactures NodeMCU ESP8266

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3.3.2 - Number of research papers per teachers in the Journals notified on UGC website during the year **2021-22.**

SN	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal
1	"Multi-Feature Extraction, Analysis and Classification for Control and Meditators' Electroencephalogram"	Dr. M. N. Tibdewal	Electronics and Telecommunication Engineering	Springer Nature-SCI Indexed Journal, SIVP.	2022	1863-1711	https://link.springer.com/article/10.1007/s11760-022-02191-6
2	"Deep Learning Models for Classification of Cotton Crop Disease Detection"	Dr M. N. Tibdewal	Electronics and Telecommunication Engineering	Zeichen Journal	2022	0932-4747	https://ezeichen.com/volume-8-issue-04-2022/
3	Pneumonia Analysis, Detection, and Classification through Various Classifiers"	Dr. M. N. Tibdewal	Electronics and Telecommunication Engineering	Global Journal for Research Analysis	2022	2277 - 8160	https://www.worldwidejournals.com/global-journal-for-research-analysis-GJRA/fileview/pneumonia-analysis-detection-and-classification-through-various-classifiers_May_2022_6532336113_0908889.pdf

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4	A Methodology for evolution of diabetic retinopathy from digital fundus Image	Dr. D. D. Nawgaje	Electronics and Telecommunication Engineering	International Journal of Advance in engineering and management	2021	2395-5252	https://ijaem.net/issue_dcp/A%20Methodology%20for%20evaluation%20of%20Diabetic%20Retinopathy%20from%20Digital%20Fundus%20Images.pdf
5	"Smart Wheelchair with safety, security and health monitoring system"	Dr. K. B. Khanchandani	Electronics and Telecommunication Engineering	Zeichen Journal	2022	0932-4747	https://ezeichen.com/volume-8issue-05-2022/
6	"Smart IOT Energy Meter with Theft Protection"	Dr. K. B. Khanchandani	Electronics and Telecommunication Engineering	Zeichen Journal	2022	0932-4747	https://ezeichen.com/volume-8issue-05-2022/
7	"Small Size Digital Oscilloscope Using ARM Processor"	Mr.V. M. Umale	Electronics and Telecommunication Engineering	International Journal for Research in Applied Science & Engineering Technology (IJRASET)	2021	2321-9653	https://www.ijraset.com/fileserve.php?FID=36151
8	"IoT Based Remote Health Monitoring System with Electrocardiograph"	Mr.V. M. Umale	Electronics and Telecommunication Engineering	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)	2022	2581-9429	https://ijarsct.co.in/Paper4620.pdf
9	"Design and development	Dr. D. P.Tulaska	Electronics and	International Journal of	2022	2320-2084,	https://iraj.in/journal/IJEEDC//pap

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ORIGINAL PAPER

Multi-feature extraction, analysis, and classification for control and meditators' electroencephalogram

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Abstract
Meditation has a metaphysical impact on human brain functioning. It is of utmost required to infer the cognitive effects of meditation using an electroencephalogram (EEG). In this novel work, the analyses of EEG signals' features are extracted for cognitive effects on a human brain for meditation intervention of 25 subjects. To analyze the meditation effects, this study examines the feasibility of statistical, spatial, spectral, coherence features, and time–frequency analysis of EEG signals for control and meditator group. Based on the effective features the various classifiers are used to compare the accuracy and distinguish a subject as control or meditator. The results demonstrate that the Support Vector Machine (SVM) gives better accuracy than Artificial Neural Network (ANN) and k-Nearest Neighbors (KNN). The statistical analysis shows that the Variance and Sample Entropy decreased in meditators whereas, in spatial analysis, the Mahalanobis distance increased. The spectral analysis stated that theta power has increased 88% of subjects whereas the alpha power is increased for the entire subjects after meditation. The coherence observed in the pre-frontal lobes' electrode pair is more in the meditators than in the control group. Eventually, meditation improves relaxation, cognitive functions, calmness, and mental concentration.

Keywords Coherence · Variance · Sample entropy · Mahalanobis distance · PSD · p-value

1 Introduction

For a long time, human beings have been pursuing meditation practices to address various health-related problems. Relaxation, confidence, and cognition are the main factors for refining the efficiency of human beings productivity. Basically, meditation is an activity that supports to enhance the understanding of self-realization. In current days scenario, the psychological stress arises due to decrescent workload, tends to insomnia, negativity or negative emotions, depression, life spoiling diseases, and many other symptoms for an extended period.

In many instances, the pathophysiological complication of disease arises from stress. Chronic or continued stress has a significant effect on the immune system that ultimately manifests illness and leads to vitamin deficiencies, ulcers, cancers, etc. [1, 2]. Previous studies scrutinized that meditation can remarkably affect physical as well as mental health and discovered the meditation effect on mental relaxation and disease diminishes [3]. It also helps to maintain homeostasis in the body. It is a technique for enhancing immune response, positive emotions, cognitive function, and lowering levels of stress, depression, insomnia, and anxiety [4]. The EEG is a temporal technique that records and monitor the electrical activity of human brain cerebrum. Due to the synchronized activity of neurons with similar spatial orientation the EEG

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activity produces oscillations at different types of frequencies [5]. This technique used to analyze the effects of meditation. The EEG signal analysis is frequently grouped in frequency bands: delta, theta, alpha, beta, and gamma.

Meditation produces changes in certain frequency bands. To identify the difference between before and after meditations' signals. Hence in order to analyze the meditation effects, first time this study examines the feasibility of statistical, spatial, time–frequency analysis, spectral, and coherence features analysis of EEG signals for before and after a month of meditation intervention.

1.1 Related work

In concern with the EEG signals, some work has been done to find the significant changes between the EEG signals and the mental states. EEG studies have been used to mention the brainwave changes that arise during meditating [6]. Lagopoulos et al. observed the changes of theta and alpha bands in non-directive meditation techniques as compare to regular relaxation [7]. Dillbeck et al. found significant changes in frontal alpha coherence in TM practice [8]. Whereas the meditative changes in concern with EEG signals have not yet been firmly established [9]. Ahani et al. proposed methods to analyze the changes of EEG and respiration signals for meditation and control state [10]. Mingqian et al. carried out the experiment to investigate the insight of mindfulness meditation [11].

Further, to detect the calmness and meditative condition EEG signal analyzed [12]. Chandana et al. demonstrated a method to compare the EEG of different level of meditators [13]. Traisak et al. observed the effects of EEG using binaural-beat-based technique [14]. Jadhav et al. illustrated the consequences of meditation on emotional response through Hjorth parameters and functional connectivity [15]. The regular meditation and yoga practice can affect the positive impact on brain areas especially, on frontal and parietal areas mentioned in [16, 17].

Gaurav G. et al. recited that theta; alpha and beta are higher in the frontal and central regions [18]. Frederick Travis narrated the importance of narrow frequency bands that reflects the different cognitive process [19]. Kora et al. elaborated the different meditation styles on Brain waves concerning physical and mental health [20]. To find the significant changes in relation to mental state and EEG signals have been explored, but there remains a lack of a classification of these signals during the state of rest and meditation [21]. Damodar et al. put forward a method to classify the human mental state using Random Forest Classifier [22]. Ingle et al. suggested different classification methods to classify the EEG signals during controlled and meditation states [23]. Sharma et al. achieved 87.2% accuracy for identification of the meditators and non-meditators [24].

In order to analyze the cognitive effects of meditation, there is a need for quantitative and qualitative analysis of EEG signals. Here the novelty is that the analysis is done using statistical, spatial, spectral, coherence are the multi-features. The classification is done by choosing effective features which are applying to ANN, KNN, and SVM classifiers for before and after a month of meditation. The promising results are obtained through quantitative and qualitative analyses.

This paper is organized as Sect. 2 for methods and material used in the EEG recording system and experimental protocol details. The Sect. 3 narrates various feature extraction and details of each. The statistical, spatial, spectral, coherence analysis and classification are given in Sect. 4. The results with discussions are presented in Sect. 5. Finally, Sect. 6 presents the conclusion of the work done.

2 Methods and material

In this study, the 'Medicaid Neuro-Compact 2400' system is used to acquire EEG signals from different subjects using Ag–Cl types of electrodes for analyzing the impact of meditation. There is a 10–20 international system with total 21 electrodes for data acquisitions. The sampling frequency (Fs) is observed as 114 Hz. The EEG samples of 25 novice healthy subjects between the age group of 16–50 years including male and female genders are used for the analysis and classification of EEG.

The EEG signal recording is done before meditation and after a month of meditation intervention for the same 25 subjects. Before meditation, the EEG data recorded when the subjects are in a calm and relaxed state with their mind stable for 10 min. The same subjects have performed meditation continuously for a minimum 20–30 min daily for a month. After a month of meditation, the EEG of meditators was recorded for 5–7 min.

The prefrontal cortex is majorly responsible for the cognitive process [11]. Thus, for analysis of the cognitive effects of meditation only the frontal lobe electrodes (F3, F4, F7, F8, FP1, FP2, Fz) are used. Each epoch has a total of 912 samples. The EEG signals are sampled at 114 Hz over 8 s time duration. All the datasets are processed by designing every step. The implementation is done by programming for features extraction, analysis, and classifications through the MATLAB (R2020a) 9.8.0.1323502 platform. The ethical clearance is acquired from the Government Medical College Akola, Maharashtra, India.

In this research work, the various subjects' brain activity or physiological EEG signals are recorded for the analysis of features before and after a month of meditation intervention. The proposed methodology is demonstrated in Fig. 1. The experimentation process is starting by designing and utilizing a finite impulse response (FIR) filter for the separation

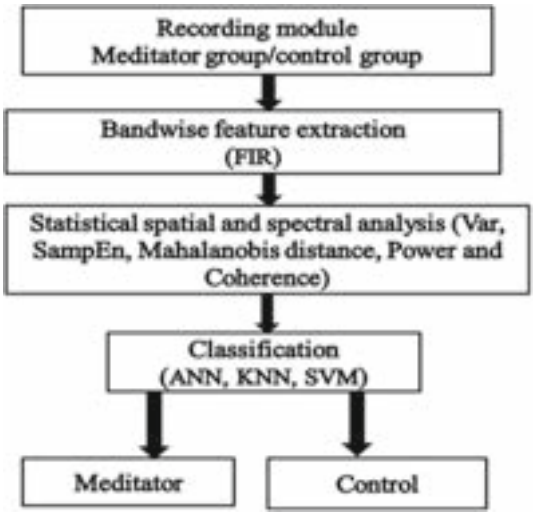

Fig. 1 Proposed Methodology

of EEG bands as per frequency bands. Further to extract the various features of the EEG bands. The statistical, spatial, spectral, and coherence analyses are performed by extracting Variance, Sample Entropy, Mahalanobis distance, Power spectral density, and Coherence multi-features before and after meditation.

The student t-test is performed to examine the discrimination of control and meditators group. The *p*-values estimated from the t-test show how better these data discriminate between both classes. In binary classification, student t-test aid in the evaluation of whether or not a particular feature in both classes is significantly different. Eventually, the effective features are used to classify meditators and non-meditators. The classification is performed using ANN, KNN, and SVM based on effective features. Finally, the results are presented in the form of receiver operating characteristics (ROC) and reclamation of meditators.

2.1 Feature extraction

The feature demonstrates a differential property, a recognizable measurement, and a functional component obtained from a section of a pattern. Extracted features are meant to minimize the loss of important information embedded in the signal [25]. The various bands of EEG signals are extracted by designing and implementing FIR filter. The FIR bandpass filter is designed after averaging all frontal lobe electrodes for both datasets of each subject. This filter is processed by assigning the minimum attenuation level value '0.001' as band attenuation. The passband ripple is fluctuations in the frequency magnitude response within the passband of the filter and the value is set as '1' which is constant across their passbands. The density factor is assigned as '20' which controls the frequencies grid to evaluate the frequency response. The EEG data of each subject processed using bandpass filter in 1 to 30 Hz which allows separating different rhythms such as delta (0.5-4 Hz), theta (4-8 Hz), alpha (8-12 Hz), beta (12-30 Hz).

All features are evaluated at the frontal electrodes for various bands, including delta, theta, alpha, and beta. The gamma is excluded in the study because of its hyperactivity in nature. For classification and differentiation between control and meditators the Variance, Sample Entropy, Mahalanobis distance, Power spectral density, and Coherence multi-features are utilized. These features are extracted band-wise for both control and meditators group with frontal lobe channels of EEG time series.

3 Details for various features

The equations for computation of each of the features are demonstrated as below:

3.1 Variance (Var.)

The variance measures the variability of electrodes' potential from the mean value of amplitude of EEG in 8 s [26].

3.2 Sample entropy (S-En)

The Sample Entropy measures the randomness of a time series. A high random brain indicates creativity or anxiety. These entropy estimators are useful in obtaining the nonlinear interrelations and complexity of brain regions. Entropy indicates the average amount of surprisal in the information processing system that underlying its feasible outcomes [27].

It is a measure of information as the measure of uncertainty that scrutinized the complexity in data of time series. It is also a measure of variability of EEG time series regarding its regularity in data sequence and reveals a high entropy value for more irregularity in data sequence. The S-En is less affected by the presence of noise and can be estimated for small length data of time series and even resistant to spikes. These phenomena make S-En an analytical tool for non-linear signal analysis of brain waves [28], as given in (1).

$$SampEn(m, r, N) = -\ln\left[\frac{A^m(r)}{B^m(r)}\right] \tag{1}$$

where $B^m(r)$ = Probability that two vectors will match for 'm' samples, $A^m(r)$= Probability that two vectors will match for $m + 1$ samples, time series with N samples, length of compared window m, and tolerance r.

3.3 Mahalanobis distance (MD)

Mahalanobis distance is the distance between a point and a distribution. It is not a distance between two distinct points; it is effectively a multivariate equivalent of the Euclidean distance. The Mahalanobis distance is introduced to overcome the problems of Euclidean distance. The Mahalanobis distance is commonly used in discriminant analysis and in testing for outliers [29]. The point has a greater Mahalanobis distance from the rest of the sample population of points that implies more leverage. The MD is evaluated as given in (2).

$$D^2 = (x - m)^T \times C^{-1} \times (x - m) \tag{2}$$

D^2: The square of the Mahalanobis distance; x: The vector of the observation (row in a dataset); m: The vector of mean values of independent variables (Average of each column);

C^{-1}: The inverse covariance matrix of independent variables.

3.4 Power spectral density (PSD)

The spectral analysis will illustrate the activity of brain over different regions and different states, which reflect the general arousal levels of brain. Power spectral density represents the power distribution of EEG series per unit frequency.

PSD estimation is a non-parametric method utilized to calculate the power spectrum of EEG time series as a function of frequency while maintaining the balance between smoothing in time and frequency resolution.

3.5 Coherence

Coherence represents the normalized covariance of two time series in the frequency domain. The magnitude-squared coherence estimate is a function of frequency with values between 0 and 1. These values indicate how well 'x' corresponds to 'y' at each frequency component. The magnitude-squared coherence is a function of the power spectral densities. The coherence function $C_{xy}(f)$ at frequency f for signal 'x' and 'y' is obtained by the normalization of cross-spectral spectrum [30] as mentioned in (3).

$$C_{xy}(f) = \frac{\left|P_{xy}(f)\right|^2}{P_{xx}(f) * P_{yy}(f)} \tag{3}$$

where $P_{xx}(f)$ and $P_{yy}(f)$ are the function of the power spectral densities of 'x' and 'y' respectively. $P_{xy}(f) =$ Cross power spectral density of x and y. Coherence is used for the estimation of functional connectivity. It is based on spectral analysis, which describes the synchronization of the brains' electric activities of different frequencies between different brain areas.

4 Artificial neural network (ANN)

ANNs are nonlinear mapping structure. ANNs can recognize correlated patterns between the input data set and respective assigned target values. It is expected as a conversant classifier due to its inbuilt characteristics like robustness, self-organization, generalization capability, and adaptive learning [31]. In this research work, the classification is done by using the feed-forward back-propagation neural network. The nature of the EEG signal is non-stationary. Each subjects' EEG signal was segmented into 8 s epoch (912 samples). The threshold values are set after averaging the results obtained by EEG bands from extracted features. Then these features are fed as input to the ANN classifier for testing and training of the proposed methodology.

The data are divided into two classes: pre-meditation and post-meditation. It classifies the EEG signal under testing which will be compared according to the assigned target as control or meditator group. The network is trained using a back-propagation algorithm. The algorithm generates a function that maps the input into the desired output.

4.1 k-Nearest neighbor (KNN)

KNN is a simple classifier that uses a non-parametric method for classification. It classifies data according to the majority of its neighbors defined by positive integer K. This classifier gives better accuracy on the training data set, due to the position of training samples and their classes are constant throughout the classification process [32].

Here, the classification is done by using Euclidean distance metric d with the nearest neighbor $K = 3$. The Euclidean distance metric is intelligible and easy to implement a method for reckoning distances in multidimensional input space. The effective features from averaged values of four bands are assigned with labels for training of the KKN with metric $'d'$ with the nearest neighbor $k = 3$ Then it classifies the data point into a particular class using number of the nearest neighbors.

4.2 Support vector machine (SVM)

SVM is the supervised learning method used for data classification. The SVM has good accuracy along with generalization capabilities. It also has a better ability to deal with a large number of predictors [33]. It utilized a machine-learning algorithm to increase predictive accuracy while automatically avoiding over-fit to the data [34]. For separating data between two groups SVM is used to construct the optimal hyperplane.

Here the classification is done using SVM along with Radial basis function (RBF) kernel. After, hypothesized selected features are used for training with assigned labels

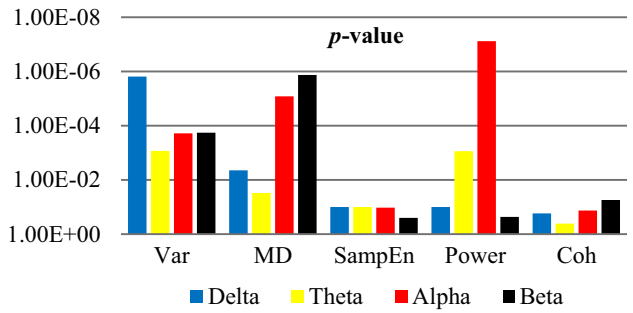

Fig. 2 Graph of *p*-value for Variance, Mahalanobis distance, Sample Entropy, Power and Coherence of various EEG rhythms

for meditators and controls. An optimal boundary for corresponding output is found using RBF kernel [21].

5 Results and discussion

5.1 Statistical and spatial analysis

As per the proposed methodology, the analysis of each of the subjects' EEG signals is done before and after meditation. The study estimates the statistical and spatial analysis after averaging the seven frontal channels of EEG data. Here it is demonstrated the features such as Variance, Sample Entropy, and Mahalanobis distance. Table 1, shows the averaged values of statistical features for all 25 subjects. It is inferred that; the variance is decreased after meditation in all the respective bands of all 25 subjects.

As the variability of electrodes' potential becomes lower than its mean value when the subject gets relaxed. The average sample entropy value for average of theta and alpha band is decreased in meditators whereas in delta and beta bands it is increased after a month of meditation intervention. The theta and alpha bands' sample entropy is low for meditators as compared to the control group.

Student t-test is utilized to supervise the significant difference between the control and meditators group EEG data. The student t-test is the hypothesis that 'there is no difference in average of two data sets [28]. A comparison of two data sets using student t-test gives a probability (p-value) of hypothesis is correct. The *p*-value indicates probability that the hypothesis is true and two data sets are same. A threshold value is chosen for the significance level.

Generally, 5% and 1% is significance level to be chosen. It is stated that if the *p*-value is equal to or less than the significance level, it shows that there is higher discrimination between two data sets. The *p*-value is evaluated from student t-test for different bands with < 0.05 as a significant level. Figure 2 shows the p-values for different features between control group and meditators group. It demonstrates that all bands' *p*-value < 0.05 for Variance, Mahalanobis distance, Sample Entropy, Power, and Coherence as shown in Fig. 2.

Meditation produces changes in certain frequency bands. Delta activity related to deep sleep and also appeared in deep meditation. Theta activity is associated with alertness, attention, cognitive, working memory, and the frontal theta activity indicative of concentration. Hence increase in theta activity reflects the increase in processing and awareness. The frontal lobe of the brain is responsible for cognitive activities such as problem-solving, attention interactions with other brain parts, which are also sensitive to intensive or continuous stress. A changed pattern of frontal functioning might be expected in subjects reporting a greater sense of self during activity.

The statistical analysis reveals that variance is higher in the control group than in the meditators group as observed in Table 1. From this, it is inferred that it reduces too much stress and anxiety. A high random brain indicates creativity or anxiety. Sample entropy is decreased in theta and alpha bands for the meditators group, unlike the control group. Hence, decreased sample entropy indicates decrease in randomness and increase in non-linearity of EEG signals. As the nonlinearity increases, brain cognitive functions perform better.

For the spatial analysis, the average Mahalanobis distance is observed higher in meditator than control group. Eventually, it means the subjects are calmed after meditation in comparison to the brain activities recorded before meditation. As resulted the *p*-values are lower having higher discriminating data set between the control and meditators group for Variance and Mahalanobis distance.

5.1.1 Spectral analysis

The purpose of this work is to estimate the effects on human being brain after the meditation. This is done by examining the different brain rhythms. One of the significant methods used to investigate the spectral feature is to explore the EEG signals' spectral characteristics rhythm-wise. The Spectral analysis produces information regarding the existence of different frequency bands of EEG that reverberates the general arousal levels of the brain [34]. There are certain major rhythms in the brain as reflected through spectral analysis of EEG. Many EEG activities have rhythmical nature illustrates the requisite for spectral analysis.

The spectral analysis is carried out with FFT decomposition and demonstrated the activity of brain over the frontal lobe regions only and different states (Supplementary Fig. 3). The powerspectral density is evaluated using FFT which is more useful to analyze the EEG signals [35]. The state changes occur after meditation due to changes in variable neuronal activity, particularly measured as changes in neuronal speed and power [36]. Hence, the electrical activity

Table 1 Variance, Sample entropy(S-En), Mahalanobis distance, Power features for before (control group) and after a month of meditation intervention (meditators group)

	EEG bands: Control Group				EEG bands: Meditators Group			
	Delta	Theta	Alpha	Beta	Delta	Theta	Alpha	Beta
Var	5.14	0.77	0.42	0.32	2.07	0.50	0.28	0.25
S-EN	0.23	0.48	0.49	0.68	0.24	0.46	0.48	0.69
MD	0.35	1.89	3.38	7.49	0.57	2.22	6.06	15.35
Power	333.0	36.3	1.77	11.03	235.6	55.12	18.44	10.15

emerged from the brain which is exhibited in the form of brainwaves. The maximum power value is extracted from the maximum amplitudes of the EEG signals shown in Table 1.

It is observed that there is an overall increase in power after a month of meditation, in theta and alpha bands compared with the control group. While delta and beta band power decreases. Increased power in the alpha band implies high activity while doing easy tasks and theta band indicates subject alert to the external environment [11]. Whereas the delta band and beta band power are decreased in the corresponding subject. From the analysis, theta and alpha bands are stronger with respect to band power in meditators than the control group which implies that theta and alpha changes appear from meditation practice. The increases in alpha and theta band power and decrease in frequency correlates with the lower level of anxiety and a higher level of calmness [3]. The alpha and theta band shows that p while delta and beta bands «0.05 indicate p 0.05. From the observation of p-value, it is implied > that the theta band has a lower p-value while alpha band has higher discriminating data set between the control group and the meditators group as shown in Fig. 2.

Through the power spectral analysis, it is perceived that power in theta and alpha bands increases significantly which supports and signifies the previous studies conducted on meditation. It is stated that, after meditation, there is a considerable increase in theta power for 88% subjects and an increase in alpha power for all the subjects. Whereas the delta and beta bands power are decreased. Theta band is associated with alertness, attention, working memory, and increased awareness of surrounding. Strong theta power spectrum indicates high activity anterior cingulated cortex and hippocampus; both areas link with autonomic nervous system. Increased power also occurs in alpha band associated with relaxation which is found in meditators. This band is stronger in meditators than control, which implies the state and traits alpha changes emerge from meditation practice. Hence, increased alpha power after meditation revealed a lower level of anxiety and a higher level of calmness. Thus, meditation augment the cognitive function and stimulates the mental concentration as evidence by increased in alpha and theta power in a frontal lobe.

5.2 Coherence analysis

The magnitude-squared coherence is calculated using Eq. (2). Coherence estimation is a measure of variability of phase between two EEG time series that quantifies the synchrony property [30]. The estimated coherence ranges from 0 to 1, where 0 indicates that the corresponding frequency components of two signals are linearly independent; while 1 indicates that both signals give the maximum linear correlation. The coherence analysis of the EEG used to examine the coupling between cortical regions and evaluate functional interactions between neural systems operating in each frequency band. The cortex of brain consists of two halves, the left and right hemisphere. The EEG electrode placement is done on the scalp by using 10–20 international system. The 10–20 system is based on the relationship between the location of an electrode and the underlying area of cerebral cortex. The cortex of brain consists of two halves, the left, and right hemisphere. In this research work, the coherence is demonstrated between two electrodes of left and right hemisphere (interhemispheric connectivity) for different bands with only frontal lobe electrode pairs such as F3–F4, F7–F8, and FP1–FP2 respectively.

The synchronization of logical with intuitive functions of the brain exemplars a good coherence between two hemispheres [37]. The coherence analysis for the control and meditators group is shown in [Online Appendix Table 2]. This indicates the higher coherence for delta, theta, and alpha bands. It is reduced for beta band in meditators. [Online Appendix Table 2] shows quantitative and qualitative analysis with subjects' reclamation after a month of meditation intervention. The left hemisphere is responsible for controlling the right side of the body; it also performs logical thinking, speech, analysis, and sense of time. On the other hand, the right hemisphere coordinates with the left side of the body. It has ability to recognize faces and comprehend maps and intuitive functions. It is observed from the coherence feature that the frontal lobe electrode pair (F3–F4) has more coherence in the meditators group compared to other electrode pairs. Higher the coherence between electrodes, higher will be the connectivity, cooperation and more information will transmit between the underlying brain regions.

The higher coherence is the higher synchrony, which indicates a strong functional coupling between the brain hemisphere areas of interest. Hence it is increased the neural information exchange, functional coordination, and integrity of cortical neural pathways in physiology [37]. The quantitative and qualitative results inferred that meditation helps to hold attention to the desired purpose. It is justified from the observation that brain hemisphere connectivity is increased and it regulates emotions.

5.3 Classification

The classification of subjects for before and after meditation is performed using different classifiers such as ANN, KNN, and SVM. As per feature selection decision, the Variance and Mahalanobis distance are selected for classification. For balancing training set, the threshold values are set after averaging the obtained result of four bands from extracted features. These values were fed as input to the classifiers for testing and training. The data is divided into two classes: before meditation and after a month of meditation intervention. For the training purpose dataset of both features each of total 30 inputs obtained from 15 subjects. Two distinct classes are used for 10 subjects' EEG data for testing each before and after a month of meditation intervention.

Receiver operating characteristic (ROC) analysis is a process for to evaluate, compare, and select classifiers according to their performance [38]. This is an emphatic technique for estimating the performance of a classifier. ROC curve narrates the trade-off between the sensitivity and (1- Specificity). ROC curve is a graphical display (not given due to space problem) for varying cut-off points of test values and sensitivity or true positive rate (TPR) on the x-axis and (1 – specificity) or FPR on the y-axis.

The classification model performance of these classifiers is measured using the area under the ROC curve (AUC). The value of AUC ranges from 0 to 1 and when it is closer to 1, it indicates better performance of the test. The AUC is calculated by trapezoidal rule. The ROC curves of three different classifiers are created with the same training data set. The ANN classifier gives AUC = 0, eventually, the performance of ANN is very low. Whereas, KNN classifier indicates the AUC = 0.9678 and the SVM classifier gives AUC = 0.9867. From these results, the highest AUC is achieved through SVM classifier and hence, SVM classifier performs better than the KNN and ANN on training data set.

ROC parameters used to estimate the performance of the proposed methodology are Specificity (Se), Sensitivity (Sn), and Accuracy (Acc) [37]. Sensitivity measures the proportion of actual positives that are correctly identified. Specificity measures proportion of actual negatives that are correctly identified. Accuracy indicates the number of correct decisions done by the classifier. True positive (TP) indicates the meditators group which are correctly identified as 'meditators' and True negative (TN) indicates the control group which is correctly identified as 'control' by the classifier. False-positive (FP) is the number of meditators which are incorrectly classified as control and false-negative (FN) is the number of control group which is incorrectly classified as meditators.

Table 2 shows the results of classification using proposed method for meditators and control EEG signals. The comparative performance of the SVM classifier shows the highest accuracy than ANN and KNN.

6 Conclusion

The objective of this innovative work is to analyze the cognitive effects on pre and post-meditation. To investigate the meditation effects on human brain signals, there is a need to enucleate the physiological signals. It seems to be a novel approach which is done first time as the combined analysis of the Statistical, Spatial, Spectral, and Coherence analysis of EEG signals for pre and post-meditation conditions.

From the quantitative and qualitative analysis, it is stated that meditation improves cognitive function and increases the mental concentration as well as functional connectivity of the brain. Thus, meditation helps to refining the efficiency of human beings' productivity. The classification of subjects for before and after meditation is performed through ANN, KNN, and SVM. From the observations of ROC parameters, it is stated that SVM gives (85%) better accuracy than ANN (72.5%) and KNN (82.5%). If the numbers of subjects are more, it makes classifier highly intelligible and strong for the training. Eventually, it will improve the testing performance.

Under the qualitative analysis, the methodology gives 100% results in terms of meditators reclamations. In the future, the work will be expanded with permutations and combinations of different age groups and gender of the subjects, meditation intervention with various type of meditation such as mindfulness meditation, transcendental meditation, etc. Also, study will be scaled to examine the effects of meditation on psychophysiological parameters.

Table 2 Results of Testing through ANN, KNN, SVM Classifier for Meditators' and Control groups' EEG signals

Testing of two class output	Receiver operating characteristic				Performance Rate %		
	TP	TN	FP	FN	Sn	Se	Acc
ANN	14	15	6	5	73.68	71.42	72.5
KNN	17	16	3	4	80.95	84.21	82.5
SVM	16	18	4	2	88.88	81.81	85.0

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Deep Learning Models for Classification of Cotton Crop Disease Detection

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Abstract: *In India, plants play a vital role in the survival of all organisms. While India solely depends on its agriculture. The crop yield should be increased. Cotton being the most important cash crop for India's industry. Whereas it provides cotton textile industry with the raw material. As a result, a significant effort should be made to combat plant diseases, which could result in a significant loss of yield. The paper discusses the deep learning models that can be used for the cotton plant disease detection majorly Convolution Neural Networks, XceptionNet, LeNet, DenseNet and MobileNet using the images of the diseased and healthy cotton leaves. The training on the model is done using the dataset consisting of total 1711 images classified into three diseased and one healthy leaves class. The training was done keeping the input and output size as constant for all the models. The DenseNet has achieved the best training and validation losses, optimum file size and accuracy of 98.25%. And it required a smaller number of parameters compared to the other models. The results of the experiments are shown to assess the performance of all the models.*

Keywords: **Plant Disease- Bacterial Blight, Curl Virus, Fusarium Wilt, Deep Learning (DL), Convolution Neural Network (CNN), XceptionNet, LeNet, DenseNet, MobileNet.**

1. INTRODUCTION

Agriculture has become a key source of economic development in India, accounting for 18% of its GDP, making India dependent on crop productivity. The appropriate crop is chosen by the farmer depending on the kind of soil, local climatic conditions, and economic worth. Because of rising population, changing weather, and political instability, agriculture companies began looking for innovative ways to enhance crop yield. The new advancement in genetic technology and fertilizer industry, the crop yields Over the decades, there has been seen a remarkable increase.

However, still in some underdeveloped regions due to less knowledge of the farmers, crop diseases has been the most troublesome to the agricultural output and the food security is at risk. These leaf diseases can appear extremely similar in their early stages, making them not easy to classify with naked eye. Visual inspection of leaf diseases calls for a expert in the field and monitoring the crop continuously. As a result, it is exceedingly expensive, time-consuming, and unreliable. Deep learning algorithms can be used to detect and classify leaf diseases automatically, quickly, and precisely.

This task requires a huge number of sample photos of diseased corps to construct a reliable plant disease detection system. In the past, collecting such a vast number of samples was difficult. But nowadays, practically everyone now owns a mobile phone with a good camera, which may be used to gather the images locally by the farmers himself.

Cotton is the most significant fiber crop in the world, not only in India providing the cotton textile industry with the raw material. So, the data used, consists of 1711 images of cotton leaf classified into 3 diseased and 1 non-disease class: Bacterial Blight, Curl Virus, Fusarium Wilt and Healthy Leaf. Also, as the farmers nowadays can afford a smartphone, but due to internet connectivity issues in rural areas, a lightweight detection model should be implemented on the smartphones or Internet of Things (IoT) devices which have limited computing capabilities. The main objective of this work is:

- To know various deep learning models.
- Compare the different models based on different parameters.
- Propose the best deep learning model and know it's architecture.
- To project the future scope of our research in agriculture.

The paper is organized as, Section 2 narrates the performance of existing deep learning models in agricultural applications. The Section 3 describes the proposed methodology.

Section 4 presents the experiment settings and result. The end part of paper is Section 5 discussed about conclusion.

2. EXISTING DEEP LEARNING MODELS

Ferentinos and Konstantinos P. [7] trained many model architectures on an open-source database including 87,848 photos, with 25 different plants in a set of 58 distinct classes of plant disease combinations, including healthy plants, with the best performance reaching a 99.53 percent success rate. The models were like AlexNet, GoogLeNet, VGG.

G. Sambasivam et al. [9] worked on the Cassava disease detection with 10000 identified images in a limited image dataset of 5 fine-grained cassava leaf disease groups, where in they used a Convolution Neural Network to solve the problem from scratch using an imbalanced dataset achieving an accuracy score over 93%.

Saleem and Muhammad Hammad [10], they proposed the comparison of state-of-the-art deep learning models with the evolution of various DL models from 2012 till date. Abdul et al. [8] proposed an optimized dense CNN architecture for corn leaf disease with the accuracy of 98.06% with even less parameters compared to the models like EfficientNet, VGGNet, XceptionNet. Bhatt, Prakruti [17], they distinguished between diseases that looked to be identical, researchers used many CNN architectures added with a combination of adaptive boosting and a decision tree-based classifier to construct a system for identifying maize leaf diseases. Healthy leaves, common rust, leaf blight, and leaf spot were among the image data categories. The Plant Village dataset provided images for each class. The model provided with an accuracy of 98%.

Shruthi U [6], studied five types of machine learning classifications for plant disease detection. Where it was found that CNN classifier detects more efficiently compared to SVM classifier. Mercelin Francis and C. Deisy [5] created a CNN model for apple and tomato leaf disease detection. Where in ach convolutional layer is followed by a pooling layer in the model. To determine whether or not disease is present, two fully connected dense layers and a sigmoid function are used. The model was trained using a 3663-picture dataset of apple and tomato leaves, resulting in an accuracy of 87%.

The basics of deep learning come from the Convolution Neural Networks (CNNs) which work on the principle of a kernel and the input image convolution. CNNs are the most important part of deep learning or any image classification algorithm. Where in normal Machine Learning, it is important to visualize the pattern, extract the needed features, do perfect pre-processing, and much more. But, for the CNNs, it directly recognizes the pattern from the image without much of the tedious tasks to be done. There are many models proposed by the researchers in the field of deep learning. Some of the popular models studied are discussed below:

A. Convolution Neural Network (CNN)

The Convolutional Neural Network (CNN) is a deep learning technology that has been a revolution in the field of image processing. Face recognition, object identification, image categorization, and other applications of CNN are common. Convolutional layers, pooling layers, fully linked layers, activation functions, and other components of a CNN model are some components that are used in different ways.

We have proposed a model architecture which can work well with a smaller number of layer and neurons in each layer. Then the major challenge was to choose the input which should not be too big which makes the model to have huge number of parameters, while not too less which will affect the performance. We decided to take an input image of size (150, 150, 3). Suppose the input has size W, padding P, filter size F and strides S, then using the convolution on filter on the input, the next layer will be of size given in (1).

$$size = (W - F + 2P)/S \quad (1)$$

We propose a 15-layer model having an input layer for the image data, four Conv2D layers for extracting the features, two Dense layers using ReLU activation for adding up the training parameters so as to extract more features, and a last dense layer using Soft max activation for final output with total parameters of 2,028,228 as seen in Table 1.

Table 1. Results Of Training Various Deep Learning

Layer	*Output Shape*	*Total Parameters*
Input	150^2 x 3	0
Conv2D	148^2 x 32	896
MaxPooling2D	74^2 x 32	0
Conv2D	72^2 x 64	18496
MaxPooling2D	36^2 x 64	0
Conv2D	34^2 x 128	73856
MaxPooling2D	17^2 x 128	0
Conv2D	15^2 x 256	295168
MaxPooling2D	7^2 x 256	0
Dropout	7^2 x 256	0
Flatten	12544	0
Dense	128	1605760
Dropout	128	0
Dense	256	33024
Dropout	256	0
Dense	4	1028

A. Convolution Neural Network (CNN)

The Convolutional Neural Network (CNN) is a deep learning technology that has been a revolution in the field of image processing. Face recognition, object identification, image categorization, and other applications of CNN are common. Convolutional layers, pooling layers, fully linked layers, activation functions, and other components of a CNN model are some components that are used in different ways.

B. XceptionNet

With the introduction of a model named as inception network by Szegedy [18]. The inception network's key feature was the use of computational resources within the network. It does away with all fully connected layers in favor of average pooling, resulting in a system with only 5 million parameters. With the big boom of the inception model, which in the stack of feature maps captures parallel pathways with different receptive field size and operations, there were many advanced versions made of it and a network was then proposed called as XceptionNet [16], it outperformed many algorithms on a large dataset.

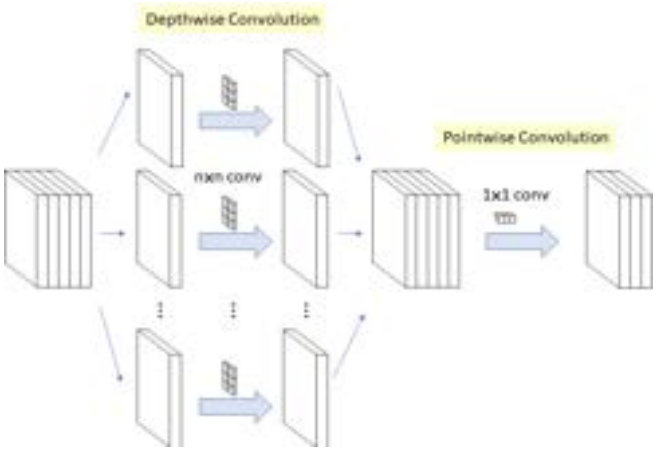

Figure 1. Depth wise Separable Convolution [22]

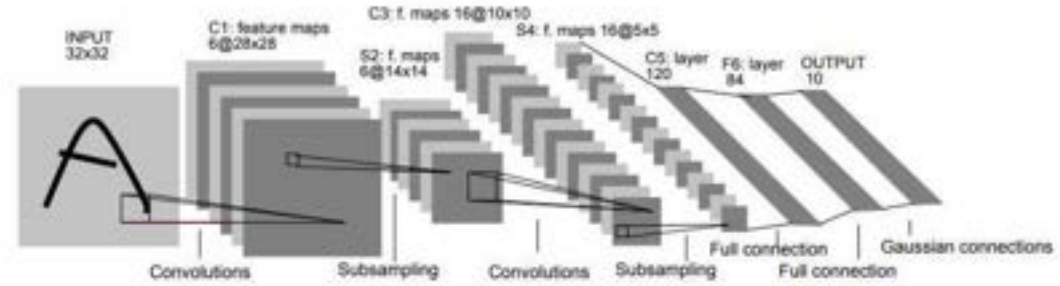

Figure 2. Architecture of LeNet-5 [19]

C. LeNet

The LeNet-5 was introduced by Yann LeCun and Yoshua Bengio [19]. It was one of the first CNN architectures. LeNet is considered to be the father of all the CNNs as it was introduced at a early time when there was not a lot of research in the field of Neural Networks. LeNet-5 has a straightforward architecture. It has three convolution layers, two pooling layers, and three dense layers. It takes a 32 x 32 image as input and outputs a 10-item list that contains the probability for each class. The architecture of the LeNet-5 is shown in Figure. 2.

D. DenseNet

In a feed-forward fashion, DenseNet [14] connects each layer to the other layers. The feature maps of the first layer are utilized as inputs in each of the following layers, and their feature maps are used as inputs in all future layers. DenseNet solves the vanishing gradient problem [20], improves feature propagation, allows for feature reuse, and greatly reduces the number of parameters. Each nth layer contains n inputs, which are made up of the feature-maps from the convolutional blocks before it. Its feature-maps are passed on to all N - n following layers. In an N-layer network, this introduced N (N + 1)/2 connections. This architecture is known as a Dense Convolutional Neural Network because it features a dense connectivity pattern.

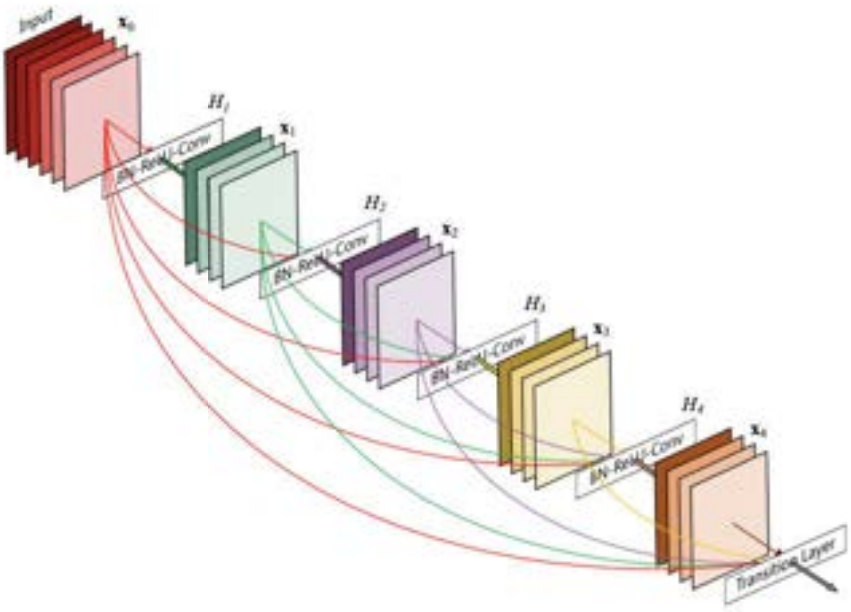

Figure 3. DenseNet 5-layered Block [14]

E. MobileNet

Mobile Net [21] is a convolutional neural network for mobile vision applications that is efficient, simple and uses less computational power. Object detection, fine-grained classifications, facial traits, and localization are just a few of the real-world applications that use MobileNet. MobileNets are made up of depth wise separable convolutions, which were first employed in Inception models to reduce processing in the first few layers. Flattened networks produced a network that was entirely made up of fully factorized convolutions, showcasing the capability of highly factorized networks. The Xception network revealed how to outperform Inception V3 networks by scaling up depth wise separable filters.

3. PROPOSED METHODOLOGY FOR DEEP LEARNING

A model in a conventional Convolutional Neural Network contains an input image, which is then processed through the hidden layers then to the output layer to generate an output of predicted label in a relatively simple forward pass. Except for the first convolutional layer, each convolutional layer uses the preceding convolutional layer's output to create an feature map, which is then given as input to the next layer. There are N direct connections between each layer and its subsequent layer for N layers.

In DenseNet each layer in the design is connected to every other layer. N(N+1)/2 direct connections exist for N layers. The information from the previous layers are used as input for each layer, and the output of the current layer will be used as input for the upcoming layers. The skip connections solve the problem of vanishing gradient, hence which allows us to train the network deeper. As a result, they can be trained deeper than traditional networks and easily optimized with this new residual usage. This innovative CNN architecture has delivered state-of-the-art results on many standard datasets with extremely few parameters. The huge advantage of DenseNet is the usage of bottleneck layer. To limit the amount of input feature-maps and hence enhance computational efficiency, a bottleneck layer of 1 x 1 convolution is added to reduce the number of feature-maps.

The first layers of the DenseNet model contains a 7x7 convolution Layer with stride-2 followed by a 3 x 3 MaxPool layer stride-2. Which is followed by a set of Dense Blocks and Transition Layers, and the final block is the Classification Layer that takes the input from these previous blocks and performs the classification.

A. Dense Connectivity

Consider a network of L layers, each performing a J_l non-linear transformation. The output of the network's Lth layer is indicated as xl, whereas the input image is designated as x0. In the forward propagation, the output of the Lth layer is given as an input to the $(L+1)^{th}$ layer, as we all know. The skip connection, on the other hand, can be expressed in (2).

$$x_1 = J_l(x_{l-1}) + x_{l-1} \quad (2)$$

The dense connections in the DenseNet model are given as in (3).

$$x_1 = J_l([x_0, x_1, \dots, x_{l-1}]) \quad (3)$$

B. Transition Layers

Transition layers are the layers that perform convolution and pooling between dense blocks. A batch-norm layer, 1x1 convolution, and a 2x2 average pooling layer make up the DenseNet architecture's transition layers. The 1x1 convolution performs the down sampling. There are many different architectures of DenseNet being, the DenseNet-121, 169, 201 and 264. The model having the least number of parameters is the DenseNet-121 and also, it is good for low to moderate number of training data hence, we are going to work on this algorithm a bit and modify it for our images. The conventional DenseNet architectures are shown in Figure. 4.

As it is training all the models on an image input of (150, 150, 3) with a batch size of 32, it was mandatory to keep the input and output same for all the models, to keep the parameters less and also to compare the models by the hidden layers.

In the original DenseNet-121, the input parameters are of shape 224 x 224 as shown in Fig. 4. The proposed modified DenseNet contains the same hidden network but with different input and output tensors. The first convolution 7 x 7 when given an input of 150 x 150, stride-2, gives the output of 75 x 75 then given a pooling layer to reduce the parameters by reducing the feature map whose output is 38 x 38. Which is then followed by a Dense Block containing 3 x 3 and 1 x 1 convolutions followed by a Transition layer having a bottleneck layer and an avg. pooling with stride-2 giving an output of 19 x 19, then a series of 2 more pair of these Dense Block and Transition Layers are used, which is at last followed by one more Dense Block having output of 5 x 5. Lastly, a Classification Layer is used having global avg pool layer and a softmax fully-connected layer having 4 outputs for our cotton image classification. The proposed model can be seen in Figure. 5.

Layers	Output Size	DenseNet-121	DenseNet-169	DenseNet-201	DenseNet-264
Convolution	112 × 112	7 × 7 conv, stride 2			
Pooling	56 × 56	3 × 3 max pool, stride 2			
Dense Block (1)	56 × 56	1 × 1 conv 3 × 3 conv × 6	1 × 1 conv 3 × 3 conv × 6	1 × 1 conv 3 × 3 conv × 6	1 × 1 conv 3 × 3 conv × 6
Transition Layer (1)	56 × 56	1 × 1 conv			
	28 × 28	2 × 2 average pool, stride 2			
Dense Block (2)	28 × 28	1 × 1 conv 3 × 3 conv × 12	1 × 1 conv 3 × 3 conv × 12	1 × 1 conv 3 × 3 conv × 12	1 × 1 conv 3 × 3 conv × 12
Transition Layer (2)	28 × 28	1 × 1 conv			
	14 × 14	2 × 2 average pool, stride 2			
Dense Block (3)	14 × 14	1 × 1 conv 3 × 3 conv × 24	1 × 1 conv 3 × 3 conv × 32	1 × 1 conv 3 × 3 conv × 48	1 × 1 conv 3 × 3 conv × 64
Transition Layer (3)	14 × 14	1 × 1 conv			
	7 × 7	2 × 2 average pool, stride 2			
Dense Block (4)	7 × 7	1 × 1 conv 3 × 3 conv × 16	1 × 1 conv 3 × 3 conv × 32	1 × 1 conv 3 × 3 conv × 32	1 × 1 conv 3 × 3 conv × 48
Classification Layer	1 × 1	7 × 7 global average pool			
		1000D fully-connected, softmax			

Figure 4. DenseNet Structure [14]

Layers	Output Size	DenseNet-121
Convolution	75 x 75	7 x 7Conv, Stride 2
pooling	38 x 38	3 x3 max pool, stride 2
Dense Block (1)	38 x 38	1 x 1 conv 3 x 3 conv X6
Transition Layer (1)	38 x 38	1 x 1 conv
	19 x 19	2 x 2 average pool stride 2
Dense Block (2)	19 x 19	1 x 1 conv 3 x 3 conv X6
Transition Layer (2)	19 x 19	1 x 1 conv
	10 x 10	2 x 2 average pool stride 2
Dense Block (3)	10 x 10	1 x 1 conv 3 x 3 conv X6
Transition Layer (3)	10 x 10	1 x 1 conv
	5 x 5	2 x 2 average pool stride 2
Dense Block (4)	5 x 5	1 x 1 conv 3 x 3 conv X6
Classification Layer	1 x 1	5 x 5 global average pool
		4 D fully-connected, softmax

Figure 5. Proposed DenseNet-121 Structure

4. EXPERIMENTAL RESULTS

The experiment setting and results for the models addressed in Section II with input size 150x150x3 and Soft-Max output of 1x4 are presented in this section. The hyperparameters and the settings are as follows:

- The most popular optimization function, Adam optimizer, with a learning rate of 0.0001 and a sparse categorical cross-entropy loss function because our model is working on multiple class classification.
- The epochs to 200 and set a callback list to save the best model.
- The data was shuffled and manually divided it into two sets: 20 percent for validation and 80 percent for training from 1711 images
- Data Augmentation is done before feeding the data to our model.

4.1. PC Hardware Setting

Nowadays, the deep learning models have become more intricate with the architecture, which need GPUs or TPUs to train the models but, our model is far smaller than the orthodox architectures for deep learning and have capabilities to run and train on systems with low processing power. However, we decided to go with the free version of google colab which provides us a GPU unit computer for a short period of time. Colab is a free to use online application like Jupyter notebook. Most importantly, it doesn't require any setup, and you can share the file with your team wherein they can also modify the same file on cloud, much like Google Docs projects. The plus point of working on Google colab is that all the libraries be it general python or advanced machine learning libraries are pre-installed in it, all we need to do is import them.

4.2. Data Preprocessing

Pre-processing data is an important part of any machine learning methodology. The models used, have large number of parameters, implying that the model will require a huge number of training data. Furthermore, gathering and producing well-labeled data takes a lot of time and work. This problem is solved mainly by the augmentation of the training data. In general, augmentation of data is nothing but to generate some duplicates of an image with the addition of some parameters such as cropping, shearing, noise and transform the dataset. This can be used on practical applications where there is a shortage of data and can generate huge dataset by the processing of the data by these methods.

There are huge advantages of data augmentation, like the addition of noise previously discussed can be a saving element for the model, as a model trained on dataset having noise, it will know how to deal with the noises and essential elements of the data, making the data more robust in dealing with unknown data. It also aids in overcoming the issue of class imbalance in categorization issues. The main plus point being that it reduces the cost of collection of extra data and labelling it. The main advantage being that the models learn limited data over time, it can prevent them from over-fitting and by learning the data from various angles.

The process of data augmentation has been extremely efficient and easy-to-use by the introduction of Image Data Generator by Keras. It lets us to augment the images in real-time while the model is still in training phase. Which saves up a lot of memory and make the training process robust. We have used the Image Data Generator with the following settings:

- Normalize the data by dividing it by 255
- Rotation Range – 40^{o}
- Width Shift Range
- Height Shift Range - 0.2
- Shear Range - 0.2
- Zoom Range - 0.2
- Horizontal Flip – TRUE
- Resized the images to 150 x 150 with 32 batch size.

4.3. Results

The trained 6 models being our own designed are, Convolution Neural Network, XceptionNet model, LeNet, DenseNet-121 and MobileNet. All of them were designed such that the input will be of 150x150x3 which outputs a data of 1x4. The other settings were discussed before in part A of this Section.

Table 2 shows the results of our training over some of the models with the same dataset and other settings. The CNN model has shown a really good potential being its training and validation accuracy is 96.19% and 95.63% respectively and also it has a smaller

number of parameters, and the model size was also low i.e., 23.3 MB. XceptionNet was the most brilliant and a powerful architecture which comes with the major disadvantage of the file size being over 250 MB which is not feasible for a mobile application or IoT systems, otherwise all of its aspects were brilliant just the number of parameters over 22.9 million which requires high end computing device.

The LeNet model, one of the oldest models out of these has also performed really well in the classification algorithm. But in Table 2 as we can see the major disadvantage here was the underfitting of data which can be seen as the validation accuracy is greater than the training. For this reason, we do not see it fit for our classification. The MobileNet which was developed for the sole application to work on low computing power systems like embedded or IoT system. It has performed exceptionally compared to the others previously discussed as it had approx. 3.2 million parameters and with that, it achieved an accuracy of 96.21% on the validation. Although, it is the same case here, the training accuracy is less than the validation which can be resolved by feeding more data or using more intricate network.

The one model who has the standpoint here is the proposed DenseNet-121 model which was seen the handiest in all the parameters achieving a training accuracy of 98.34% and validation accuracy of 98.25%. With optimum file size and parameters of 46.2 MB and approx. 3.9 million respectively. The major difference seen in all the architectures is in the loss function and the epoch at which maximum validation accuracy was obtained. The training and validation losses must be theoretically same or the difference between them must be minimum to minimum. When comparing all the architectures, it is found out that the least loss is in XceptionNet and DenseNet, but the minimum difference is found out in the proposed DenseNet model, making it the superior one. Also, as we can see that the DenseNet achieved the optimum results at the 78th epoch making it the model which can trained fastest. While in the others, the optimum results were found when they crossed the 150-epoch mark. Although, the performance of the DenseNet model can be increased with more data added to training or with the use of transfer learning.

Figure 6. Results of testing the model on unseen data - Bacterial Blight and Curl Virus

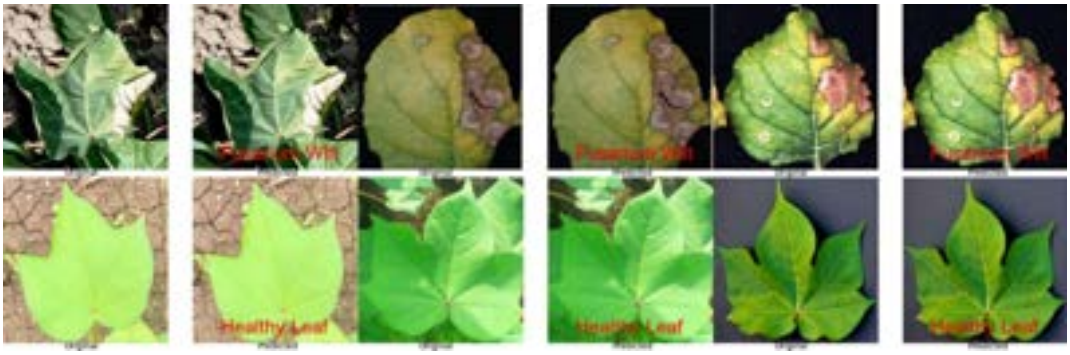

Figure 7. Results of testing the model on unseen data - Fusarium Wilt and Healthy Leaf

These all the parameters make the proposed DenseNet-121 model the best pick out of these 5 architectures and is quite adaptable and feasible for both high and low-end computing systems, as it achieves really good results in low parameters and the final model is formed of 46.3 MB which is normal for today's era.

For testing purposes, 12 unseen images of diseased and healthy cotton leaves are tested on the DenseNet model and the results can be seen in Figure. 6. for Bacterial Blight and Curl Virus, whereas in Figure. 7. for Fusarium Wilt and Healthy Leaf. As discussed previously, we have seen that data augmentation helps a lot in images that might be distorted or noisy. In Figure. 6., the first prediction for curl virus is done on an image with low resolution, making its noise high. A correct prediction is done on it. Showing that data augmentation is a key part.

Table 2. Results Of Training Various Deep Learning Models

Architecture	Training Accuracy	Validation Accuracy	Training Loss	Validation Loss	File Size	No. of Parameters	Max. Validation Acc. at epoch no.
CNN	96.19%	95.63%	0.1066	0.1779	23.3 MB	2,028,228	194
XceptionNet	99.03%	99.12%	0.0328	0.0732	262.6 MB	22,914,484	169
LeNet	97.71%	96.21%	0.0721	0.1319	173 MB	15,115,864	147
DenseNet-121	98.34%	98.25%	0.0425	0.0635	46.2 MB	3,921,476	78
MobileNet	95.91%	96.21%	0.1257	0.1704	37.5 MB	3,243,908	180

5. CONCLUSION AND DISCUSSION

Convolution Neural Networks are very perspective research field. To take an image, detect, and classify the leaf if it is diseased or healthy, a modified DenseNet-121 was used. When compared to other current models, it achieved a training accuracy of 98.34% and validation accuracy of 98.25% with 3,921,476 number of parameters. As the model was trained perfectly on 78th epoch and started to overfit the data on the training data, suggesting us to use the early stopping method to pick the model which is perfect in variance and bias. Using the orthodox deep leaning architectures to train from scratch, to get optimum accuracy is a time-consuming operation. As a result, different models can be employed or retrained depending on the previously trained models referred to as transfer learning. As a result, in future work, it is proposed to employ a transfer learning model which being more efficient, less in size and easy to apply than traditional training, which might be one of the best solutions to be utilized in smartphones or other embedded devices. We will also work on plant disease detection android application to help with deep learning-assisted smart agriculture for common man.

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Original Research Paper

Machine Learning

PNEUMONIA ANALYSIS, DETECTION, AND CLASSIFICATION THROUGH VARIOUS CLASSIFIERS

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ABSTRACT Pneumonia kills about a million children and adults each year and affects 7% of the world's population. Chest X-rays are mainly used to diagnose pneumonia. However, even for a trained radiologist, examining chest X-rays with the naked eye is challenging. There is a need to improve diagnostic accuracy with an automated system. This article proposes an efficient classification model for pneumonia detection, trained on digital chest radiographs. It would help the radiologist in their decision-making process. An original approach that depends on a weighted classifier is proposed that optimally integrates the weighted predictions of the most advanced deep learning model such as ResNet, Xception, Inception, DenseNet, and MobileNet. This deep learning approach is a supervised learning approach in which the model predicts the results based on the quality and availability of the dataset. In this investigation, a promising result has been obtained for the MobileNet classifier with an accuracy of 92%. More accuracy and classification techniques can be improved by using more datasets.

KEYWORDS : Pneumonia, CNN, X-rays, WHO, Artificial Intelligence.

I. INTRODUCTION

The threat of pneumonia is tremendous for many developing countries where billions face fuel poverty and depend on polluting kinds of energy. WHO estimates that more than 4 million premature deaths from diseases related to household air pollution, including pneumonia, occur every year [1]. More than 150 million people are infected with pneumonia every year, especially children under the age of 5 [2]. The problem can be further exacerbated in such regions because of the dearth of clinical assets and staff, for instance, with inside the 57 international locations in Africa an opening of 2. There are 3 million medical doctors and nurses [3],[4]. For those populations correct and speedy prognosis method is everything. You can ensure timely access to treatment, saving much-wished money and time for the ones already in poverty.

Many tests are available to diagnose pneumonia, including chest X-ray (CXR), chest MRI, and needle biopsy of the lungs [5]. The cheap and most widely used of these methods is CXR, which makes a crucial contribution to medical care and epidemiological studies [6],[8]. The X-ray approach is more optimal than the CT approach because CT imaging takes a longer time than X-ray. Also, CT scans require wonderful scanners, and those styles of scanners might not available in lots of underdeveloped countries. In many areas of the world, there may be the trouble of a scarcity of scientific groups of workers and radiologists, however, play a critical function in the detection and prediction of pneumonia [9], [10]. Nowadays, the famous technique to diagnose pneumonia sickness is the use of Artificial Intelligence (AI) primarily depends totally on computers, cell devices, cloud servers, and edges [11],[12].

One of the widely used medical techniques to identify the disease is a chest X-ray. When the beam of electrons, called X-ray photons, penetrates the body tissue, an image is formed on the photographic film. When examining chest X-rays for pneumonia identification, the doctors and radiologists look for white spots in the lungs called infiltrates that identify infection. The limited color scheme of X-rays, consisting of black and white tones, causes inconvenience. when trying to determine whether or not there is an infected area in the lungs. However, these blurred patterns would also be seen in tuberculous pneumonia and severe cases of bronchitis.

For conclusive diagnosis, investigations along with whole blood count (CBC), Sputum test, Chest computed tomography (CT) scan, etc. can be needed. Therefore, we're simply trying to hit upon the opportunity of pneumonia from Chest X-rays, seeking out a cloudy place. Conclusive detection will rely on pathological tests.

II. MATERIALS AND METHODS

The details of the experiment and the assessment step to check the effectiveness of the proposed model are shown. Our experiment is primarily based totally on the chest X-ray dataset. For coding, we used Python version 3.8 with open CV libraries. We implement the open-source Keras deep learning framework with the TensorFlow backend to construct and train the Convolutional Neural Network model. The experiments are performed on a standard system with an Intel Core i5 9300H @ 4.10 GHz processor (CPU), a GTX 1650 graphics card (GPU), and 8 GB DDR4 RAM.

2.1 Dataset

The dataset used in this work has been collected from

Kaggle.com, Get Life Hospital Amravati, and Harshivanand Hospital, Varanasi. The dataset consists of 5856 chest X-rays with resolutions ranging from 400p to 2000p. Out of 5,856 chest X-rays, 4,270 are for pneumonia and 1,580 are for healthy subjects (Table 1). Pneumonia is caused by viral and bacterial infections. However, the dataset used in this examine does now no longer encompasses viral and bacterial co-contamination cases. This data set was segmented into training and test sets.

Table 1: Complete detail of the Dataset

Type of subject	Number of X-ray images	Source
Normal	1580	Kaggle.com
Pneumonia	4270	Get Life Hospital + Harshivanand Hospital
Total	5856	Get Life Hospital + Harshivanan Hospital + Kaggle

Table 2 shows the training and test set segmentation, the variety of the train (the usage of augmentation), and test images for extraordinary assessment experiments. Four extraordinary algorithms had been trained on the usage of the training dataset which was evaluated in the test dataset. The figures underneath display samples for regular and Pneumonia chest X-ray images from the dataset.

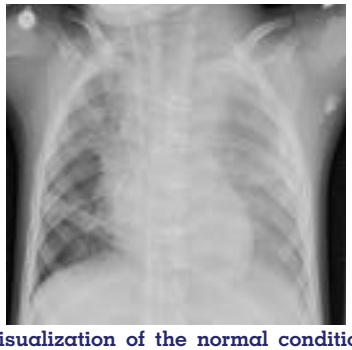

Figure 1: Visualization of the normal condition from the training dataset

Figure 2: Visualization of the normal condition from the validation dataset

Figure 3: Visualization of the normal condition from the testing dataset

Figure 4: Visualization of Pneumonia condition from the training dataset

Figure 5: Visualization of Pneumonia condition from the testing dataset

Figure 6: Visualization of pneumonia condition from the validation dataset

Table 2: Details of Training and Test set

Types	Training Set		Testing Set	Validation
Normal and Pneumonia	Normal	1341	234	8
	Pneumonia	3875	390	8

2.2 Data Pre-processing

A local library consists of 5,856 X-ray images for pre-processing of the data. Using this local library, it automatically detects categories within the dataset and adjusts the image size even if we don't specify the image size. The default image size is 50x50. The pickle object is used to reduce the time it takes to load the data.

2.3 Data Augmentation

CNNs produce an efficient result with a large number of datasets. However, the scale of the operating database isn't always very huge. There is a not unusual place trend in training deep learning algorithms to make the relatively smaller dataset right into a large one using data augmentation techniques. It has been pronounced that data augmentation can ameliorate the classification accuracy of deep learning algorithms. The overall performance of the deep learning models may be ameliorated through

augmenting the prevailing data in preference to gathering new data. Some of the deep learning frameworks have inbuilt data augmentation techniques. however, in this study, the authors have applied Keras ImageDataGenerator to generate new training sets.

Keras ImageDataGenerator function is an image enhancement technique for applying different alterations to the authentic images, ensuing in multiple converted copies of the identical image. However, each copy differs in certain aspects depending on augmentation techniques such as scrolling, rotating, flipping, etc. These image enhancement techniques not only extend the scale of the dataset but additionally contain a diploma of variant withinside the dataset that permits the version to higher technique invisible statistics and generalize. Also, the version turns into extra effective while trained with new, slightly modified images. So, with only some traces of code, one could immediately create a huge corpus of comparable images while not having to fear approximately amassing new images, which isn't beneficial in a real global scenario.

Figure 7: Flow Chart of the Proposed Model

2.4 Convolutional Neural Networks (CNNs)

CNNs are beneficial equipment in computer vision to categorize and understand input objects from 2D and 3-D images [13]. The conventional architecture of the CNN model generally includes a few couples of convolutions and pooling layers. Some techniques which include batch normalization [14], dropout [15], and ResNet block [16] were implemented to enhance the accuracy and performance of deep CNN models.

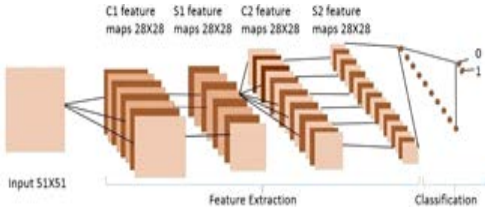

Figure 8: Architecture of two major layers [8]

The classifier is located at the next end of the proposed Convolutional Neural Network (CNN) model. A classifier wishes character features (vectors) to carry out computations like some other classifier. Therefore, the output of the feature extractor (a part of CNN) is transformed right into a 1D function vector for the classifier method called flattening, in which the output of the convolution operation is flattened to provide an extended feature vector for the dense layer to apply in its very last classification process. The classification layer carries an oblate layer, dense layers of length 80 and 1, respectively, at RELU among the 2 densest layers, and a sigmoid activation feature that plays the classification tasks. The mathematical expression for RELU and sigmoid in which we get the theoretical value is

RELU: $y = \max(0, x)$ (2)

Sigmoid: $S(x) = 1/1+e\text{-}x$ (3)

The visual representation of RELU and Sigmoid functions are given below. An extensive type of sigmoid functions consisting of the logistic and hyperbolic tangent capabilities had been used because of the activation function.

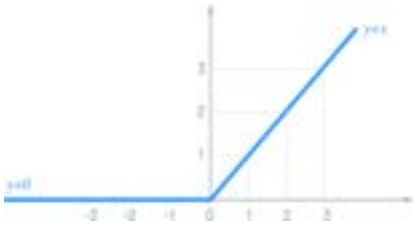

Figure 9: Visualization of RELU Curve [23]

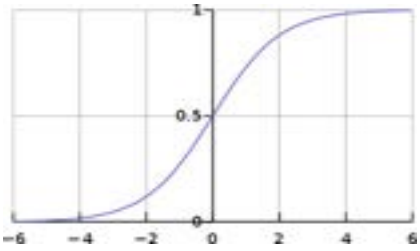

Figure 10: The Logistic Curve of Sigmoid function [24]

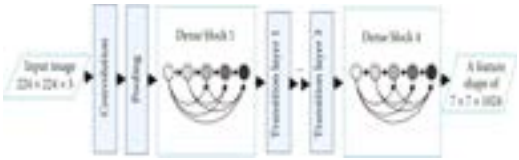

Figure 11: The architecture of the DenseNet Model [5]

Attempts have been made to assess classification performance using metrics such as precision and loss. The classification accuracy is the overall performance assessment measure. Accuracy represents how properly the classifier does in predicting times primarily based totally on the training data.

Accuracy: It is the ratio of the number of real anticipated instance each positive and negative to the total no. of instances.

Accuracy (%) = ((TruePositive + TrueNegative) / Total no. of instances) * 100

These terminologies are explained below:

1. True Positive: Number of predicted positive and actual positive instances.
2. True negative: No. to instances predicted positive but are actually negative.
3. Total Instances: The sum of all instances classified by the classifier.

Table 4: Accuracy of Proposed Model

Dataset	Accuracy of Proposed Model
Training	94.37%
Test	91.34%
Validation	92.11%

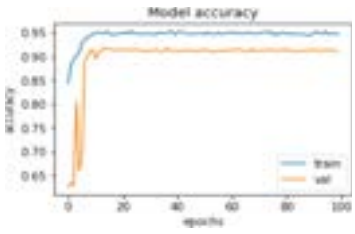

Figure 11: Visualization of Model Accuracy

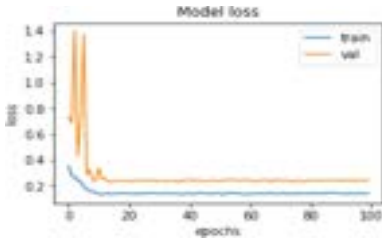

Figure 11: Visualization of Model Loss

IV. TCONCLUSION AND DISCUSSION

We proposed a model that classifies positive and negative pneumonia data from a group of radiographs. Our model is constructed from scratch, which distinguishes it from different strategies that depend closely on the transfer learning approach. And we enforce the created model in software that can work on Android and IOS. In the future, this work could be extended to come across and classify X-ray images with COVID19 and pneumonia has been a big problem lately and our next approach will address this issue.

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A Methodology for evaluation of Diabetic Retinopathy from Digital Fundus Images

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ABSTRACT: For a particularly long time, automatic diagnosis of diabetic retinopathy from digital fundus images has been an active research topic in the medical image processing community. The research interest is justified by the excessive potential for new products in the medical industry and possible reductions in healthcare costs. However, the maturity of state-of-the-art algorithms cannot be judged due to the lack of commonly accepted and representative image database with a verified ground truth and strict evaluation protocol. In this study, problems and issues related to the database are discussed from medical, image processing, and security perspectives. Based on the discussion, an evaluation methodology is proposed and a prototype image database with the ground truth is described. The database is made publicly available for benchmarking diagnosis algorithms. By utilizing the proposed database, it is now possible compare different algorithms, and correspondingly, analyze their maturity for technology transfer from the research laboratories to the medical practice.

I. INTRODUCTION

Diabetes has become one of the rapidly increasing health threats worldwide [19]. Only in Finland there are 30 000 people diagnosed to the type 1 maturity onset diabetes in the young, and 200 000 people diagnosed to the type 2 latent autoimmune diabetes in adults [1]. In addition, the current estimate predicts that there are 200 000 undiagnosed patients [1]. Proper and early treatment of diabetes is cost effective since implications of poor or late treatment are very expensive. In Finland, only 10% of the total health care costs of diabetes arise from 70% of early diagnosed patients while the remaining 90% arise from the patients having poor treatment (30%) [2]. This fact promotes the study of automatic diagnosis methods for screening over larger populations. Fundus imaging has an important role in diabetes monitoring since occurrences of retinal abnormalities are common and consequences serious. However, since the eye fundus seems to be sensitive to vascular diseases, fundus imaging is considered as a candidate for non-invasive screening of diabetes. The success rate of screening depends on accurate fundus image capturing and especially on accurate and reliable image processing algorithms for detecting the abnormalities. Various algorithms have been proposed by many research groups for this purpose. However, it is impossible to judge the accuracy and reliability of the approaches because of the lack of commonly accepted and representative fundus image database and evaluation protocol. The commonly accepted protocol could evaluate the maturity of state-of-the-art methods, i.e., produce the achieved sensitivity and selectivity rates. This would finally allow the technology transfer from research laboratories to practice.

The main contribution of this work is a framework for evaluating methods for an automatic diabetic retinopathy diagnosis. A prototype database with the ground truth and evaluation protocol are proposed. Experimental results for a method from the literature are reported. This study provides the means for the trustable evaluation of automatic diabetic retinopathy. The idea for this approach originates from the strict regulations for the valuation of biometric authentication method, e.g., the FERET protocol for face recognition methods [13].

A. Diabetic retinopathy

In the type 1 diabetes, the insulin production is permanently damaged, whereas in the type 2 diabetes, the person is suffering from increased resistance to insulin. The type 2 diabetes is a familial disease, but also related to limited physical activity and lifestyle [19]. The diabetes may cause abnormalities in the retina (diabetic retinopathy), kidneys (diabetic nephropathy), and nervous system (diabetic neuropathy) [11]. The diabetes is also a major risk factor in cardiovascular

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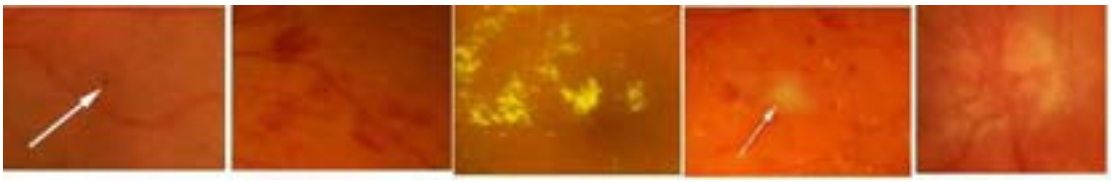
diseases [11]. The diabetic retinopathy is a complication of diabetes, causing abnormalities in the retina, and in the worst case, blindness. Typically, there are no salient symptoms in the early stages of diabetes, but the number and severity predominantly increase during the time. The diabetic retinopathy typically begins as small changes in the retinal capillary. The first detectable abnormalities are microaneurysms (Fig. 1(a)) which are local distensions of the retinal capillary and which cause intra-retinal haemorrhage (Fig. 1(b)) when ruptured [6]. In time, the retinal edema and hard exudates (Fig. 1(c)) are followed by the increased permeability of the capillary walls [6]. The hard exudates are lipid formations leaking from these weakened blood vessels. This state of the retinopathy is called non-proliferative diabetic retinopathy. However, if the above- mentioned abnormalities appear in the central vision area (macula), it is called diabetic maculopathy [18]. As the retinopathy advances, the blood vessels become obstructed which causes microinfarcts in the retina. These microinfarcts are called soft exudates (Fig. 1(d)). When a significant number of soft exudates (> 6), or intraretinal microvascular abnormalities are encountered, the state of the retinopathy is defined as preproliferative diabetic retinopathy. The preproliferative diabetic retinopathy can quickly turn into proliferative diabetic retinopathy when extensive lack of oxygen causes the development of new fragile vessels. This is called as neovascularization (Fig. 1(e)) which is a serious state threatening eye sight. The field of eye sight can be obstructed by a haemorrhage to the vitreous body which is a common cause of blindness for the type 1 diabetes. The neovascularization can tear retina, and when it is located near the center of macula, it can cause the loss of eye sight [18]. Due to the progressive nature of the retinopathy, regular monitoring is needed after diagnosis. However, broad screenings cannot be performed due to the fact that the fundus image examination requires attention of medical experts. For the screening, automatic image processing methods must be developed.



(a) (b) (c) (d) (e)

Figure 1: Abnormal findings in the eye fundus caused by the diabetic retinopathy: (a) microaneurysms (marked with an arrow), (b) haemorrhages, (c) hard exudates, (d) soft exudate (marked with an arrow), and (e) neovascularization.

B. Automatic methods

As mentioned previously, the diagnosis of diabetic retinopathy can be divided into the following two categories:

1. Screening of the diabetic retinopathy
2. Monitoring of the diabetic retinopathy

Most automatic systems approach the detection directly using shape, color, and domain knowledge of diabetic retinopathy findings, but the abnormalities can also be found in- directly by detecting changes between two fundus images taken from the same eye in different time moment [8, 14]. The direct approach contributes to screening of the disease, where indirect approach contributes to both screening and monitoring of the diabetic retinopathy. Both approaches use roughly the following stages for finding abnormalities in fundus images: 1) image enhancement 2) candidate diabetic retinopathy finding detection 3) classification to correct diabetic retinopathy category (or hypothesis rejection). Some of the main features distinguishing between the different findings and normal fundus parts are the color and brightness. The same features have been verified also by ophthalmologists. Unsurprisingly these features dominate in the automatic methods, and therefore will be shortly reviewed in our brief surveys for different type of findings in Section 2.1.1 and Section 2.1.2. Most of the automatic methods also detect normal fundus parts, such as optic disk, blood vessels, and macula. The automatic methods either use the vital domain information provided by the normal fundus parts or remove them due to their similar color and shape appearance with abnormal fundus findings. The detection of normal fundus parts is not considered in this study.

II. LITERATURE SURVEY

A. Image enhancement methods

Niemeijer et al. [10] estimated non-uniform background intensity of fundus image by

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applying median filtering to the green channel of the fundus image. Shade correction was generated by subtracting the result from the original green channel.

Fleming et al. [3] had similar approach for microaneurysms, but the green channel of the original fundus image was divided with the background intensity image. In addition, the shade corrected image was normalized for global image contrast by dividing with its standard deviation. Multiple local contrast enhancement methods were tested to improve detection accuracy.

In hemorrhage detection, Zhang and Chutape [22] used histogram specification applied to each individual RGB color component to normalize the colors between different fundus images.

Sinthayothin et al. [16] used local contrast enhancement to equalize the intensity variation in fundus images. The fundus images were transformed from RGB color model to IHS color model and the local contrast enhancement was applied to the intensity component of the image.

Detection and classification methods: Niemeijer et al. [10] extracted the candidate finding areas by assigning posterior probability of being red finding for every pixel us- ing Gaussian filter and its derivates as features for k-nearest neighbor clustering. Shape and intensity properties of the candidate areas were used for more accurate abnormal red finding and normal red finding classification.

Fleming et al. [3] segmented candidate microaneurysm areas by applying region growing to image enhanced with morphological top-hat operation and thresholding. The result candidate areas were classified with k-nearest neighbor clustering using the shape and intensity information.

Zhang and Chutape [22,23] used hemorrhage areas restricted by finite window in training images as input for support vector machine. To detect different sized hemorrhages a pyramid of images was generated by changing the resolution of fundus image. The local minima of the support vector machine provided evidence map were selected as hemorrhage locations. The principal component analysis was used to reduce the complexity of feature space.

Sinthanayothin et al. [16] sharpened the edges of red finding regions by applying moat operator to green channel of the contrast enhanced image. From the result image, red findings were extracted with recursive region growing and thresholding.

B. Hard and soft exudates

Image enhancement methods: Narasimha-iyer et al. [8] used normal retinal findings (vasculature, optic disk, fovea, and abnormal findings) to estimate the illumination component using iterative robust homographic surface fitting to compensate the non- uniform illumination in fundus images.

In detection of bright diabetic retinopathy areas from fundus images, Zhang and Chutape [24] applied adaptive local contrast enhancement to sub-image areas using the local mean

and standard deviation of intensities. The same approach was used by Osareh et al. [12] after color normalization between fundus images using histogram specification.

Wang et al. [21] adjusted the image brightness using brightness transform function similar to gamma correction.

Detection and classification methods: Hsu et al. [4] determined abnormal and normal finding areas using intensity properties for dynamic clustering. From the result abnormal areas, hard exudates were separated from soft exudates and drusen using intensity contrast information between abnormal areas and immediate background. The domain knowledge of retinal blood vessels were used to remove false artifacts.

Walter et al. [20] eliminated the vessels by applying morphological closing to the luminance component of the fundus image. From the result, within a sliding window local standard variation image was calculated and thresholder into coarse exudate areas. More accurate contours were acquired by thresholding difference between original image and morphologically reconstructed image.

Sa`nchez et al. [15] used yellowish color and sharp edges to distinguish hard exudates from the fundus images. The image pixels were classified into background and yellowish objects using minimum distance discrimination, where the count our pixels of extracted optic disk were used as background color reference and pixels inside the con- tour were used as yellowish object color reference. The segmented yellowish areas and

their edge information extracted with Kirsch's mask were combined to hard exudates areas using boolean operator.

Zhang and Chutape [24] located the bright abnormal regions in fundus images by applying fuzzy c-means clustering in LUV color space. The result areas were classified to hard exudates, soft exudates, and normal findings using support vector machine.

Osareh et al. [12] searched the coarse hard

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exudate areas using fuzzy c-means cluster- ing with Gaussian smoothed histograms of each color band of the fundus image. The segmented areas were classified to exudate and non-exudate regions using neural net- works. Color, region size, mean and standard deviation of intensity, and edge strength were used as features.

Li and Chutape [7] segmented exudates with combination of Canny edge detection and region growing in LUV color space. Gradient, mean pixel value, and seed pixel value were used as criteria in region growing.

Niemeijer et al. [9] used a similar approach for bright abnormal region detection as they used for finding abnormal red regions in [10]. In addition to the previous work, the prior knowledge of optic disk and vascular arch were used to improve detection accuracy.

Sinthanayothin et al. [16] clustered similar pixels using intensity difference as criteria for recursive region growing. The region with the most pixels were considered as background and defined the threshold value for hard exudate areas.

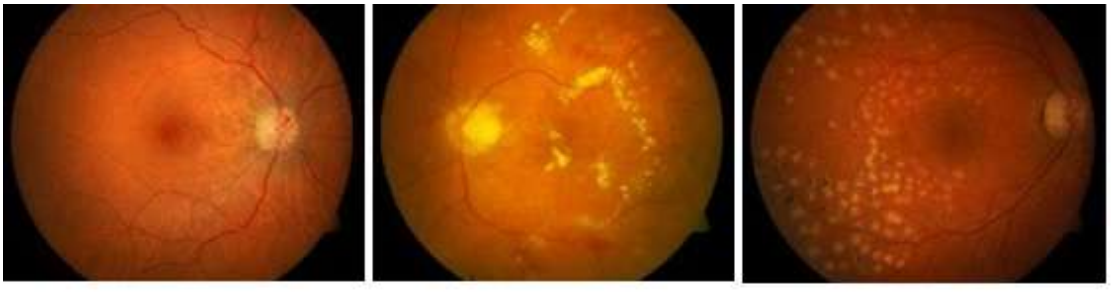
Wang et al. [21] used spherical color coordinates as features for the classification of fundus image pixels to background and bright abnormal findings using minimum dis- tance discriminant. The abnormal findings were verified using local-window-based method.

III. EVALUATION DATABASE

A necessary tool for the reliable evaluation and comparison of medical image processing algorithms is a database including a selected set of high-quality medical images which are representatives of the diabetic retinopathy and have been verified by experts. In addition to the images, also information about the medical findings must be avail- able. This information of findings is called the ground truth. An accurate algorithm should take an image as input, and output a result or description which is consistent with the ground truth. In the evaluation, the consistency is measured and compared between the algorithms. In the following, we describe images and ground truth for DIARETDB0.

A. Fundus images

The current database consists of 130 color fundus images of which 20 are normal and 110 contain signs of the diabetic retinopathy. The images were taken in the Kuopio university hospital. The images were dedicatedly selected, but their distribution does not correspond to any typical population, i.e., the data is biased – no a priori information can be devised from it. Images were captured with few 50 degree field- of-view digital fundus cameras with unknown camera settings (flash intensity, shutter speed, aperture, gain) (Fig. 2). The images contain an unknown amount of imaging noise and optical aberrations (dispersion, transverse and lateral chromatic, spherical, field curvature, coma, astigmatism, distortion), and unknown accuracy of photometric information (color or intensity). Variance over the visual appearance of different retinopathy findings can, thus, be considered as maximal. However, The data correspond to practical situations, and can be used to evaluate the general performance of diagnosis methods. The general performance corresponds to the situation where no calibration is performed (no correspondence to the real-world measurements), but where images correspond to commonly used imaging conditions, i.e., the conditions typically encountered in hospitals. This data set is referred to as “calibration level 0 fundus images”.



(a) (b) (c)

Figure 2: Fundus images: (a) normal fundus, (b) abnormal fundus, and (c) abnormal fundus after treatment by photo-coagulation.

B. Ground truth

The most important accuracy measures for medical diagnosis methods are sensitivity and specificity. Sensitivity and specificity are defined on the image basis – an image either contains a specific finding or not despite the fact that the

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diabetic retinopathy findings do have spatial locations in the fundus. For the computer vision researchers, it is important to ensure that the automatically extracted diabetic retinopathy findings also spatially correspond the findings marked by experts, that is, they appear at the same location in the image. Thus, the more detailed expert ground truth contains also the description of visual appearance of diabetic retinopathy findings. For every fundus image there is a corresponding ground truth file. A ground truth file contains all finding types found in the specific image file. An example ground truth file contains e.g.: red small dots hemorrhage hard exudates soft exudates neovascularization
If a certain finding type is not found in the image, it is marked as not available (n/a):
Red small dots hemorrhage hard exudates n/a neovascularization

C. Marking visual findings

The image ground truth is based on expert-selected findings related to the diabetic retinopathy and normal fundus structures (see Fig. 3). A person with a medical education (M.D.) and specialization to ophthalmology is considered as an expert.

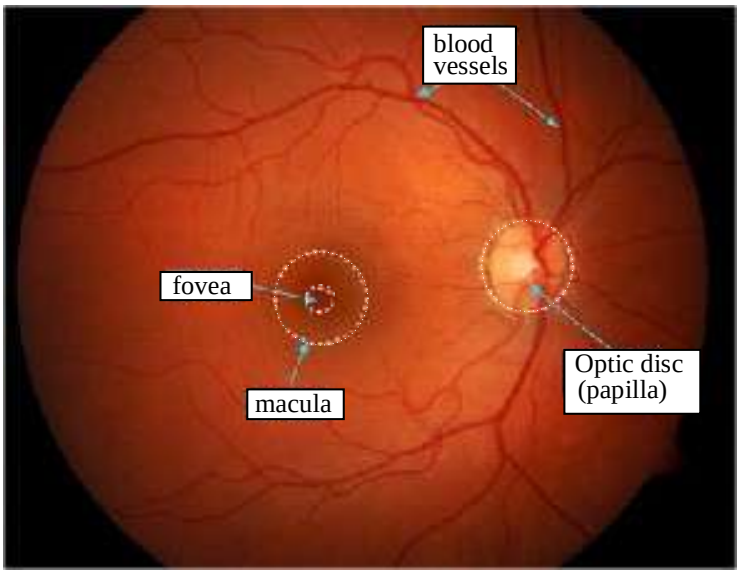

Figure 3: Structural elements of a normal fundus.

A special software tool was provided for the experts to inspect the fundus images and annotate the findings. The user interface of the current software version is shown in Fig. 4. It should be noted that the workstation displays were not calibrated. Therefore, the diabetic retinopathy findings were not equally visible on all displays. However, the situation corresponds to the current best practices. The ground truth tool provided two graphical marking directives at the time of marking and the usage was not instructed for the medical experts. This freedom of choice was allowed to prevent a biased scheme, and the medical experts were allowed construct their own best practices to mark different findings. It was possible to use different combinations of the graphical directives for the same type of findings. Currently, The following graphical directives are:

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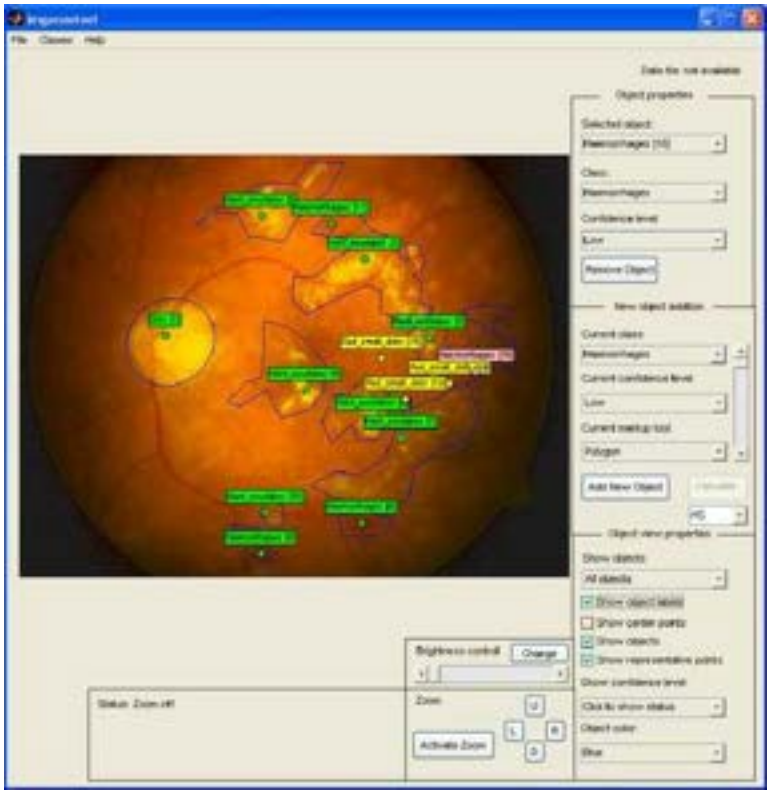
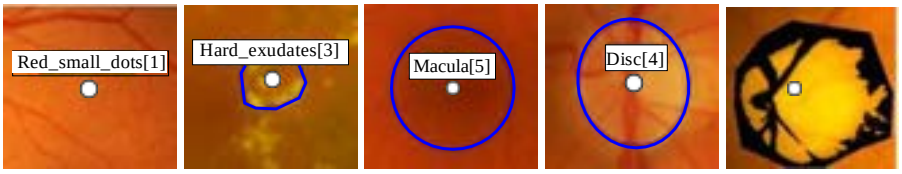


Figure 4: Graphical tool for gathering knowledge from medical experts.

1. Centroid (Fig. 5(a)),
2. Polygon region (Fig. 5(b)),
3. Circle region (Fig. 5(c)),
4. Ellipse region (Fig. 5(c)), and
5. Representative point (Fig. 5(e)).

In addition to the graphical directives, the image annotation tool provided a gamma correction tool and semi-automatic tool for more accurate definition of the finding areas (Fig. 5(e)). The semi-automatic tool used the color information provided by the representative point. In gathering the expert knowledge, the semi-automatic tool was not used.



(a) (b) (c) (d) (e)

Figure 5: Graphical directives for marking the visual findings: (a) centroid; (b) polygon region; and (c) circle region; d) semi-automatic region cropping tool and representative point.

D. Training and test sets

The set of 130 images was divided into 5 image categories, and a fixed number of randomly selected images were taken from each category to form the training set. The rest of the images compose the test set. The image categories were formed to confirm that each diabetic retinopathy finding type is included in the both training and test sets. The diabetic retinopathy finding types that each image group contains are the following:

1. Red Small dots, haemorrhages, hard exudates.
2. Red Small dots, haemorrhages, hard exudates, soft exudates.
3. Red Small dots, haemorrhages, hard exudates, soft exudates, neovascularization.
4. Red small dots, haemorrhages, soft exudates, neovascularization.
5. Normal.

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IV. CONCLUSION AND FUTURE RESEARCH

The development of image processing methods to a mature level where the results can be transferred from the research laboratories to practice requires the following: accepted and applied protocols for evaluating the methods, protocols that are similar to the strict regulations in the medical treatment, and medicine research. Medical image processing is not different from the medical practice in that sense. We proposed the first step for a standardized evaluation of methods for detecting find- ings of diabetic retinopathy. DIARETDB0 is in many ways a difficult database, but it corresponds to the situation in practice: the images are uncalibrated, expert evaluation is free form and the displays used to view the images are uncalibrated. In the future, however, we will continue to develop the database and evaluation methodology. The following development steps will be taken:

1. The fundus camera and optics are calibrated due to deficiencies of imaging (as the results, optical distortions are known and photometric information is the same between images). Calibration level 1 achieved.
2. A predefined set of directives for different kinds of findings is provided to the experts. The directives prevent the free form description, and thus, allow control over subjective interpretations.
3. Findings are classified based on the confidence level (high, medium, low) given by the expert. All findings are independently verified by several experts.
4. The effect of display calibration for the experts will be evaluated.
5. Sensitivity and specificity measures will be improved (sensitivity/specificity function).
6. Location of normal findings will be added to the data and a protocol for evaluating also their localization accuracy

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Smart Wheelchair with safety, security and health monitoring system

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Abstract- The new progressions of science and development have most certainly affected how normal individuals lives however shouldn't something be said about handicapped individuals and the senior resident who can't stroll without help and are utilizing wheelchair which has restricted portability are as yet carrying on with a hopeless life. Wheelchairs are being utilized for moving patients in medical clinics as well as incapacitated individuals throughout the previous six centuries. The impaired individuals move wheelchairs by the utilization of their upper limbs or in different cases one more human is expected to push their wheelchair forward. Here we propose a separable extension that can be related to a wheelchair and can change over ordinary wheelchairs into powered ones. This lessens the user's human exertion and power to drive the wheels of the wheelchair. Besides, it allows physically impaired people to go from one position to another. The Wheelchair is additionally furnished with an accident detection framework which increases the safety of patients driving wheelchairs. Along with that, for continuous health monitoring of the user or patient, an IoT-based Health monitoring framework is integrated into this model which provides routine checkups and the reports or information is conveyed through a web server platform called Thingspeak. One additional part function that is real-time video monitoring through the mobile camera is also included which makes our Wheelchair a "Smart Wheel Chair". The model additionally expects to fabricate a comparable wheelchair that would have a kind of insight and thus assists the user with his/her development.

KEYWORDS - Electric wheelchair, Health Monitoring, Accident alert.

I. INTRODUCTION

However the new enhancements of science and advancement have drastically changed the way in which human lives their life, there are certain individuals who have not had the choice to develop from these new enhancements. Specifically handicapped individuals with have restricted versatility are as yet carrying on with restricted life.

A wheelchair expects to give help to those handicapped and disabled people by providing them with some kind of movement, but a smart wheelchair would enormously help them. A smart wheelchair includes a controller section that permits the driver/user to give input as an Accelerometer. The controller section then, at that point, consolidates the request and takes the normal action to move the wheelchair to the particular position. This model comprises the detachable electric part which has a controller, hub motor, throttle, and a rechargeable battery.

Accidents and the death rate because of street accidents are expanding at a disturbing rate. A large portion of the accidents and deaths that happen are because of the absence of quick clinical help, on the streets like express thruways. An office or group for giving prompt clinical help to the region of the accident can diminish the casualty to a more noteworthy extent. Along these lines comes the possibility of a ready framework that detects the accidents and their reality to be aware of the close the clinical community for giving emergency vehicles or clinical guides to the accident region.

Here a minimal expense-ready framework is proposed to give a prompt clinical guide to the accident casualties by awarding the close clinical help community with the specific spot of accident and the information of the patient through SMS. This framework additionally takes the condition of the accident casualty by actually looking at the heartbeat to get the severity of the accident and notify the clinical guide community.

Medical care is given more significance nowadays in almost every country considering the effect of Covid. With respect to that the most appropriate approach toward health monitoring is an IoT-based health monitoring system. Internet of Things is a new and advanced approach that is growing at a rapid rate in clinical consideration. By using the wearable sensors and the reports available at our fingertips by mobile phones, the popularity of IoT is based health monitoring is increasing at a much higher speed.

IoT-based health monitoring helps in reducing the spread of illness and provides better guidance about our health even if the expert or doctor is sitting at a far distance. Here in this paper, we have proposed a flexible health monitoring system that can continuously screen the patient's temperature, pulse, and various limits. This data of the user can be stored and checked on a web server platform named "Thingspeak". This monitoring system using IoT helps to store data and sent continuous information about users' health to doctors, relatives, and friends from a distance, which helps to track regular health and avoid future uncertainty.

One additional part of our model is real-time monitoring of the user with help of a user android camera. This helps to continuously monitor the user and that video can be seen on any

browser using the URL generated while accessing the IP Phone camera app on mobile.

II. Literature Survey

The History And Evolution Of Wheel Chair from mechanical to electric kinds are talked about well by Iqbal (2015). Based on accumulated data, plan a wheelchair that has minimal expense and is receptive to the poor and middle-class population.

In this paper the author [2] has mentioned a wheelchair which is a cost-effective and non-polluting solution in the form of an Electric Wheelchair, the limitation of this project is we need frequent replacement of brush shoes, and losses are more due to mechanical losses.

Research has been done on Voice and motion controlling connection points [3] that are sent to the framework notwithstanding the customary joystick-controlling point of interaction to upgrade the cooperation with the client. The fundamental disservice is, that this isn't extremely valuable for people since one has an explicit handicap and he/she doesn't require more than one controlling mode.

The system used in this wheelchair is controlled by a joystick placed in the right hand. Facilities like speech recognition, feeling detection, receiving calls, availability of meals, and obstacle detection are present in Elderly Supportive Intelligent Wheelchair [4]. The disadvantage is only two emotions are captured happy and angry, In the hardware part the processor is slow, so they use two processors.

Laura Carolina Dasuha at el [5] utilizes a procedure called Co-employable Mobility Services of the Future (CoMoSeF) that uses a sensor CAN BUS introduced in every one of the vehicles where the sensor is filling in as correspondence between vehicles. The CoMoSeF has been needed to utilize unpretentious sensors that can be introduced on each vehicle through which vehicles can converse with one another.

Norsuzila Yaacob et al [6] use a piezoelectric sensors, PIC 16F microcontroller, Global System for Mobile (GSM), and GPS modules to recognize vehicle crashes. The genuineness of the accident is nothing but how powerful is the impact of accident on the vehicle is decided by the piezoelectric sensor and then passes an alert message on the server along with the region details such as coordinates and responding to that message the help team is dispatched to the accident spot.

In this paper [7], The creator has arranged an advantageous device that would comprehend heart circumstances and temperature. Similarly, the creator has used “SMS” procedures. For locating the coordinates of the user GPS module was used.

In the paper [8], The creators have executed the undertaking by utilizing RFID which is valuable for the patients when they are alone. However, this paper has come in front of some difficulties as the data set is central. Continuous execution of the undertaking isn't really simple.

III. Project Specification

For this project, we are intending to utilize a 500W, 48V the brushless hub motor which can be helpful for moving the actual wheelchair and the heaviness of a typical handicapped individual. To run this engine we are utilizing batteries with a joined power rating of 48V and 24Ah.
These batteries, assuming that completely discharged will take up to 4-5 hrs. utilizing the power supply and have a mileage of 20 km at a speed of 20 km/h. We are intending to assemble this connection utilizing a casing produced using Aluminum 6061 for pulling a joined load of around 200 kg. Additionally to this for safety measures, we are adding an accident alert system and likewise, for a health monitoring system, we are introducing a continuous health monitoring system. Both systems will be linked to the phones of doctors, relatives, friends, etc.

Details of sub-system:

A. Electric Front-Wheel attachment:

Our methodology comprises a handle-based driving framework, like those of bikes and scooters comprising of a throttle used to control the driving wheel. The driving part is performed by the use of a hub motor based on the planned weight estimations. These engines are thus driven by the power given by a battery-powered battery. A simple method for coupling the connection with the wheelchair is by welding a bar beneath the footrest of the wheelchair. This bar will be joined by utilizing a coupling using a clip and clamp mechanism.

- Required Hardware Components

The hardware components used in this design are listed as follow:

- Hub motor

The Hub motor is nothing but an electric motor that is integrated into the hub of the wheel of any vehicle and helps to drive it directly. A BLDC motor is fueled by direct flow power (DC) and has an electronically controlled replacement framework, rather than a mechanical compensation framework in view of brushes. In this type of motor, current, and force, voltage, and rpm are directly related.

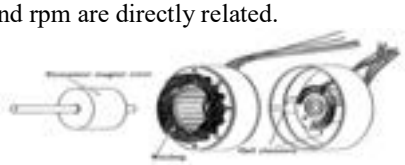

Fig.1 - Hub motor

- Controller

The Controller of the motor is the device with various combinations of sensors and groups of devices that help to drive the motor in a predetermined way. It is helpful in various functions of the motor and improves the performance of the motor.

Fig.2 - Controller

- Battery

Batteries are the parts that store electrical energy, taking into account the motor of the vehicle being referred to run. The lithium-ion battery was the most productive decision for an electric vehicle since it offers high energy thickness while outstanding somewhat light-weight and minimized in size.

Fig.3 – Lithium-ion battery

- Charger

To use the battery to its most extreme limit the battery charger assumes a vital part. The attributes of the charger rely upon the parts, exchanging techniques, and control calculations.

Fig.4 – Battery charger

- Throttle

To engage the throttle, you simply twist the handlebar, and the bike will accelerate. Let go of the throttle, and the bike will stop.

Fig.5 – Throttle

PERFORMANCE ANALYSIS

- Calculation of Hub Motor for the front wheel

1. Specification of Motor:

Power (P) = 500 w, Volt (V) = 48 v

2. Power Equation is given as:

Power (P) = Voltage (V) × Current (I)

Hence, I = P ÷ V = 500 ÷ 48 = 10.41 Amp.

3. RPM (Speed of Motor)

Let us take the diameter of the motorcycle wheel (d) = 31 cm=0.31m

Radius of the motorcycle wheel (r) = 15.5 cm = 0.155 m

Circumference of wheel = $2\pi r$ = (2π x 0.155) = 0.9734m

For 1 revolution of wheel, it covers 0.9734 m

We have taken, the top speed of motorcycle is 20 km/hr

20 km/hr = 20 x (1000/60)=333 m/minute

It means when a motorcycle drives at a speed of 20 km/hr, it will be reached 333 metres for 1 minute.

$$\text{Maximum wheel rpm} = \frac{\text{Distance reached per minute at top speed}}{\textit{Distance covered by wheel for 1 revolution}}$$

= 333/0.9734

= 342.099 (**342** RPM approximately)

Maximum wheel RPM is approximately **342 RPM .**

2. Torque of the motor (T)

Power = $2\pi NT/60$

500 = $2\pi(342)T / 60$

On solving we get ,

T = 14.73 Nm

Torque of the motor, T = 14.73 Nm

3. Selection of Hub Motor

To design an electric wheel chair with a gross weight of 200kg (100kg kerb weight + 100kg loading) and a top speed of 20 km/hr.

Each vehicle ought to beat these 3 resistance forces.

1) Rolling force
2) Gradient force
3) Aerodynamic drag force

Therefore, total resisting force is given by:

$F_{TOTAL} = F_{ROLLING} + F_{GRADIENT} + F_{AERODYNAMIC\ DRAG}$

Where,

Ftotal = Total force

Frolling = Force due to Rolling Resistance

Fgradient=Force due to Gradient Resistance

Faerodynamic drag=Force due to Aerodynamic Drag

Ftotal is the total force that is acting opposite to the wheelchair, which we have to overcome, so for that, our motor must be that much capable.

ROLLING RESISTANCE FORCE

When the wheelchair starts running it has contact with the ground which creates rolling resistance, this will be very low or zero for flat surfaces, and it is given by:

Frolling = Cr.m.a

Where, Cr : Coefficient of rolling resistance

M : Mass of the vehicle (in kg)

a : Acceleration due to gravity (m/s²)

Take, Cr= 0.004 (for asphalt road)

m = 200 kg and

a = 9.81 m/s²

Frolling = 0.004 x 200 x 9.81

= 7.848 N (Newton)

GRADIENT RESISTANCE

Gradient resistance force is the obstruction presented when driving on an inclined surface or let's say a flyover. in this case, we can say it is the road for our Wheelchair, shown in the (fig.6) where angle θ shows the gradient between the ground and slant way.

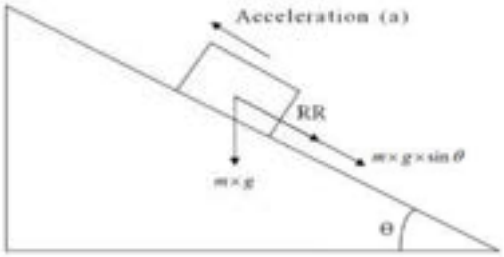

Fig.6:- Forces acting on Vehicle climbing an Inclined surface.

We can calculate Gradient force by using below formula.

F grad = (mg). sin(θ)

Where,

m – Vehicle's mass (in kilogram)

g – Acceleration by gravity (m/s²)

θ - Slope or Gradient angle

If we consider an angle of θ (inclined angle)=2 degree

F gradient resistance = m × g × sin θ =200 × 9.81 × sin 2

= 68.472 N

AERODYNAMIC DRAG

In nature we can observe different forces, in this, we have to observe force act by air also called Aerodynamic Force. So we can calculate this force by using the density of the medium and the velocity of the vehicle. The formula is shown below.

F aero. drag = (0.5)(ρ.V².Ca.At)

Where,

ρ = 1.23 kg/m³ (Density of air medium)

V = 20 km/hr = 5.5m/s (Velocity of vehicle)

Ca = 0.88 (Coefficient of air resist.)

At = Front side area of vehicle (m²)

=(height x width) . Adjusting value

=(1.45 x 0.78)x 0.70

= 0.7917 m²

F aero. Drag = 0.5(1.23 x 5.5² x 0.88 x 0.79)

= 12.93 N

Therefore, the force required for moving the wheelchair is,

Ftotal= Frolling + Fgradient + Faerodynamic drag

= 7.848 + 68.472 + 12.93

= 89.25 N

Now, the power required is,

Power = Force × Velocity × (1000 ÷ 3600)

= 89.25 × 20 × (5 ÷ 18)

= 495.833 watts.

Thus, the power expected to drive the wheelchair is 495.833 W, which is simply underneath our motor given specification i.e., 500 W. Hence, the design is ok to drive.

➢ Battery Calculation

Find out the Watt hour of the battery.

To run the 500 Watts motor for 1 hour, Simply multiply (500 Watts X 1 hour) = **500 Watt hour.**

Take efficiency of 80% for battery.

i.e.

(500*0.8) = **400 Watt hour.**

Convert Watt hour of battery into Ampere hour of battery

Power = Voltage X Current

Also,

Watt hour = Voltage X Ampere hour

400= 48 X Ampere hour

Ampere hour = (400/48)= 8.3 Ampere hour (say 10 AH)

Therefore, to run the 500 Watts motor for 1 hour, 48V 10 AH Lithium ion battery is needed. If the electric bike is running at an average speed of 20 km/hr, 48V 10 AH provides 20 km mileage.

Charging Time required to charge the battery :

The charging current (Ic) of lithium ion battery should not exceed 30 % of the ampere-hour(Ah) rating of the battery. (i.e., Consider some 30% of losses during charging of battery (due to heat dissipation))

The charging current (Ic) = 30% of the ampere hour(Ah)

= 0.30 x 10

Ic = 3 A

Calculate the charging time (in hours) by using the formula,

Tc = Battery capacity in AH / Charging Current In Ampere

Tc = 10/3

Tc = 3.33 hours

Due to heat dissipation losses, 30 % time will be extra taken to charge the battery.

Tc = 3.33 +0.99

Charging time, Tc = 4.32 hours

= 4 hours 19 minutes

B. Accident Alert System:

In this model, we are using Arduino UNO to integrate with the GSM module SIM 900A and GPS Neo-8m receiver. For capturing the X and Y-axis coordinates of the vehicle we are using an accelerometer and for sending a notification message we have used GSM SIM 900A which sends messages to the registered contact number of the guardian or family members. The longitude and latitude of the wheelchair are continuously captured by the GPS module. The accident alert framework block diagram is displayed in fig.7 below.

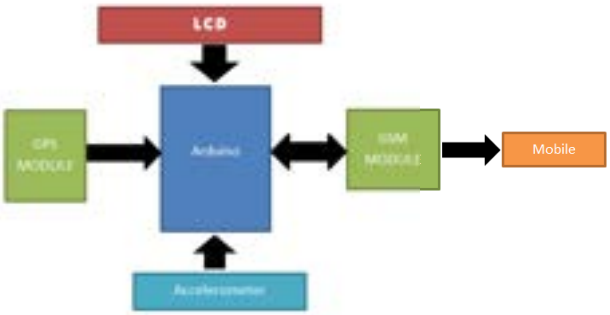

Fig.7 : Architecture of Accident alert system

The Accelerometer ADXL335 sensor is utilized to measure the unplanned accidental vibration of the vehicle. The Global Positioning System (GPS) module is utilized to identify the area of the vehicle. The vibration and area information from this sensor is sent to Arduino UNO Microcontroller. The GSM SIM900A module is utilized to send ready messages to the predefined cell phone. The LCD is likewise associated with Arduino for showing where the vehicle arrives at the Driver.

- ❖ Components required for hardware
  The Components required for hardware design are given as follows:
- ➢ Arduino Uno

Fig.8 Arduino

Arduino is in a generally an open source stage used from building electronic adventures (Fig. 8). UNO is the most well-known board used. It works on 5V inventory at 16MHz clock speed and the processor is ATMega328. Arduino IDE is an item used to type the code and move it on to the heap up (Fig. 9).

Fig.9 Arduino IDE

Arduino board can be controlled in two distinct ways. One, using the USB connect from the PC and two, from the AC mains using the power barrel jack. The board has a voltage regulator for giving offset DC voltages to all parts. It has a valuable stone oscillator to give the 16MHz clock repeat, a reset catch to reset the structure, a 3.3V and a 5V yield supply pins and a ground pin. Arduino UNO has six basic pins for exchanging data from straightforward sensors also, to change over it to modernized structure for transparency of the microcontroller. It has 14 computerized I/O sticks in which 6 are PWM age pins furthermore, 1 is UART pin. Arduino UNO board also includes if the Tx and Rx LEDs and power LEDs. It gives a norm structure factor that breaks the components of the more limited size regulator into an progressively accessible pack.

- ➢ GPS module (Global Positioning System)

Fig.10 – GPS module

Global Positioning System is abbreviated as GPS. It is used to locate a particular area on earth's crust which means it gives the longitude and latitude of a point on earth with conscientiously UTC time. To get the proper region of an accident in our venture we use a GPS module. These gadgets get their directions from the satellite each and every second. GPS module sends the data associated with the accompanying circumstance dynamically, and a lot of data as the information is sent in NMEA design (fig.11).

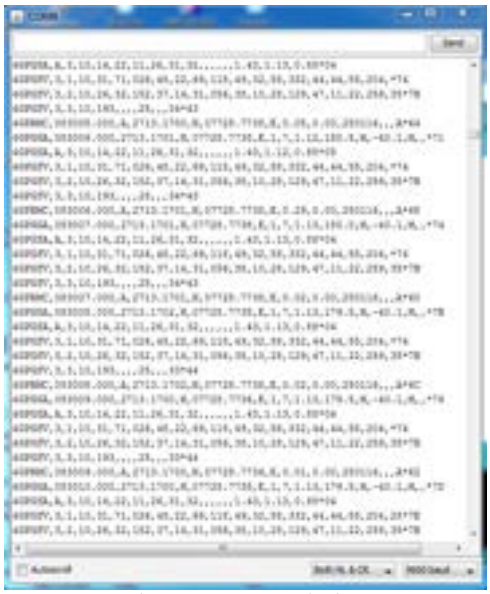

Fig.11 – NMEA design

NMEA configuration involves a couple of sentences, where we simply require a sentence. This sentence contains the time, headings, and other important information and starts from $GPGGA. Global Positioning System Fix Data is acronym as GPGGA. By remembering the position of the commas for the string you can remove the required work from the $GPGGA string. Anticipate that you should see the $GPGGA string and stores it in a show, then, at that point, Latitude can be found after two commas and Longitude can be found after four commas. In the present situation, this longitude and scope can be placed in different exhibits.

- 16 x2 LCD (Liquid Crystal Display)

Fig.12 – LCD display

A liquid crystal display (Fig. 12) is a type of flat panel display used as screens in screens, phones, projects, and so on. It is a combination of two states of issue, solid and liquid. LCD uses liquid pearl to show an undeniable picture. An LCD contains setting enlightenment which gives light to the pixels. It has red, blue, and green subpixels which can be turned on or off using pixels. The display appears dark when all of the pixels and subpixels get off and it appears to be white when all the sub-pixels are turned on.

- GSM Sim900A Module (Global System for Mobile Communication)

Fig. 13 – GSM Module

GPRS (General Packet Radio Service) module or a GSM (Global System for Mobile) module is a chip or on the other hand, a circuit that is utilized to create an arrangement between a mobile phone or an enrolling machine and a GPRS or GSM system (Fig. 13). SIM900A conveys GPRS/GSM 850/900/1800/1900 MHz execution for sms, Voice, and information with less power.

- Accelerometer ADXL 335

It is a slim, little, less-power, full three axis accelerometer with signal changes with respect to voltage yields. It estimates speed increase with a base full-size span of ±3 g.

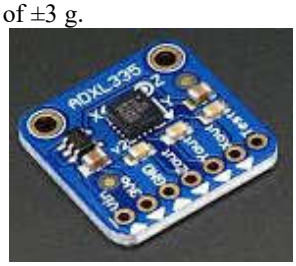

Fig.14 – Accelerometer

IMPLEMENTATION AND WORKING

In the arrangement of the accident alert system, Arduino is utilized for controlling the entire system with a GSM module and a GPS receiver. For identifying the direction of the wheelchair GPS receiver is utilized, and for sending SMS the coordinates of the accident area GSM module is utilized. The accelerometer specifically ADXL 335 is utilized for recognizing accidents or unexpected changes in any pivot. An LCD 16x2 is in like manner used for showing the situation with the framework. The framework is ready to begin after dumping the code into Arduino.

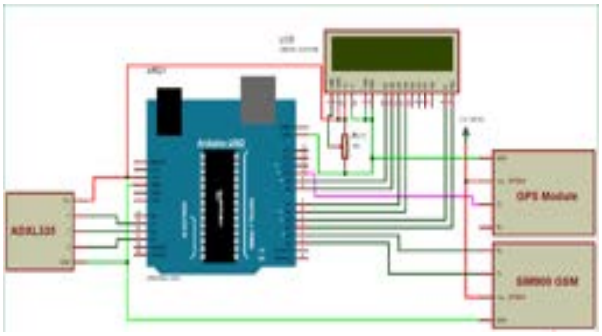

Fig.15: Overall Circuit of the System

As soon as, the axis value of the accelerometer is disturbed, the GSM module gets an accident alert from the Arduino. The information from the GPS module is perused by Arduino and the direction is get by extricating the $GPMRC String. The region is continually displayed on LCD. However, when there is a change in axis GSM module sends SMS to the pre-registered number like rescue team, relative, friends, etc. The principal prerequisites of this model are GPS and GSM modules. They need to be accurately defined or initialized to get the wanted outcomes.

C. Health Monitoring System:

Healthcare applications are more significant among the application in IoT that is being worked on within the world. IoT has been extensively used to interconnect the significant level clinical resources and to offer quick and convincing clinical consideration organizations to people. The undeniable level sensors can be either worn or embedded into the body of the patients, to screen their prosperity persistently. The information accumulated in such a manner can be dissected, added up to, and mined to do the early forecast of sicknesses.

Every possible research is going on in the field of Internet of medical things, in this we are developing a health monitoring system with ESP8266, LM35, Think speak, Arduino Uno which will integrated with the Electric wheelchair for the continuous health monitoring of the patient on E-Wheelchair, which makes this project intelligent.

Fig.16 Block diagram of health monitoring system

❖ Components required for hardware

The Components required for hardware design are given as follows:

➢ Temperature sensor

The output of the temperature sensor (LM35) is an analog signal that is directly proportional to the centigrade temperature. The LM35 device partakes in a high ground over direct temperature sensors adjusted in Kelvin, as the client isn't supposed to remove a colossal consistent voltage from the outcome to get accommodating Centigrade scaling.

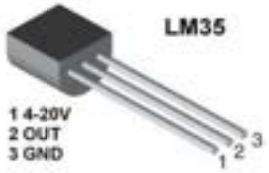

Fig. 17 – Temperature Sensor

➢ Pulse Sensor

The pulse sensor is also called the heartbeat sensor. The beat LED flashes synchronously with every heartbeat when it is working. To measure the BPM rate the digital output pin is connected to the microcontroller to get the desired results. It follows the working principle of light modulation by considering the flow of blood through the finger at every pulse.

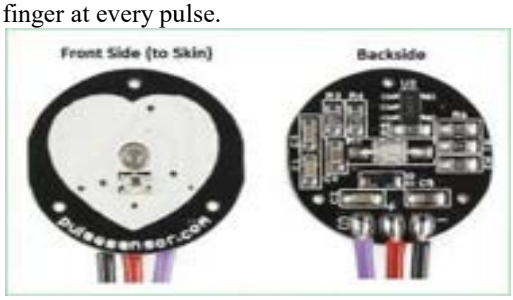

Fig. 18 – Pulse sensor

➢ Wifi Module ESP8266

The ESP8266 is not too costly and very easy to understand to provide access to Internet. This module works on both as a station and as an Access point. It should be operated within the given voltage limit that is 3.3V, and any voltage above 3.7V would damage or burn this module.

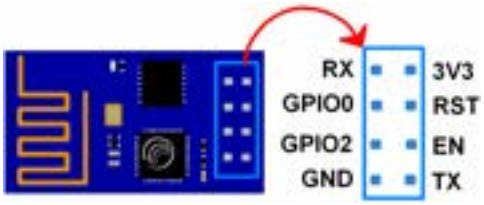

Fig. 19 – ESP8266

IMPLEMENTATION AND WORKING

This IoT-based health monitoring system consists of ESP8266 and Arduino as shown in (fig.16). LM35 Temperature Sensor and Pulse sensor measure Temperature and heart rate (BPM) respectively. The output pin of the pulse sensor is connected to the A1 pin of the Arduino and the remaining two pins that are

VCC & GND are connected to the power supply and the ground pin of the Arduino. Similarly, connect the output pin of LM35 to the A1 pin of Arduino and the remaining pins to VCC and GND respectively. Now the code is processed in Arduino and the output is shown on a 16*2 LCD display. This LCD is connected with digital pin 7 of Arduino through a 220ohm resistor. The data is sent to the server by the ESP8266 WiFi module when partnered with Wi-Fi. To divide the 5V into 3.3V we will be using 2.2k & 1K resistor as the Rx pin of the ESP8266 works on the 3.3V supply. The platform or server on which the data of the user will be monitored is Thingspeak. This information of the user can be monitored from any corner of the world with an Internet connection by login into the Thingspeak Channel.

Fig. 20 – Results of Health Monitoring System

D. Continuous Video Monitoring System:

Video monitoring is a section of the actual security industry that comprises remotely checking public or private spots with cameras. These cameras are modest and simple to get. In this manner, the video dealt from these cameras is for the most part observed with some restraint or overlooked. They are much of the time utilized as straightforward documents or to send back a caution once an episode has happened. Today, observation cameras have turned into a substantially more valuable instrument. Rather than inactively recording pictures, they are utilized to recognize occasions that require consideration simultaneously as they happen and make a move continuously. The CCTV for people is one of the most dynamic exploration points in the vision by PC. It has various sorts of safety applications.

In this video surveillance, we are continuously monitoring the driver of our wheelchair (One camera will be needed on the wheelchair.), if the accident happened so the guardian will live monitor and get the precise information about the incident at his position. This means our wheelchair has the feature of video monitoring.

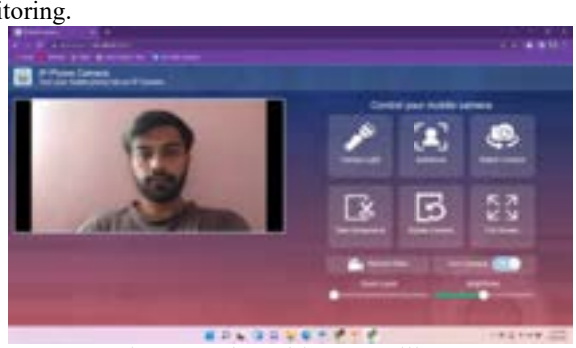

Fig. 21 – Live Video Surveillance

Interface your laptop/PC and phone to similar Wi-Fi. Open the application on your phone. Explore through the application and select the Start option server at the corner. Note down the IP address that shows up on the screen. Paste the same IP address in any web browser and hit enter. The page will open where you have some control over the camera of your phone.

IV. RESULTS

The smart wheelchair attachment is intended to automate wheelchairs and subsequently accomplish a proficient and simple transportation vehicle for patients as well as debilitated individuals. The connection utilizes metal bars and line plans intended to be appended to a wheelchair's front poles and accordingly clip on the front wheelchair poles. The accelerator is integrated into the handle with a ball bearing for efficient movement in any direction as required by the user. The power source for our model are lithium-ion batteries which are used to power the motor as well as IoT systems like accident alert systems and health monitoring system.

V. CONCLUSION

By mounting the combined module of health monitoring and accident alert systems on the electric wheelchair the risk of medical emergencies and risk of accidents on road will be reduced to a great extent. In the event that assuming the wheelchair has met an accident and the user needs help. Then at that time with the help of the sensor mounted on the wheelchair it is able to detect the accident has occurred and the coordinates of the area of the accident are sent to the predefined number so they can provide the required help and medical facilities to the user in few moments and save their lives. An additional benefit of video monitoring will help to see the condition of the user(old age people) in any situation which provides better security. Our model can be used by the individual who has to depend on a wheelchair to move from one place to other with the help of others. It can cover a range of 20kms to 25kms with a top speed of 20kmph. Batteries used in this wheelchair are rechargeable and take around 4.5hrs to charge completely.

VI. FUTURE SCOPES

- This wheelchair, which contains the accident alert system senses the impact of force on the front side of the wheelchair. In this we can go for a unique concept, if the impact of force is greater than the predefined value, then a drone that is implanted in the vehicle will start flying, start the live surveillance of the accident area and send the live video to the guardian.
- Creating an accelerator that has inbuilt sensors, which can continuously monitor the health parameters like bpm and temperature and able to contact a guardian in an emergency.
- Adding more health monitoring parameters as per the medical condition and need of the user.
- Integrating an obstacle detection system in this model and applying automatic brakes in case of an obstacle is detected.

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We might want to make a move to communicate our genuine thanks to our aide Dr. K.B. Khanchandani, for his regarded direction and consolation, particularly through difficult times. His ideas expand our vision and directed us to prevail in this work.

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Smart IOT Energy Meter with Theft Protection

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Abstract: *:. Energy theft is a common issue in countries like India, where usage of energy is continuously increasing as the population increases. Each year, utilities in the power system lose a significant amount of money because of energy theft. The newly constructed AMR for energy measurements demonstrates the idea and operation of a redesigned automated power metering system, but due to this a rise is seen in theft of electricity and regulatory losses due to irregular period examination at the customer's home. Going door to door with each customer makes it impossible to detect and solve theft. In this study, a redesigned procedure depended on the MICROCONTROLLER ESP8266 is used to find and restrict power theft in electricity metres as well as remotely disconnecting and reconnecting the service to resolve the issue a specific customer's (line) When unauthorised activity is detected, a message is automatically transmitted to the utility central server through the GSM module, and a special message is resend to the microcontroller to terminate the unauthorised supply. To address common losses, errors in readings, and voltage fluctuation complications, a novel process is used by interspersing the GSM characterised into smart metres enable with (SPDT) Single pole double throw relay. Customers will be able to use the prototype to learn about the billing system, collect data from smart metres, store it in a centralised database, and generate reports.*

Keywords: GSM, Power consumption, Billing, Smart Energy Meter

1. INTRODUCTION

The foremost requirements for the continuation of life's contents is electricity. It should be utilised with caution in order to get the most out of it. However, in our country, there are numerous locations where there is an excess of power, while many others do not have access to it. Our distribution practises are also partly to blame, because we are still unable to accurately anticipate our exact requirements, and power theft continues to be a problem. Consumers, on the other hand, are dissatisfied with the services provided by electricity firms. Most of the time, they receive grievances about analytical mistakes in monthly invoices. This allows us to monitor the metre and determine whether or not an issue exists. A circular metal strip rotates in the previous metre, and we calculate the consumption based on that revolution. However, our metre is based on a pulse that is generated based on consumption, and we previously linked an android board to monitor the pulse, and a bill is issued based on the pulse. We hope to obtain monthly electricity usage from distant places straight to a central office with the help of this project. We can reduce the amount of human work required to record electricity usages, which are now collected by visiting door to door.

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2. EXSISTING SYSTEM

construction of a GSM and Arduino based power theft detection and protection:

GSM based power theft design, simulation and theft has been done. It discusses various forms of energy theft including the irresponsibility of the military, billing variabilities prompting decrease of assets by the service organizations has additionally been accomplished as this work forestalls individual contact between the end client and the specialists. With remote observing of meter perusing and sending SMS, at whatever point there are unusual readings, in client's power meter, the created framework can be prepared to assist utilities with lessening the ramifications of family power burglary A programmed electrical switch is frequently incorporated into the unit to somewhat stop power to the facility to the home or to the consumer trying to profit from the theft of electricity. This framework configuration chiefly centers around a solitary stage power appropriation framework. The robotization of the client charging framework has been accomplished in light of the fact that the meter monitors the purchaser's charge on time. This plan accordingly eliminates manual meter perusing with its tedious framework and bill taking care of outcomes which influences the business while adding higher bills to the buyer.It likewise centers around programmed disengagement and availability while charging is low and high, wiping out the additional expense of reconnecting.

Design of an Overload Trip Facility for a Smart Energy Meter:

We began this project with a proposed technique of energy management from the user's perspective, with the goal of educating the user about energy management so that he can manage his load, reduce his bill, and participate in energy conservation. So first, we looked at the many components that are required project and selected a microcontroller that is both cost-effective and meets all of the project's requirements. The ARDUINO UNO is used for this, and it is modified in C involving the Arduino IDE programming as a compiler, which effectively accumulated our code and afterward stacked it onto the microcontroller. Different electronic parts, such as GSM and ACS712, have been interfaced. We tested our hardware by connecting the Arduino on the Veero board to the relays. For each of the three phases, current and voltage are measured, and power is estimated based on how the load is managed When the user's predefined threshold value was exceeded, they received a notification stating "System Overlaod."Each phase uses a distinct method of reclosing: Phase I is reclosed by pressing a button, Phase II is reclosed after a one-minute delay, and Phase III is reclosed by pressing a button. Development of an IoT metering system based on Arduino for on-request energy checking.

This study created an IoT-based smart electric meter and investigated its assimilation process. The study produced a straightforward and usable remedy in the shape of an energy utilization rate remote metre using a Composite Design technique. The architecture was demonstrated to be capable of sensing current, power usage, and handling a customer's cost. The energy utilization and cost are communicated to the cloud server using these measures. Customers will be able to see their consumption rate more easily as a result of this. When compared to [18], the IoT smart meter created met these requirements: measurable, control and adjustment, and correspondence (productive sending and getting of information). capacity to get firmware updates, efficient power management, show and time synchronization These components are necessary for communication between the meter and the electricity supplier's framework. The concept of Request Side Management was successfully implemented in the work. However, the current study does not currently cover ideas for approving the framework particular guide as introduced in [20]. Therefore, future exploration will be completed to research the opportunities for computerized approval of the framework detail as far as necessities for

broadening GSM remote correspondence with WiMax (4G LTE) and optical fibre for significant distance interchanges. Additionally, an open tampering technique will be implemented in the IoT smart meter to screens any form of tampering. lower the load

Theft Detection Prepaid Electricity Meter,

The Prepaid electricity metre with theft detection project was successfully executed and has many applications in families, particularly in rural areas. This technology can be widely deployed due to its inexpensive cost and the fact that it prevents income leakage to already overburdened power boards due to electricity theft. This project's key benefit is its low-cost approach for prepayment metering of electricity usage, which also prevents theft of electricity at the household level. The tamper detection feature prevents any user invasions into the electricity metre in order to change or stop the computation of units consumed.

3. SYSTEM ARCHITECHTURE

Human personnel read power metres and charge customers in the current method, which is done from home to home and building to building. To achieve entire area data gathering and billing, a large number of personnel and a considerable working period are required. Billing by humans is prone to reading errors since the residential electric metre is sometimes positioned in an inaccessible location. The job of labour billing is sometimes limited and hampered by poor environmental conditions. Paper billing has a habit of getting lost in the mail. In developing countries like India, the rising development of residential housing and industrial buildings requires more human laborers and longer working hours to finish the utilization understanding undertaking. These builds the energy provider's working expenses for meter perusing.

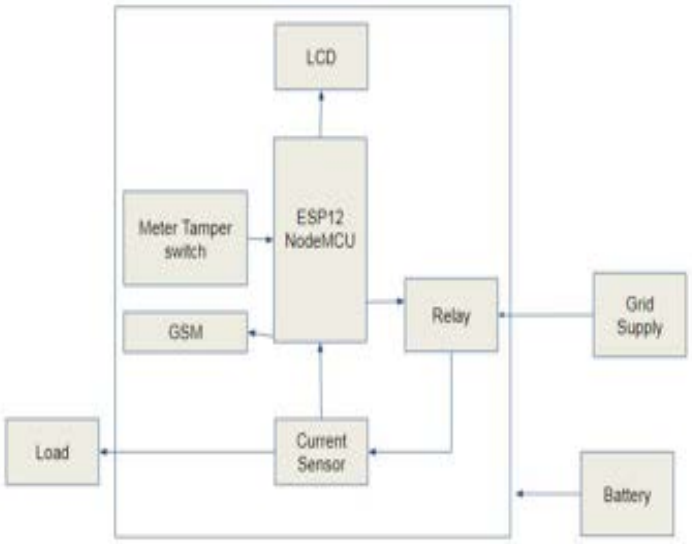


Figure.1. BLOCK Diagram

The energy metre keeps track of how much energy the load uses. There were electromechanical energy metres available in the past, and now there are digital energy metres available. The energy metre is primarily based on the fact that an increasein the amount of current flowing through the circuit spins the disk, which implies that the rotational speed of the plate is relative to how much current coursing through the circuit. In the same way that the power consumption per charge is recorded by the

microcontroller by the flashing frequency of the LED integrated in the meter, the old sort rotating impact of disc type metre causes the stuff component to act correspondingly. The current kind of energy meter likewise had a flickering driven for counting beats are shipped off the microcontroller and these readings are put away in the microcontroller's external memory. The main central processing unit in this project is a nodemcu based on ESP12. This controller is wifi-based, allowing data to be monitored and sent to an IoT cloud server. The grid phase wire passes via the current transformer, which detects the wire current caused by the load and calculates the load and unit KWH. On a daily basis, data on power use is sent to a cloud server. If the metre outer cover is attempted to be opened, the metre tamper switch is activated, and an SMS is sent to the authorised person and grid company that the meter tampering occurred.

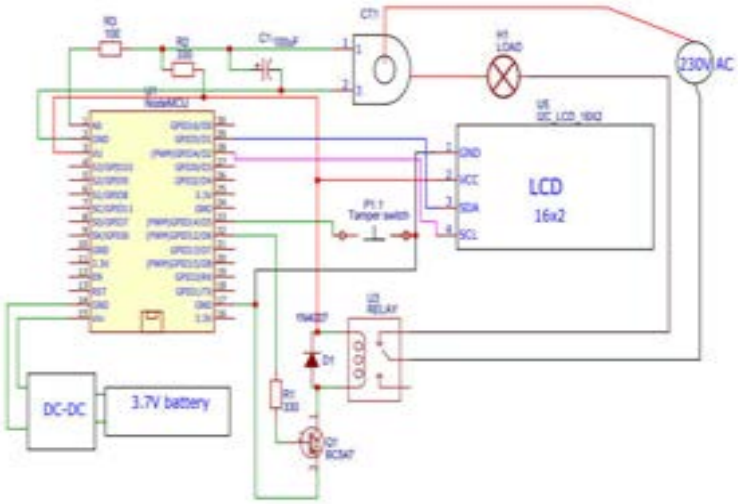


Figure.2. Circuit Diagram

4.REQUIRMENT ANALYSIS

1. **Software Requirement**

- Arduino IDE

2. **Hardware Requirement**

- Arduino
- Node Microcontroller ESP12
- ESP8266
- GSM Module
- CURRENT TRANFORMER
- LCD DISPLAY
- BATTERY

5. COMPONENTS DETAILS

5.1. Arduino:

The boards give digital and analog I/O pins that can be associated with different extension boards (safeguards) and different circuits. The cards include sequential communication interfaces, including Universal Serial Bus (USB) on certain models, and are additionally utilized to load programs from personal computers. Microcontrollers are usually programmed with a vernacular of highlights of the C and C++ programming

dialects.Also the typical compiler toolchains, the Arduino project includes an integrated development environment (IDE) depended on the processing language project.

5.2.Arduino IDE:

The Arduino Integrated Development Environment (IDE) is a cross-platform application written in the Java programming language given by the Arduino project. It was created from the IDE of the programming languages Processing and Wiring. And Insert, find and replace text content, auto indent, bracket matching and syntax highlighting, and compile and import to an Arduino board with one click. Also included are a transmission box, a text content terminal, a button toolbar of not uncommon functionality, and an order of working menus

.Downloading Arduino IDE

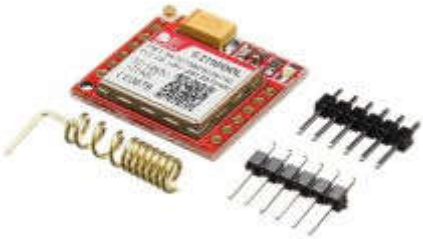
First transfer the Arduino IDE to ensure that you simply have the newest code version (some older versions won't work), access the subsequent URL: https://www.arduino.cc/en/Main/Software.The CH340G may be a low cost serial to USB programming chip and doesn't escort native windows or waterproof drivers. but it's been created terribly simple to install.

transfer and install the drivers through the wemos website: https://www.wemos.cc/product/d1-mini.html

Install driver and search in Device Manager that COM port is detected when connecting NodeMCU

5.3.GSM Modem :

A GSM module is a specific shape of modem that acknowledges a SIM card and capabilities on a cell consumer's membership, just like a telecellsmartphone. A GSM modem seems to a cell operator to be equal as a cell telecellsmartphone. When a GSM modem is associated to a laptop, the laptop can talk over the cell community the use of the GSM modem. While maximum of those GSM modems are used to offer cell net access, a lot of them will likewise be utilized to ship and get hold of SMS and MMS messages. A GSM modem is probably a standalone modem with a serial, USB, or Bluetooth connection, or it may be a cell telecellsmartphone with GSM modem functionality.In this paper, the time period GSM modem is used as a trendy time period to consult a modem that helps many protocols withinside the GSM Evolution family,including2.5Gtechnology.



5.4.NODE Microcontroller ESP12 :

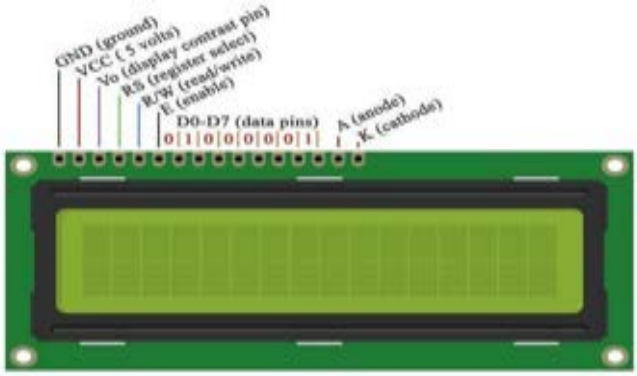
The board we are the use of is called "NodeMCU " and it comes with an ESP8266 module that we are going to programme. It comes pre-mounted with the maximum latest model of Micro Python, in addition to all the drivers we will need. Because the ones forums have been firstly made for a unique software, the D0, D1, D2. numbers imprinted on the board range from what Micro python uses. To figure out which pins belong together, look at the image below. It connects to the computer through a micro-USB port. A resetting button is located on the side of the board. Two rows of pins run down the sides of the board, to which we will connect wires. The following is the meaning of the symbols: 3v3 - This is a fancy way of writing 3.3V, which is the internal voltage of the board. Consider this pin to be the positive side of a battery. The ground is indicated by the letters gnd and G. Consider it the battery's negative side. "gpio" stands for "general purpose input output “Use these pins to send and receive signals to and from the various devices you connect to. They can be used as an output, similar to a switch that your application can link to plus or minus. They can also be used as input, informing your software whether they are attached to the plus or minus side. The analogue pin is labelled a0. It can detect and measure voltage, but only up to 3.3V. This pin is connected to your computer's 5V power supply. It's also useful for a variety of other things.

5.5.ESP8266 :

In the Internet of Things business, the Espress ESP8266EX provides a exceptionally incorporated Wi-Fi SoC answer to satisfy consumers' regular expectancies for green strength utilisation, compact layout, and dependable overall performance.The ESP8266EX can act as a stand-on my own utility or as a slave to the host MCU with complete standalone WiFi networking capabilities. When the utility is hosted with the aid of using the ESP8266EX, it's going to release without delay from flash.The embedded high-velocity cache facilitates enhance device overall performance and reminiscence optimization. ESP8266EX also can be utilized as a Wi-Fi adaptor in some microcontroller structure the usage of SPI/SDIO or UART interfaces. Antenna switches, RF baluns, strength amplifiers, low noise acquire amplifiers, filters, and strength control components are all covered into the ESP8266EX.The small format decreases the scale of the PCB and removes the want for outside circuitry. The small layout shortens PCB length and removes the want for outside hardware. Beside Wi-Fi, the ESP8266EX consists of an progressed model of Tensilica's L106 Diamond collection 32-bit CPU in addition to on-chip SRAM. The GPIOs may be used to attach it to outside detectors and different gadgets . Test code for diverse packages is furnished thru the Software Development Kit (SDK).The Smart Connectivity Platform (ESCP) from Espressif Systems affords superior capability such as:

5.6.*LCD DISPLAY* :

LCD (Liquid Crystal Display) display cover is an digital show elements and discover a extensive variety of implementation. A 16x2 LCD show may be extremely fundamental elements and may be extremely typically utilized in numerous gadgets and circuits. These designes are desired over seven segments and different multiphase LEDs. The motives being: LCDs are practical; without problems programmable; don't have any predicament of showing unique even custom characters (dislike in seven sections), activites, etc.



5.7. Current Transformer:

To connect a CT sensor to an Arduino, the CT sensor's output signal must be conditioned to match the Arduino analogue inputs' input criteria, which are a positive voltage between 0V and the ADC reference voltage. It's is too hard to measure AC current with an Arduino. It's achievable thanks to the Itead TA12-100 current transformer. A voltage current transformer with a 1000:1 ratio is used in the device. A 200 ohm resistor is connected to the output of this transformer. The voltage drop across the resistor is used to compute the AC current. It comes in handy for measuring current at line frequency.

5.8. RELAY:

A relay may be a switch that may be turned on and off by electricity. Electromagnets are unremarkably wont to automatically actuate switches in relays, however different in operation principles appreciate solid-state relays are used. Relays are used once circuits ought to be controlled by discrete low power signals, or at the point when various circuits should be constrained by one signal. Transfers were regularly utilized in telephone trades and early PCs to hold out intelligent cycles. Contactors are a type of transfer that could deal with the unreasonable energy expected to control electric right away powered automobiles and different loads. Solid-country relays use solid-country gadgets to carry out switching operations as opposed to transferring factors to manipulate the circuit. Relays with calibrated running traits and, in a few cases, two or three running curls are utilized to watch electric circuits from over-burdens or disappointments. In current energy frameworks, those abilities are nonetheless carried out with the aid of using virtual gadgets called "safety relays".

Early relays were used as repeaters in long-distance telegraph circuits, continuance signals from one circuit to another.

6. CONCLUSION

The motivation behind this archive is to give an outline of prepaid energy meters which will be used to control the amount of power consumed by consumers to avoid wasting energy. Prepaid energy meters are an inexpensive way to reduce theft of electricity. Users do not have to pay excessive amounts. Instead, they only have to pay what they need. Prepaid energy meters are more reliable and easier to use. In the power business, this prepaid remote energy meter is a godsend. It regulates consumer electricity usage in order to prevent power waste. It contributes to the nation's income by forestalling current stealing and rebuffs deceptive clients. On the opposite hand, the look should meet some specified requirements. the sole concern is that the security and privacy of the info} because it is prone to cybe attacks. However, mistreatment GSM on this specific system has several blessings over antecedently used methods. knowledge transmission is charged at guidelines SMS rates, so fees don't seem to be supported the length of knowledge transmission. Cost-effectiveness of reading. The developed system conjointly provides information on everyday, month to month, and annually consumed energy. consumption. Everyday power utilization subtleties work with clients deal with their power utilization. This created framework is solid and secure because of just supported people will get to the framework. The sole issue is that the security and privacy of knowledge that's prone to cyber attacks. However, using GSM in this system has many advantages over previous methods.Data transmissions are billed at normal SMS rates, so there are no costs based on the duration of the data transmissions. The cheapest indicator. The developed system also provides daily, monthly, and annual power consumption data. Consumers can better adjust their electricity consumption if they have access to information about their daily consumption. It is solid and secure on the grounds that main approved people can get to this planned framework.

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Small Size Digital Oscilloscope Using ARM Processor

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Abstract: ***Oscilloscopes are indispensable tools for anyone designing, manufacturing or repairing electronic equipment. In today's fast-paced world, engineers need the best tools available to solve their measurement challenges quickly and accurately. As the eyes of the engineer, oscilloscopes are the key to meeting today's demanding measurement challenges. There are many types of oscilloscope available in the market. The main types of oscilloscopes are analog oscilloscope, digital oscilloscope and PC based oscilloscope. From which the digital oscilloscope are widely used now a days due there accuracy portability, high speed, high resolution, data storing capability etc. here we provide an alternative solution which is basically a digital oscilloscope with almost all the control options which any standard digital oscilloscope has. This paper describes the development of a portable, very low cost oscilloscope. The user can start/stop the display, adjust the time division and adjust the voltage division. The features of this device make it suitable for implementing as an educational re-source for graduate students from Electrical, Electronics, Instrumentation, and Computer Science faculties.***

Keywords: ARM processors, Oscilloscope, GLCD.

I. INTRODUCTION

Oscilloscope is a measuring device which can show various waveforms & voltages, Frequency, time period, wavelength on screen. Graph show the variation of signal amplitude (Y-axis) with time (X- axis). The oscilloscope accepts voltage signals at its input, but virtually any type of signal (vibration, heartbeat, ECG, speed of objects, sound, light ashes, etc.) can be viewed in an oscilloscope with the use of transducers. Today world is moving towards digitization & now days Advanced RISC Machine (ARM) is the most important building blocks in lots of applications. The digital oscilloscopes takes the input signal and convert it into a digital signal, through an analog-to-digital converter (ADC), which is then analyzed and used to plot an image of the original signal on liquid crystal display (LCD) screen. The digital oscilloscope produces every waveform as a sequence of samples. These samples are then saved until it accumulates enough samples to portray a waveform. The advantage of these types of scopes is that a trace can be store and displayed along-side others for comparison or calibration. Digital oscilloscope can allow you to capture and view events that may happen only once transient event. Thus, digital oscilloscopes are widely used all over the world due to its advantages.

The primary parts are microprocessor and display device. ARM microprocessor is used as a controlling element and this will produce output at very fast speed when compared to microcontrollers. ARM consists of in-build ADC thus there is no need to externally interface it. Graphical Display is used for displaying signals because of its better features. The basic parts of oscilloscopes are probes for sensing signal values, and switches to make device user friendly. Switches are provided for adjusting Voltages, Frequency and its time base. This is a design of oscilloscope for medium range frequencies.

II. SYSTEM OVERVIEW

ARM7 is one of the widely used micro-controller family in embedded system application. LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer.ARM7 has Princeton memory architecture.

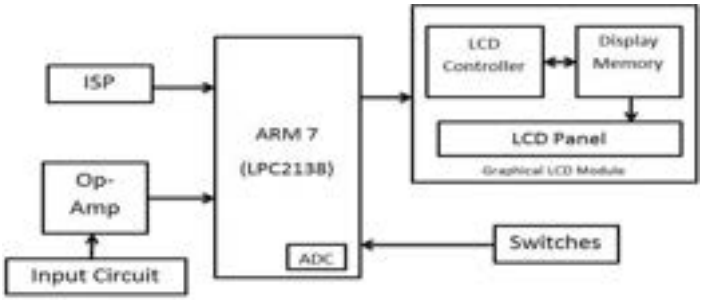

Figure 2.1: Block Diagram

As ARM consists of in-build ADC, there is no need to externally interface it. So the sensed signals from probe are directly send to the microprocessor, where it is converted to its digital value. ARM processor will sit ideal until a new data or digital value is sensed at probes. Then it will pass the data to being displayed on GLCD. At some point of time tuning and altering of waveform is also required, for its proper demonstration. Switches are provided for adjusting voltages, frequency and its time base. The values of voltage and frequency are chosen such that the waveform is displayed in an appropriate manner. Triggering is also an important factor because if its value is not properly set then waveforms will not be shown. This will be a design of auto triggering. In this type of designs user does not have to take care of horizontal and vertical triggering

III.HARDWARE DETAILS

A. LPC2148

ARM LPC2148 is used as a controlling device and graphical display for displaying signals. Probes will be there for testing circuit. The probes will be similar to as used in bigger oscilloscopes. By using ARM it will be an easier task to sense a particular signal and control it. As ARM consists of in-build ADC, there is no need to externally interface it. So the sensed signals from probe are directly send to the microprocessor, where it is converted to its digital value. ARM processor will sit ideal until a new data or digital value is sensed at probes. Then it will pass the data to being displayed on GLCD. At some point of time tuning and altering of waveform is also required, for its proper demonstration. Switches are provided for adjusting voltages, frequency and its time base. The values of voltage and frequency are chosen such that the waveform is displayed in an appropriate manner. Triggering is also an important factor because if its value is not properly set then waveforms will not be shown. This will be a design of auto triggering. In this type of designs user does not have to take care of horizontal and vertical triggering[1].

B. A/D Converter

ARM provides an advantage of in-built ADC. This will minimize the hardware requirements of device. ARM has two in-built analog to digital converter, with the features as 10 bit successive approximation method is used for conversion in ARM7, input multiplexing approximation analog to digital converter and Measurement ranges 0 V to VREF (typically 3 V).

C. Comparator Circuit

In the comparator circuit, input is captured from an external source via BNC connector. This input signal may be AC or DC. Thus, firstly signal is passed through one op-amp to convert an input signal to DC signal and then the next operational amplifier will compare the input DC signal with a predefined voltage. If input signal is weak then it will amplify with respect to Vref, on the other hand if signal carries some sort of noise or errors it is also attenuated by using comparator. The output of comparator circuit is given to ADC0.0 channel. Only a single channel of Analog to digital converter is used because this is a single channel oscilloscope. Thus a single waveform will display at a time.

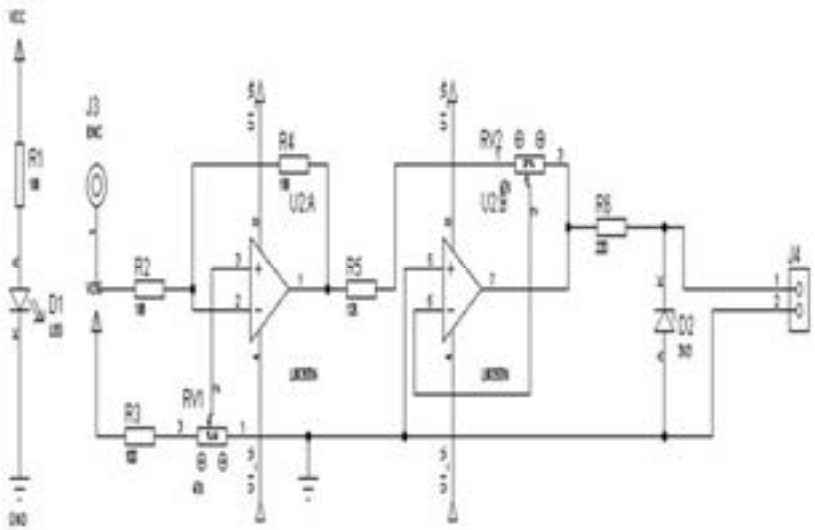

Figure 3.1: Comparator Circuit

D. Display Device

LCDs are used in a wide range of applications including televisions, computer monitors, aircraft cockpit displays,instrument panels, and signage. Graphical Liquid Crystal Displays add versatility to any project.

Figure 3.2: Graphical Liquid Crystal Displays

This GLCD is of 128 x 64 pixel. Graphic displays featured with a low-power LED-backlight. Brightness can be switched off and adjusted infinitely. Consumer devices such as clocks, video players, calculators, gaming devices, watches, and telephones are also some application of LCD. Graphical display devices replaced cathode ray tube (CRT) displays in most applications. Wider range of screen sizes is available for GLCD than CRT and plasma displays, and they do not use phosphors. The LCD screen is more energy efficient and can be disposed of more safely than a CRT.

IV. IMPLEMENTATION

This section describes how voltage and frequency are determined. To determine voltage and frequency, the input wave is sampled first and then further processed.

A. Voltage Determination

The heart of the computer-based data acquisition is usually the analog to digital converter (ADC). Basically this device is a voltmeter. Its input is voltage and its output is a digital number (a collection of 0's and 1's) proportional to the input voltage. The controller is usually programmed to convert this outputted digital number into a number that is represents the measured voltage. The LPC 2148 consists of two 10 bit successive approximation ADC. Consider, for example, ADC designed to measure between 0 and 10 volts and convert this measurement into an 8-bit digital number. Then a 0 volt input is associated with the digital output of 0 (in binary 0000 0000) and a 9.999 volt input is associated with the digital output of 255(in binary 11111111). In general the digital output of the ADC is related to the input voltage by the equation[2]:

$$\text{Digital Output} = \frac{\text{Integer part of } (256 * \text{ Input Voltage})}{10}$$

If the input voltage is 4.78231415 volts then the ADC would produce the number 122 as its output. The computer program would then take this number and relate it with a voltage
using the equation[2]:

$$\text{Voltage Reading} = \frac{\text{Digital Output} * 10}{256}$$

For this example this final conversion yields 4.78. Note that because the input was converted to an 8-bitinteger in the middle of the process, a great deal of potential precision has been lost. For the 8-bit device with a range of 0-10 volt, the smallest change in the output reflects a difference of 0.039 volts (10 Volts/256) on the input. Thus the error caused by the processing of a signal through this ADC would be ±0.02 volts.

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B. Frequency Determination

This section describes the implementation of a single pin measurement of frequencies up to 500 kHz using the Timer 2 counter input pin. The code written implements a frequency acquisition system that can be combined with a voltage measurement via the ADC to track both the frequency and voltage of the input signal. The measurement is displayed on a LCD screen. Since frequency is the number of cycles of a given waveform recorded over 1 second, both the number of cycles and the time taken for that number of cycles have to be measured. By measuring the number of cycles over 1 second, the frequency of the waveform is determined. In order to measure the number of cycles, a record of the number of times a 1-to-0 transition occurs on the waveform should be maintained. This is done using the Timer 2 counter input pin, which increments the Timer 2 registers on a 1-to-0 transition. There are two ways to measure a second. The first involves setting up Timer 0 with reload values such that it overflows when 10 ms has elapsed. By counting 100 of these overflows, a 1 second interval can be measured.

V. FLOWCHART

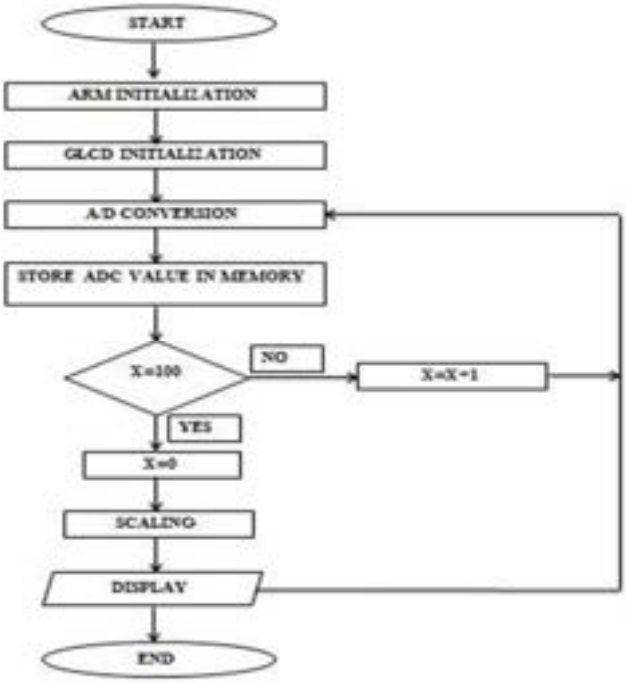

Figure 5.1: Flowchart

After the display of welcome screen, program will be at pause state until a "start" button is pressed. Whenever a new digital value appear at Analog to Digital Converter after real time sampling of input signal, that particular digital value is displayed on Graphical Display as a form of pixels. Graphical Display is of 128 x 64 pixels, In this 100 pixels are used for displaying signal and remaining 28 pixels for displaying digital values of voltage, frequency. This process will continue until device is in switch on mode.

VI. RESULT

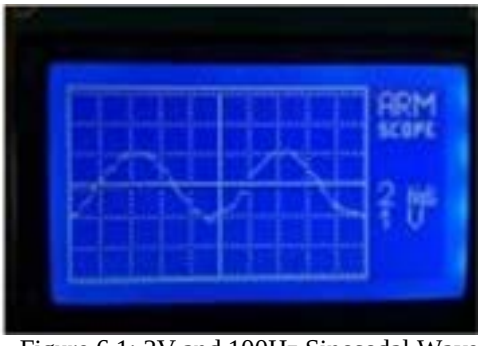

Figure 6.1: 2V and 100Hz Sinosodal Wave

Figure 6.2: 3V and 1KHz Square Wave

Figure 6.3: 2V and 1KHz Triangular Wave

VII. CONCLUSION

The usefulness of an oscilloscope is not limited to the world of electronics. The oscilloscope is low cost and avoid of the complexity use in the development of conventional scopes. It produces comparative results. It is a choice for all non-critical work that goes on every day in the laboratory and in out-of-lab measurements due to its portability. Initially the ARM Oscilloscope was tested feeding the signals from function generator. Provided facility for having different sampling rate and variable voltage divisions. The kind of input waveform, like sine wave, triangular wave, square wave or any other function can be continuously changed and tested in this oscilloscope.

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IoT Based Remote Health Monitoring System with Electrocardiograph

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Abstract: *In recent years, especially in the context of covid health care development, we have seen that a less amount of medical facility gotten to a patient. To track a few individual data athome like temperature, pulse rate and heart beats of the patients and inform the doctors in case of any patient emergency. To track this data doctor needs a platform to see that data like temperature of patient's body, what's the heart rate of patient for this we are using Thing speak server using this doctor can see the condition of patient. This platform where users can display records in real-time basis. In this paper we discussed health monitoring frameworks that allows patients to be supervised without the need to consult a physician who can be using with market sensors. This module provides the necessary opportunity for a day-to-day paramedic company that canbe recorded by a doctor and can receive a notice anyway in an emergency. This field position is most commonly used while the patient is under normal examination or under long-term home care. To measure heart rate usually use a heartbeat sensor but this system will use an AD8232 sensor that will display a patient's Electrocardiograph using the IoT system. Our project proposes a flexible health monitoring system with Electrocardiograph modifications.*

Keywords: Arduino, Electrocardiogram, Pulse Rate, Blood Pressure, Temperature, Stress, IOT Monitoring System.

I. INTRODUCTION

The growing network of IoT connected devices is growing every day. Most of these technologies are used to improve the efficiencyof health care. In this paper we present the various situations in which the health care system finds it useful for physicians and patients. The health care system is most effective during road accidents, when the affected person can be monitored up to the hospital. patients who haveto monitor for a long time which causes the nurse to call and may use a Health Monitoring System. This study helps patients who live in remote areas who do not have access to health facilities.

greater intently in India, each day many of the peoples are concerned by coronary heart diseases, and mostly because of the patients did no longer get timely and right assist. The present-day document of The India Spend analysis of information says that the 50-60 thousand doctors' scarcity in India.

Medical care is given more significance nowadays in almost every country considering the effect of Covid. With respect to that the most appropriate approach toward health monitoring is an IoT- based health monitoring system. Internet of Things is a new and advanced approach that is growing at a rapid rate in clinical consideration. By using the wearable sensors and the reports available at our fingertips by mobile phones, the popularity of IoT is based health monitoring is increasing at a much higher speed.

IoT-based health monitoring helps in reducing the spread of illness and provides better guidance about our health even if the expert or doctor is sitting at a far distance. Here in this paper, we have proposed a flexible health monitoring system that can continuously screen the patient's temperature, pulse, and various limits. This dataof the user can be stored and checked on a web server platform named "Thingspeak". This monitoring system using IoT helps to store data and sent continuous information about users' health to doctors, relatives, and friends from a distance, which helps to track regular health and avoid future uncertainty.

One additional part of our model is the real-time monitoring of ECG. This helps to continuously monitor the patient's heart rhythm.

II. METHODOLOGY

The temperature, blood pressure, heartbeat, and values are sensed by the sensor and the sensor values are sent to the microcontroller for further processing and storing. Whenever the microcontroller encounters the abnormal value of any parameter, it alerts the person by sending an SMS to the mobile using the Wi-Fi module, Also, these values are sent to the thing speak server.

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2.1 Remote Health monitoring system using Electrocardiograph

Healthcare applications are more significant among the application inIoT that is being worked on within the world. IoT has been extensively used to interconnect the significant level clinical resources and to offer quick and convincing clinical consideration organizations to people. The undeniable level sensors can be either worn or embedded into the body of the patients, to screen their prosperity persistently. The information accumulated in such a manner can be dissected, added up to, and mined to do the early forecast of sicknesses.

Every possible research is going on in the field of the Internet of medical things, in this we are developing a health monitoring system with ESP8266, LM35, Think speak, and Arduino Uno which will beintegrated with the Electric wheelchair for the continuous health monitoring of the patient on E-Wheelchair, which makes this project intelligent.

In this model, we are using Arduino UNO to integrate all the sensorslike LM35, pulse sensor, ECG sensor, Stress sensor, etc. For monitoring the patient's health condition. Like temperature, heart rhythm, pulse rate, etc. The Remote health monitoring framework block diagram is displayed in fig. Below.

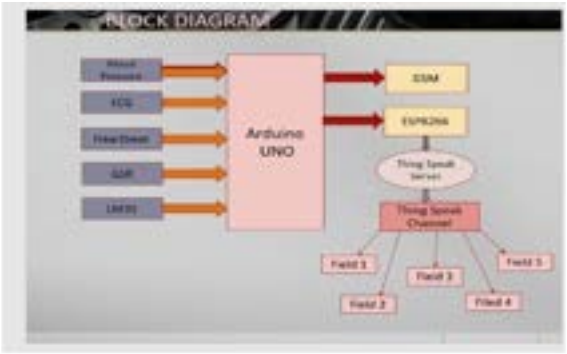

Fig.: Remote Health monitoring system using Electrocardiograph

The LM35 temperature sensor is utilized to measure the body temperature of the patient. The patient's body temperature information from this sensor is sent to Arduino UNO Microcontroller. The GSM SIM900A module is utilized to send ready messages to the predefined cell phone. The LCD is likewise associated with Arduino for showing data received from the various sensors.

2.2 Components Required for Hardware

The Components required for hardware design are given as follows:

A. Arduino Uno

Fig. Arduino

Arduino is in a generally an open-source stage used for building electronic adventures (Fig.). UNO is the most well-known board used. It works on 5v inventory at 16 MHz clock speed and the processor is ATMega 32. Arduino IDE is an item used to type the code and move it onto the heap up.

B. Arduino IDE

Arduino board can be controlled in two distinct ways. One, using the USB connection from the PC, and two, from the AC mains using the power barrel jack. The board has a voltage regulator for giving offset DC voltages tall parts. It has a valuable stone oscillator to give the 16MHz clock repeat, a reset catch to reset the structure, a 3.3V, a 5V yield supply pins, and a ground pin.

Arduino UNO has six basic pins for exchanging data from straightforward sensors also, to change over it to modernized structure for transparency of the microcontroller. It has 14 computerized I/O sticks of which 6 are PWM age pins furthermore, and 1 is a UART pin. Arduino UNO board also includes the Tx and Rx LEDs and power LEDs. It gives a norm structure factor that breaks the components of the more limited size regulator into a progressively accessible pack.

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C. 16 x2 LCD (Liquid Crystal Display)

Fig. LCD display

A liquid crystal display (Fig. 12) is a type of flat panel display used as screens in screens, phones, projects, and so on. It is a combination of two states of issue, solid and liquid. LCD uses liquid pearl to show an undeniable picture. An LCD contains setting enlightenment which gives light to the pixels. It has red, blue, and green subpixels which can be turned on or off using pixels. The display appears dark when all of the pixels and subpixels get off and it appears to be white when all the sub-pixels are turned on

D. Temperature Sensor

The temperature sensor (LM35) is an analog signal. The temperature sensor is used to measure the body temperature of the patient's body. The LM35 works with variations in temperature. The internal structure of LM35 consists of transistors, amplifiers and few resistors. It has 3pins. The output of LM35 is in volts. Every 10 mv change is equal to 1 degree Celsius. Equation to convert voltage into degree Celsius is [(Supply Voltage * 1000/1024)/10] =0.4882.

Fig. Temperature Sensor

E. Pulse Sensor

The pulse sensor is also called the heartbeat sensor. The beat LED flashes synchronously with every heartbeat whenit is working. To measure the BPM rate the digital output pin is connected to the microcontroller to get the desired results. It follows the working principle of light modulationby considering the flow of blood through the finger at every pulse.

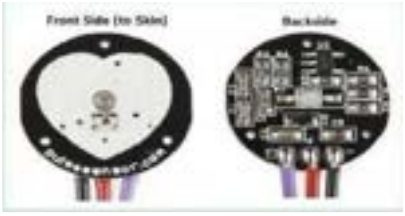

Fig. Pulse Sensor

F. Wi-Fi Module ESP8266

The ESP8266 is not too costly and very easy to understand to provide access to the Internet. This module works both as a station and as an Access point. It should be operated within the given voltage limit which is3.3V, and any voltage above 3.7V would damage or burn this module.

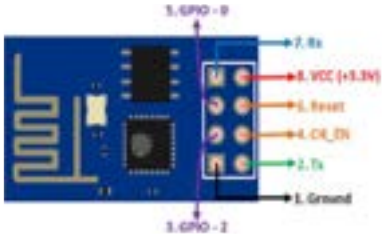

Fig. Wi-Fi Module ESP8266

G. Blood Pressure Sensor

Blood pressure sensor measures and displays the values of the Blood Pressure & Pulse rate, and it will send the measured values to other devices through serial communication. The display shows the readings of Systolic, Diastolic, and Pulse rates respectively. It resembles a wristwatch that eliminates the pumping procedure.

Fig. Blood Pressure Sensor

Specifications of the Blood Pressure Sensor. It operates at 5v, 200ma voltage regulated and each reading consists of IS bytes at 9000 baud rates. The output reading is an S-bit value in ASCH format with fixed digits fi-om 000 to 255.

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H. GSM (Global System for Mobile Communication)

Digital mobile technology such as GSM (Global Telecommunications System) is used to transfer mobile data and voice services. The GSM module is a chip or vice versa, a circuit used to build a system between a mobile phone or a registration machine and a GPRS or GSM system. Currently, GSM technology supports more than one billion mobile subscribers worldwide in the above 210 countries. This technology provides voice and data services from the most important to the most complex. This is a general overview of GSM technology.

Fig. GSM (Global System for Mobile Communication)

I. AD8232 ECG Sensor

Heart disease has become a major problem in the last few years and many people are dying from these complications. So, we are launching this project. The AD8232 sensor operates at an input voltage of 3.3 to 5 volts. The output voltage of the AD8232 sensor is 0 to 3.3 volt. Electrocardiography is a technology that measures the electrical activity produced by the heart. Electrical changes can range from hundreds of micro volts to one millivolt. These changes can be applied to electrodes attached to the skin. re-recording the voltage conversion in a short time gives us a structural voltage. Over time this plot is often called an electrocardiogram to help diagnose various heart conditions

Fig. AD8232 ECG Sensor

J. GSR Sensor

GSR Sensor stands for Galvanic Skin Response and is a method for measuring the electrical conductivity of the skin. It can be used to reflect human emotional activity. In the event of emotional stress or strong facial expressions, sympathetic activity increases and promotes sweat gland secretion, which increases the electrical conductivity of the skin. GSR allows us to detect such strong emotions simply by placing two electrodes on two fingers of one hand. It's an interesting tool to create projects related to emotions, such as B. Sleep quality monitors. Some galvanic skin response devices, such as B. lie detectors, this scientific principle also applies.

Fig. GSR Sensor

K. Thingspeak Server

Thingspeak server is an IoT Cloud Platform that lets us collect and store sensor data in the cloud and develop internet of things applications. Thingspeak is a free online data aggregation platform. Generally, Thingspeak is used to collect data from sensors. Thingspeak provides instant visualization of the data. It is a very popular for people who experimenting in IoT. Using Thingspeak we can create various fields, like measuring for temperature, Heartrate, pulse rate etc. Various sensor data we can able to see on thingspeak in the form of visuals. This data anyone can see on remote place using username and password

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III. RESULT

The IoT-based Remote Health Monitoring System with Electrocardiograph accomplishes a proficient and simple. The following fields show the various parameters of the patient body on the ThingSpeak server. Which was measured through various sensors. Like body temperature, pulse rate, etc.

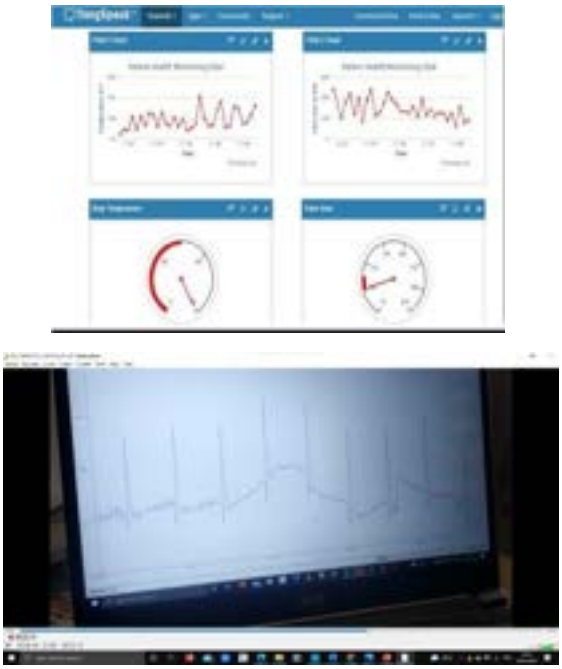

Fig. ECG Graph output.

IV. CONCLUSION

The IoT-based Remote Health Monitoring System with Electrocardiograph was designed and developed using Arduino. The program is effective and accurate. It detects all parameters using a variety of sensors such as heart rate, heart rate, blood pressure (BP), body temperature, ECG, and Depression. Based on the numbers of these sensors, the condition of the patients is calculated, and the information is transmitted using the IoT to the affected person's cell phone to take the necessary action. The improved model is more flexible and consumes less power. It is very useful in medical camps. From the project designed above, we can conclude that we are able to transfer audio data from remote patients toa physician's PC using wireless transmission technology. This can be of great help in the medical field and helps physicians to keep a close eye on the patient's health.

FUTURE SCOPE

We all know that the future scope of monitoring patient health through internet connectivity is emerging day by day as it helps in camps like medical teams in rescue camps in times of disaster. Unable to get bigger or bigger. Or as a large machine, this portable kit will be useful. Bioelectronics is entering the field of electronics or engineering as well as medical science.

ACKNOWLEDGMENT

We might want to make a move to communicate our genuine thanks to our guide Pro. V. M. Umale for his regarded direction and consolation, particularly through difficult times. His ideas expand our vision and directed us to prevail in this work.

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DESIGN AND DEVELOPMENT OF WAREHOUSE MANAGEMENT SYSTEM FOR PREVENTION FROM HAZARDS

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Abstract - Warehouse Management Systems (WMS) are complex software systems used by distribution organizations. This WMS was created to aid users in improving the efficiency of tracking all warehouse metrics. The warehouse environment characteristics have a significant impact on the warehousing time and quality of the fruits. As a result, multiparameter monitoring and analysis of the parameters collected, as well as regulation and management, are critical in the fruit storage environment. This study now includes preservation strategies as well as a Wi-Fi Mesh Network-based multi-parameter monitoring system. It also builds the hardware structure of the system monitoring node, describes the operation of numerous interfaces and sensors, and evaluates the structure of the fruits warehousing monitoring system. This system can detect characteristics such as item motion, maintaining the proper temperature and humidity range for fruit preservation, and identifying dangerous gases and their concentrations.

Keywords - Internet of Things(IOT),Warehouse Management System (WMS),World Health Organization (WHO).

I. INTRODUCTION

The warehouse's primary function is to store things in one location before transferring them to company customers. The entire distribution process is made up of several smaller steps that must be closely managed. As a result, software systems known as WMS have been developed. By enhancing the entire working process and offering helpful business analysis, a well-implemented WMS can save distribution/manufacturing organizations a significant amount of money. Food has always been an important aspect of the survival of living species such as animals and humans. Every human being has a basic requirement for wholesome nourishment, which should include decent nutritional meals that keeps people healthy and energetic. Humans can consume a variety of foods, including vegetables, fruits, meat, and pulses, and the quality of these foods varies. Quality is the most important component in the food industry since the greater the food quality, the better the industry's prospects of success in a competitive market [1], and demand rises automatically as customer awareness rises. As a result, the expectations are high. As a result, the requirement to monitor food quality has increased [2]. According to a survey published in the United States, the annual cost of food-related sickness treatment is estimated to be between $50 and $80 billion USD. According to World Health Organization figures, India's yearly expenditure will be over $15 billion in 2019 and around $28 billion (Rs 1,78,100 crore) in 2020. (WHO). It was discovered that one out of every ten people becomes unwell as a result of consuming poor-quality food; as a result, the globe loses roughly 33 million people. - It explains why we must concentrate on food quality, which begins at the very beginning, namely, where food is manufactured and stored (food safety and food warehousing) [4]. In some food businesses, professional food inspectors manually inspect food quality, which is tedious and time-consuming, needs a lot of human work, and is expensive [5]. In various situations, it has been discovered that a food inspector becomes unwell when inspecting food due to poor quality (worsening of food), terrible odour, or tasting the food [6]. Professional food inspectors manually inspect food quality in some food enterprises, which is tedious and time-consuming, requires a lot of human work, and is costly [5]. It has been established that a food inspector becomes ill while checking food owing to poor quality (worsening of food), foul odour, or tasting the food in various scenarios [6]. Because these businesses have various warehouse sizes, and even some small vendors have large warehouses to store their products, manually monitoring food safety is a significant burden for both industry (in terms of money) and food inspectors (in terms of their health) [7]. As a result, we must devise strategies to reduce the risk of health problems while also ensuring the safety of food and food warehouses. There are numerous issues that affect the food storage system, including food quality maintenance, intruder attacks, food rotting owing to odour issues, changes in environmental parameters, and the propagation of hazardous gases throughout the system, all of which contribute to food rotting. As a result, we can create a system that will assist in maintaining food quality.

We have considered numerous parameters in this system that are required for enhancing food storage systems, such as gas leakage, and it will detect various gases such as LPG, smoke, butane, and so on. After identifying a gas leak, it will begin the process of attempting to neutralize the harmful gases.

Similarly, it will measure the temperature and humidity before displaying it on the serial monitor screen for temperature and humidity maintenance. surpasses that limit, it will immediately activate its cooling system to return the temperature to its normal state. For intruder detection, it will first detect the presence of an obstacle or an intruder, after which it will display an alert message on the system, which will not only alert but also provide the particular range of that obstacle.

II. SYSTEM ARCHITECTURE

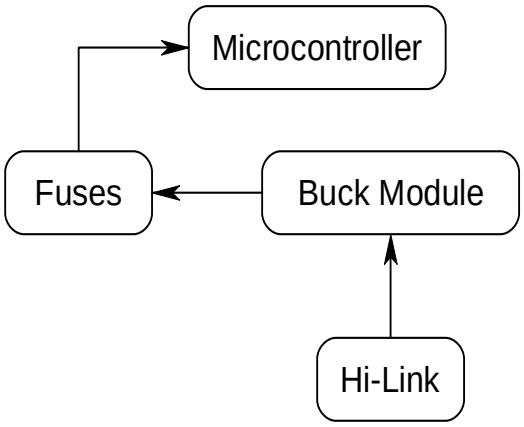

Fig.1 Power Supply Structure

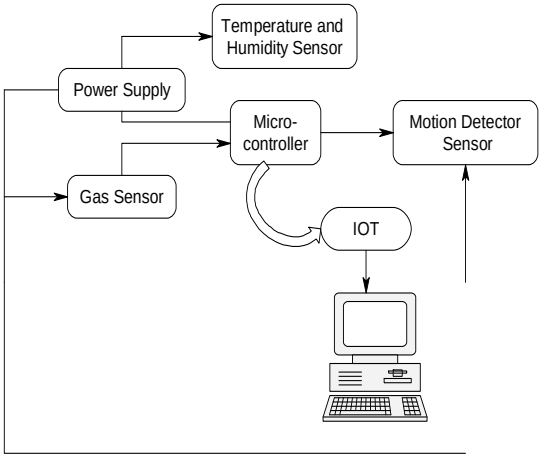

Fig.2 System Architecture of WMS

We used a Hi-link 10W-5V power supply, a Buck converter to convert a lithium ion battery to 4.2V from a 5V USB source, and fuses to limit the current parameters. As illustrated in Fig. 1, we have connected all of these modules to the ESP8266.The complete link between the functional components of the project setup is depicted in Figure 1. Each component receives a controlled power supply that allows them to communicate with one another. The model mainly consists of ESP8266 microcontroller which is the heart of the system. The IOT functioning of the system is well managed by the low-cost, highly efficient Wi-Fi module ESP826601.

There are 3 sensors viz., temperature sensor, Humidity sensor (DHT11), Gas sensor (MQ2) and Motion detector sensor (RCWL-0516) which are all connected to the micro controller through which they send the physical parameter values to the server to the help of Wi-Fi module.

III. IMPLEMENTATION OF SYSTEM

The model starts its workflow beginning with the boot setup of the code sample overloaded into the Node MCU ESP8266 microcontroller. We've connected a gas sensor, a temperature sensor, a humidity sensor, and a radar sensor to this system as shown in fig.6. All of the sensors are connected to the NODEMCU board via Wi-Fi mesh networking so that they may converse and relay data to one another. All of the sensors, such as the gas sensor (MQ-2) will detect external gases such as H2,LPG,CH4,alcohol,smoke or propane in the environment, as well as the DHT-11 sensor, which will monitor temperature and humidity, and the radar sensor, which will detect the range of motion of an object.

When sensors detect changes in these parameters throughout the system, the microcontroller detects the changes and sends the data to the server. The receiver will receive the data from the transmitter and measure various parameters such as gas detection, object detection, temperature and humidity changes, and show them on the serial monitor screen. We set a specific limit for all of these sensors after monitoring all of these data, so that it can take specific action to remedy an issue.

We have put up a cooling system to complete a temperature and humidity loop, so that if a temperature surpasses a specific amount, it will automatically turn on its cooling system, which will normalise its temperature value. To prevent the transformer from overheating and control a fan, we employed a temperature control relay to keep the ambient temperature at a predetermined level. In the case of a gas leak, it will try to neutralise any dangerous compounds present after detecting them.
The WMS implementation is presented in Fig. 3, in which all of the necessary sensors and power units are grouped together to produce a given result. We have only built a prototype of WMS, but in order to design a better solution, we can replace all of these sensors with specialized ranging sensors.

Fig.3 Implementation of System

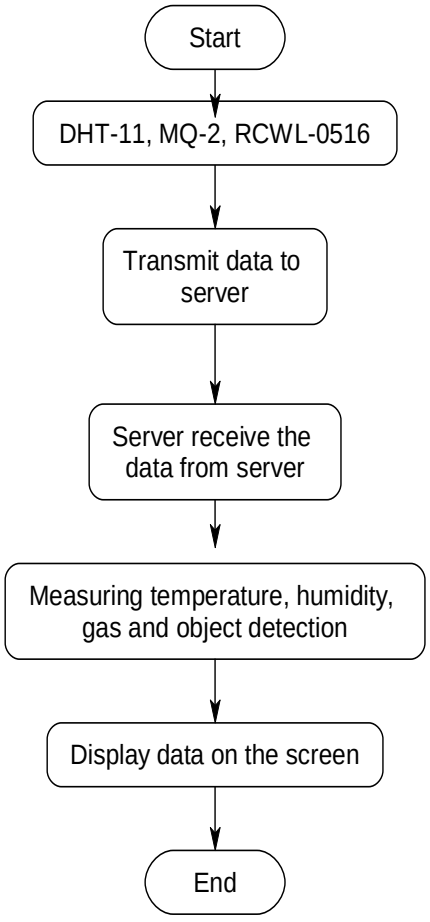

Fig.4 System flow chart for warehousing

The sensor data is now uploaded to the ThingSpeak.com. IOT website, which maintains track of changes in the ware house's atmospheric characteristics. The values sensed by the sensor are displayed on the monitor screen. In addition, the uploading process takes 15 seconds. This is due to a 10 second wait for the controller to process the data value, and another 5 seconds for the ThingSpeak.com website to handle the incoming data. The data that has been processed can now be used for statistical or visual analysis.

IV. RESULT

A. Graphical representation of Radar Sensor

The radar sensor's output is as follows: it determines the particular range of an intruder after detecting its presence surrounding the system. The output is in the form of a switch, with '1' indicating motion detection and '0' indicating no motion detection. First, as shown in Fig.5, the data in the following graph is in a normal state. The graph has steadily increased after analyzing some motion, and the threshold point when motion is recognized is named "Motion Detected." If motion is detected, the radar meterwill display a green signal, as shown in Fig. 6, whereas if no motion is detected, it will display a red signal.

Fig.5 Radar Sensor Data

Fig.6 Radar Sensor output

B. Graphical representation of Temperature & Humidity Sensor

The outcome of the temperature and humidity measurement is presented below, and it has supplied a specific temperature and humidity value. In Figure 7, you can see a graphical representation of temperature monitoring. We can see that the temperature is consistent at specific moments throughout the experiment. We set a temperature limit, such as 40 degrees Celsius, and if the temperature data exceeds the limit, it is referred to as "peak value." On the temperature meter illustrated in Fig.8, the temperature values will be displayed. Now, in Fig.9, the humidity is high at various spots at first, but after some time has passed since detection, it has gradually decreased, and the point where it has

declined is referred to as "Humidity Decline" point. As indicated in Fig.10, the corresponding readings will be displayed on the humidity meter.

Fig.7 Temperature Data

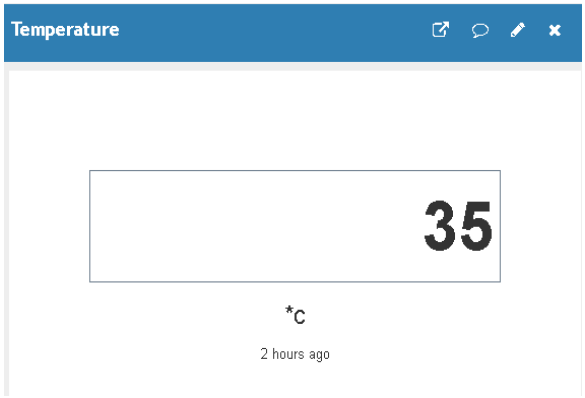

Fig.8 Temperature Meter

Fig.9 Humidity Data

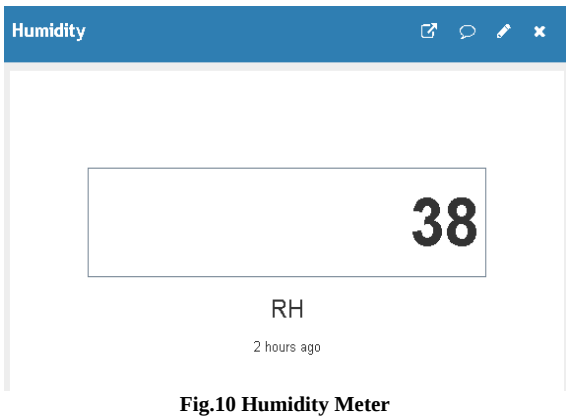

Fig.10 Humidity Meter

C. Graphical representation of Gas Sensor

It has also given a concentration of a certain gas after detecting its existence for gas detection. The graphical depiction of a gas sensor is shown in Fig.11; after detecting the concentration of gases, if the concentration reaches a high point, it is referred to as " peak value ". Fig.12 depicts a gas level indicator that provides a value, in this case it is 51.9 PPM.

Fig.11 Gas Sensor Data

Fig.12 Gas Sensor Meter

V. CONCLUSION

The Internet of Things system was built on the NODEMCU, high-performance, low-power, low-cost computational platform that is integrated with the ESP8266 Wi-Fi module. In this IoT network, the 'things' were both input and output devices. One DHT-11 sensor was used to detect zonal temperature and humidity data, while another sensor, the MQ2, and the RCWL-0516, were used to measure CO, identify light intensity, and track the motion of objects. Levels of concentration in a specific location. The Wi-Fi credentials entered in each source code were the same for all nodes, despite the fact that each node had a different source code.

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Student Performance Evaluation System Web Application

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Abstract: *Managing the result sheets using traditional approach is a cumbersome process. The person must maintain the result records in registers and files using pen and paper. The problem with this approach is, it requires lot of paperwork which is the part of our non-renewable natural resources. We are in the age, where we must think about sustainable development. The manual method of students' academic result processing was found to be tedious, especially when carried out for many students, this makes the entire process time-consuming and error prone. Managing the results using mobile phones, provide an alternative way in this direction. The aim of the project is to provide the evaluation result to the student in a simple and accurate way. The application will provide summary report regarding students' performance report and semester wise marks list. The whole result analyzer will be under the control of the local and global evaluator, and they will have full privileges to read, write and execute the result. The system presents a single platform that will be used to manage the processing of all examination records within the institution. It gives the privileges to the Teacher and students to access the result and the student can also download his result. The web application will be designed using HTML, CSS, JavaScript & developed using visual Studio code. For Front End of this web application, we use Bootstrap is a free and open-source CSS framework directed at responsive, front-end web development. It contains CSS- and JavaScript-based design templates & the backend of application we used PHP & MYSQL.*

Keywords: Performance Evaluation, Web Application.

I. INTRODUCTION

Nowadays most of the education system practice online learning mechanism rather than using the traditional teacher centered teaching mechanism to enhance the learning ability of the students by making a student-centered learning mechanism. The teachers must evaluate the student's performance.

Student performance evaluation system is a web-based application that mainly focuses on providing the evaluation to the student. The student gets their respective evaluation report of that semester. The student can access their evaluation through a web application is more convenient and the faculty can easily analyze the performance of student. The system is divided into three modules- Student, Faculty and Administrator. The student using his login credentials view his report similarly faculty using their login credentials evaluate students respectively. The administrator can add new users in faculty and student sections, it can also add new subjects, classes as per the sessions. The admin is provided with the privileges to modify the student and faculty information by updating their details in web application.

The update of any current session or previous one is done by the administrator. Information about the grades obtained in various semesters. Information regarding evaluation of each semester of a student. Visualization of evaluation report that conveys the overall student's performances in a particular subject. The main objective of this system is to provide the student a convenient and simpler way to check their results and for evaluating the semester results available. It assists the faculty and student to analysis his/her and the whole class performance in a subject. The application is reduced as much as possible to avoid errors while entering the data. It also provides error message while entering invalid data. No formal knowledge is needed for the user to use this system. Thus, by this all it provides it is user-friendly. Student performance evaluation system, as described above, can lead to error free, secure, reliable, and fast networking system. It can assist the user to concentrate on their other activities rather to concentrate on the record keeping. Thus, it will help organization in better utilization of resources.

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II. EXISTING SYSTEM

In the existing system the evaluation is done by manual process where faculties can give evaluation about the students by using paper and pen. But by our process, faculty can give evaluation through online system without wasting their time. In the manual system after when the feedback is given by all the faculties and the overall grade for each subject and each student is calculated. After that all those grade reports given by the faculties are checked by the University Authority. Hence the performance of students is estimated, and counseling of the students can be done. So, the existing system requires more time to do a piece of work, for this reason the online system evaluation is implemented. This is the major limitation of the existing system for giving evaluation about the students and viewing report of the students.

Design of Student Performance Evaluation System:

Collaboration is a society of classes, interfaces, and other elements that work together to provide some cooperative behavior that's bigger than the sum of all its parts. Collaboration is also the specification of how an element, such as a classifier or an operation, is realized by a set of classifiers and associations playing specific roles used in a specific way.

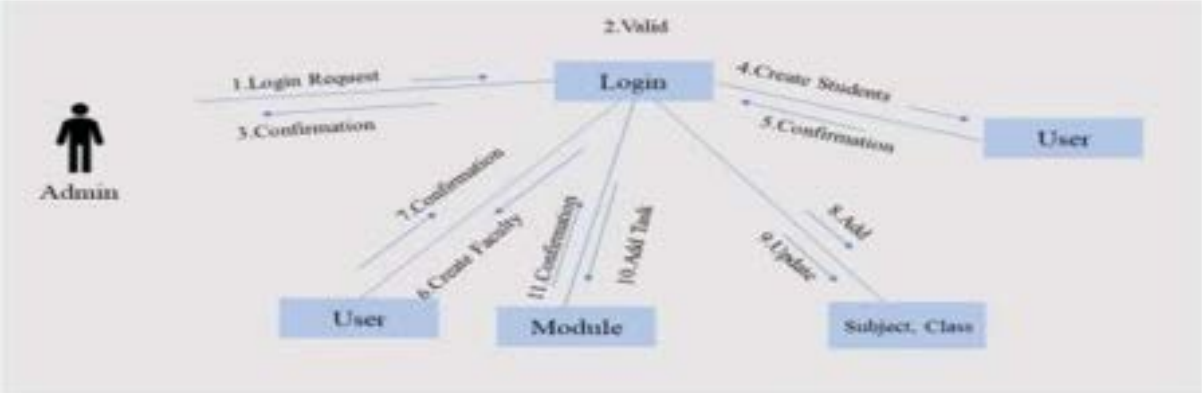

Figure.1. Admin Collaboration

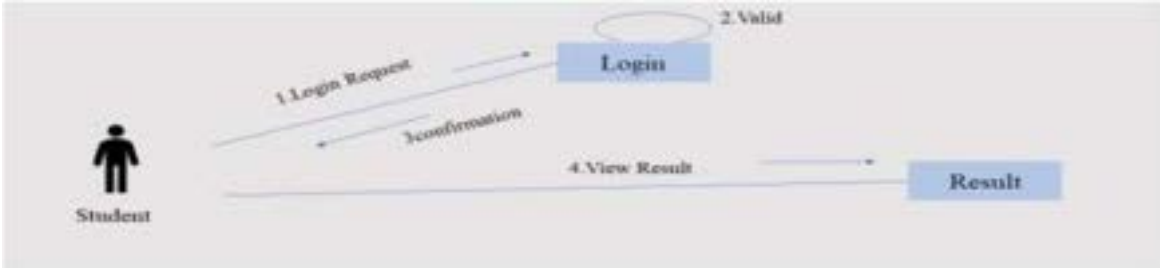

Figure.2. Student Collaboration

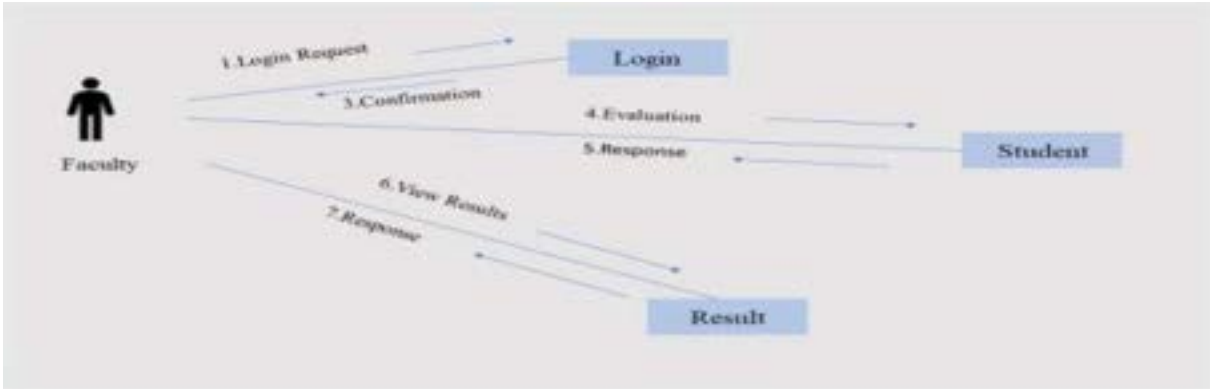

Figure.3. Faculty Collaboration

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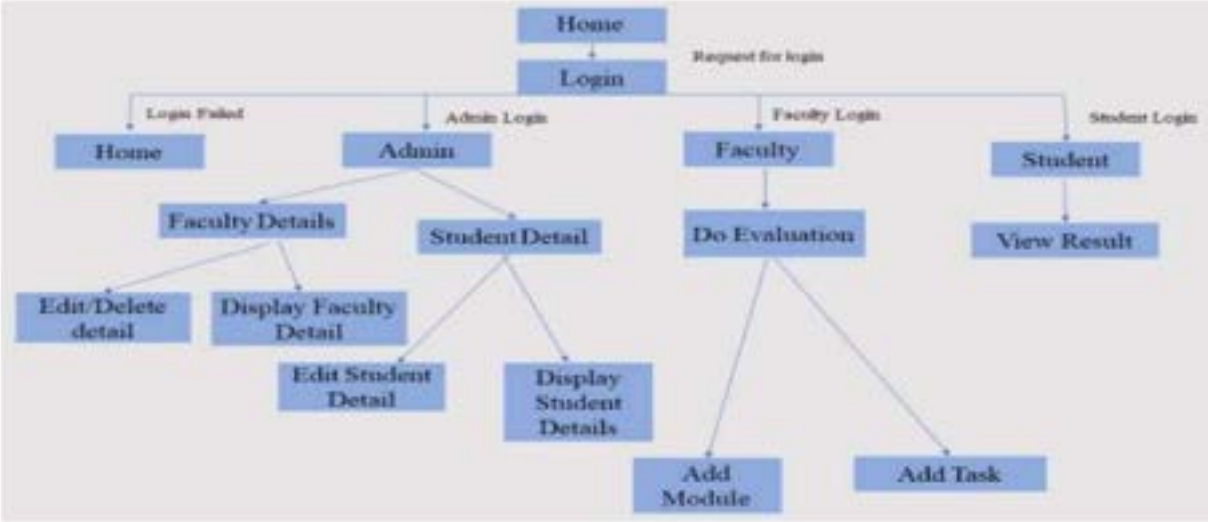

Figure.4. Project flow

III. REQUIREMENT ANALYSIS

Software Requirement

- Operating System: Window 10
- Front-end: HTML, CSS, JavaScript
- Database: MYSQL
- Back-end:PHP

Hardware Specifications

- Processor: Core i3,1.5MHz
- RAM:2GB
- Hard Disk:150G

VI. TECHNOLOGY DESCRIPTION

A. HTML:

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. Web browsers receive HTML documents from a web server or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document. HTML FORMS

HTML Forms are required when you want to collect some data from the site visitor. For example, during user registration you would like to collect information such as name, email address, credit card, etc. A form will take input from the site visitor and then will post it to a back-end application such as CGI, ASP Script or PHP script etc. The back-end application will perform required processing on the passed data based on defined business logic inside the application.

B.CSS (Cascading Style Sheet)

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language. Although most often used to set the visual style of web pages and user interfaces written in HTML and XHTML, the language can be applied to any XML document, including plain XML, SVG and XUL, and is applicable to rendering in speech, or on other media. Along with HTML and JavaScript, CSS is a cornerstone technology used by most websites to create visually engaging webpages, user interfaces for web applications, and user

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interfaces for many mobile applications.

C. JavaScript:

JavaScript often abbreviated as JS, is a high level, interpreted programming language. It is a language which is also characterized as dynamic, weakly typed, prototype-based and multiparadigm. Alongside HTML and CSS, JavaScript is one of the three core technologies of World Wide Web content engineering. It is used to make dynamic web pages interactive and provide online programs, including video games. The majority of website seem play it, and all modern web browsers support it without the need for plug-ins by means of a built-in JavaScript engine. Each of the many JavaScript engines represent a different implementation of JavaScript, all based on the ECMA Script specification, with some engines not supporting the spec fully, and with many engines supporting additional features beyond ECMA.

D. Hypertext Preprocessor (PHP)

PHP started out as a small open-source project that evolved as more and more people found out how useful it was. Rasmus Lerdorf unleashed the first version of PHP way back in 1994.PHP is a recursive acronym for " PHP: Hypertext Preprocessor " PHP is a server-side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. It is integrated with several popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server. PHP performs system functions, i.e., from files on a system it can create, open, read, write, and close them.PHP can handle forms, i.e., gather data from files, save data to a file, through email you can send data, return data to the user. You add, delete, modify elements within your database through PHP.

E. MYSQL:

MySQL is an open-source relational database management system (RDBMS) based on Structured Query Language (SQL). MySQL is a popular choice of database for use in web applications and is a central component of the widely used LAMP open- source web application software stack (and other " AMP " stacks). LAMP is an acronym for" Linux, Apache, MySQL, Perl/PHP/Python" Free software open-source projects that require a full-featured database management system often use MySQL. Applications that use the MySQL database include: TYPO3, MODx, Joomla, WordPress, phpBB, MyBB, Drupal and other software. MySQL is also used in many high-profile, large-scale websites, including Google (though not for searches), Facebook.

F. XAMPP

XAMPP is the most popular software package which is used to set up a PHP development environment for web services by providing all the required software components. During the process of software deployment, most of the web servers use almost similar components, so use of XAMPP provides easy transition from local server to live server. XAMPP is a AMP stack which stands for Cross platform, Apache, MySQL, PHP, Perl with some additional administrative software tools such as PhpMyAdmin (for database access), FileZilla FTP server, Mercury mail Server and JSP Tomcat server. Other commonly known software packages like XAMPP are WAMP, LAMP, and others. The XAMPP server is used to test PHP pages. It works as local server. It contains a MySQL database to manage or save data on a local server.

G. WEB SERVER: APACHE

The Apache HTTP Server, informally known as Apache, could be a free and opensource cross-platform net server, discharged below the terms of Apache License two.0. Apache is developed associated maintained by an open community of developers below the auspices of the Apache software system Foundation. The Apache HTTP Server is cross platform as of one June 2017 ninety-two of Apache HTTPS Server copies run on UNIX distributions. Version 2.0 improved support for non-Unix operational systems like Windows and OS/2. recent versions of Apache were ported to run on OpenVMS and NetWare.

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V. METHODOLOGY

There are 3 modules. They are

1. Admin Module 2.Faculty Module 3.Student Module

The system can be developed using web technologies HTML, CSS, PHP and using the database MySQL. The front end can consist of user registration with the respective university registered number and the password by the user. The student can view his results in the tabular format with the respective aggregate and percentage of that semester. The data based on the roll number of the student all the data can be retrieved back to the table and displayed as results. The PHP can also be used for visualization of data. We use fusion charts for the dynamic visualization Primarily the data can be collected from the college administration. This data includes university registered number of every student currently collected is then classified and tabulated into useful and understandable manner.HTML is used for structuring the web page and its content. It is used to develop different pages like user registration, login page and the page for providing results.CSS is used for styling the web page. PHP is used for connecting to the database and perform operations on it through queries.

VI. IMPLEMENTATIONS

Implementation is the process of building the web according to its design. A web implementor uses hypertext markup language (HTML), Cascading Style Sheets (CSS) to develop structure and design of web. PHP has been used as server-side scripting language, were as sql is used to communicate with the data base. These make it possible for a web to be dynamic so that it could interact with the user.

The implementation process resembles web development because it involves using a specific syntax for encoding web structures or a programming language in a formal language in computer files.

Home Page

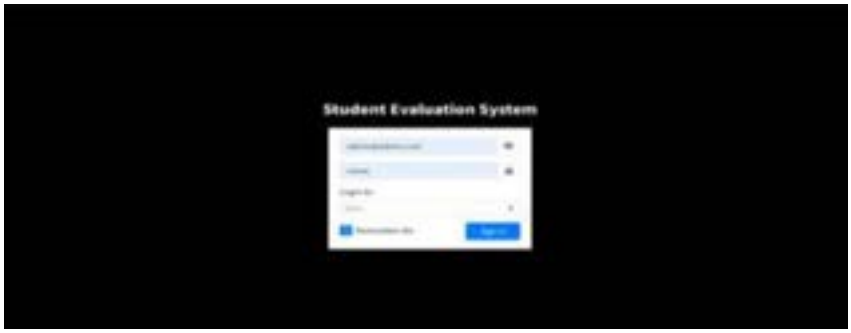

Fig 4.1 Home page

Home page consist of login form through which all the three portals of admin, faculty and student can be accessed. All the three users have been assigned with credentials of email id and password by which they can login to student performance evaluation system.

Admin portal

Fig 4.2 Subject list

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After logging in as admin, it has different controls to manage the system. Admin can different subjects present in current academic year.

Add class

Fig4.3 Class list

Academic year

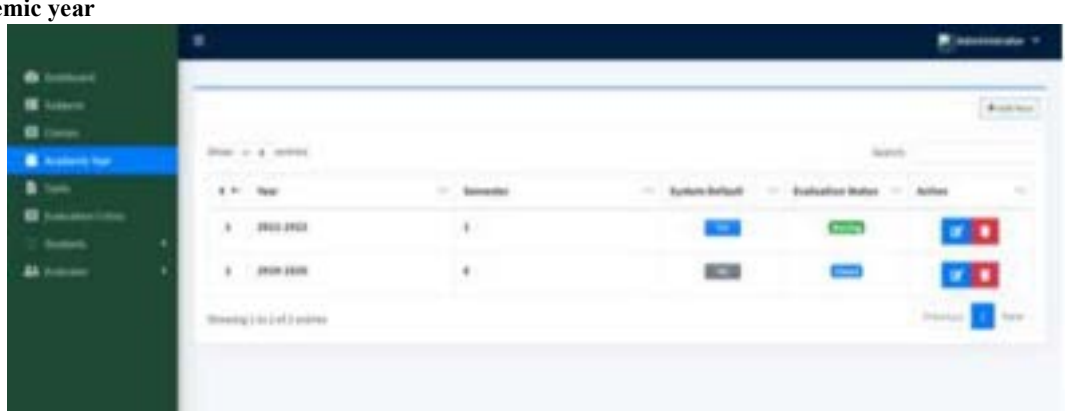

Fig 4.4 Add Academic year

Task

Fig 4.5 Add Task and module

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Add student

Fig 4.6Add Student

Add Faculty

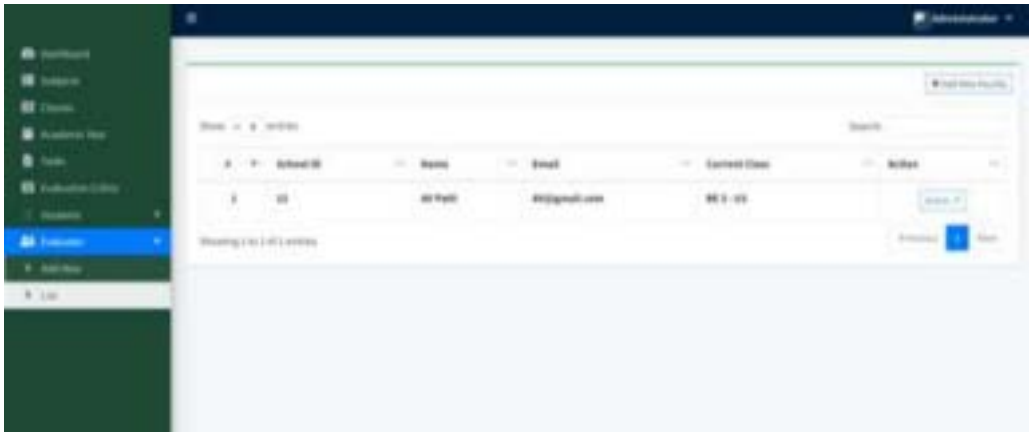

Fig 4.7 Add Faculty

Student portal

Fig 4.8 Student Portal

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Faculty portal

Evaluation

Fig 4.9 Evaluation portal

Evaluation report

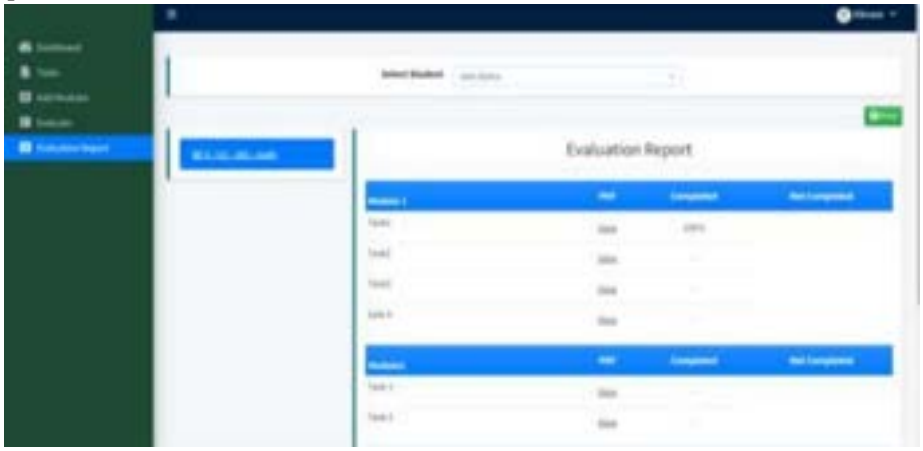

Fig 4.10 Evaluation Report

Database

Create a Database Table Using MySQL. Now, start your SQL XAMPP server and select admin. This will direct you to the phpMyAdmin webpage. Now, log in with your username and password. Now, on the MyPHPAdmin, create a new databaseby clicking "New" on the left-hand side of a webpage.

Fig 6.5 php my admin page

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Next, enter a name for the database where it says "Create database.

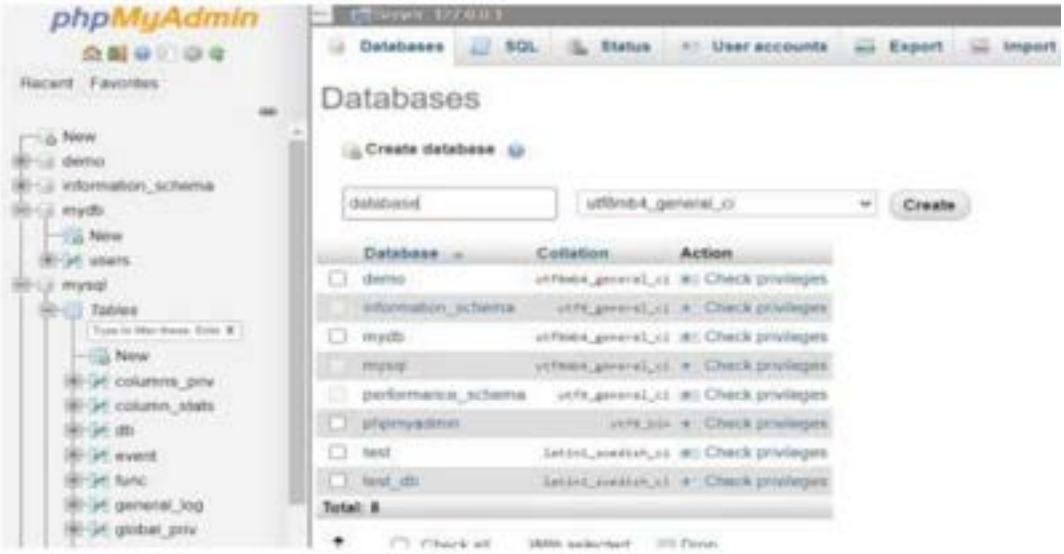

Fig 4.11 Database creation

Then, you will be directed to the next page where you will create a new table. Now, enter the desired table name.

Fig 4.12 New table creation

Next, you can select the desired type of number for the 'Fields' text box. Once you have completed the steps, click the Go button. In the type of space, select these options.

Open a Connection to a MySQL Database.

Once you create a PhpMyAdmin database, your next step is to write a code on Visual Studio. Go to Microsoft visual code -

> create a new file and name it as DB connection. Now, in the code below, you will notice the function mysqli_connect().As the name suggests, it does the same task. It connects the database to the form that was

```
<?php
$sname= "localhost";
```

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$uname= "root";
$password = "“;
$db_name = "test_db";
$conn = mysqli_connect ($sname, $uname, $password, $db_name);if (! $conn) {echo "Connection failed!";}
Now, execute the below SQL query to create the user table within your MySQL database.

Create the user table

```
Table structure for table `faculty_list`
--

CREATE TABLE `faculty_list` (
  `id` int(30) NOT NULL,
  `school_id` varchar(100) NOT NULL,
  `firstname` varchar(200) NOT NULL,
  `lastname` varchar(200) NOT NULL,
  `email` varchar(200) NOT NULL,
  `password` text NOT NULL,
  `avatar` text NOT NULL DEFAULT 'no-image-available.png',
  `date_created` datetime NOT NULL DEFAULT current_timestamp()
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

Fig 4.13 Query for creating table

- id: serial number
- School id: Faculty id
- first name: Stores first name of the faculty
- last name: Stores last name of the faculty
- email: Stores email address of Faculty
- Password: Store password
- Date created: Stores date and time of creation.

Fig 4.14 Faculty list in database

Similarly all tables are created.

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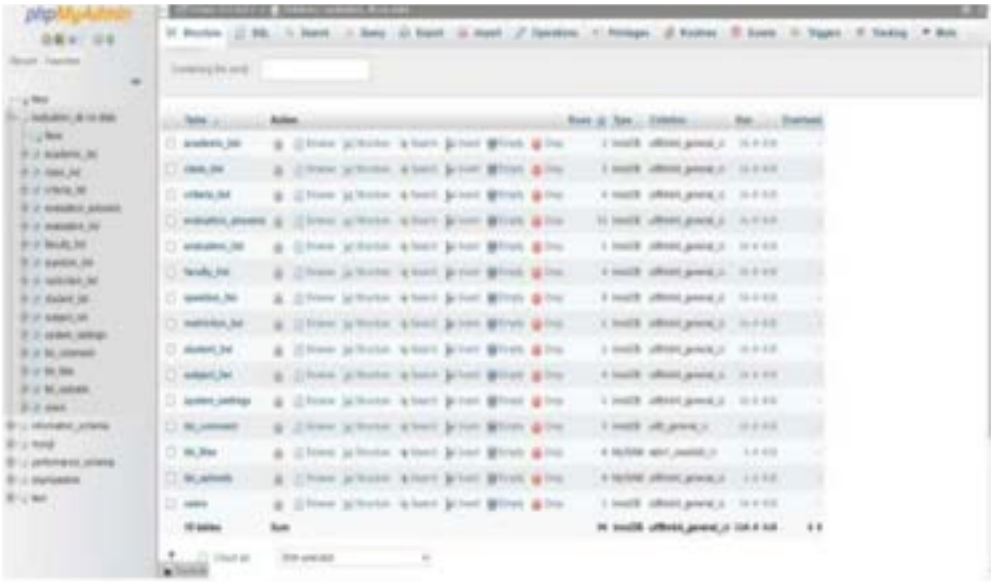

Fig 4.15 Database tables

V. CONCLUSION

Student Performance Evaluation System is an internet web site and may be used at anyplace, any time and by any student or college. This application can avoid the calculation and alter the method of visualizing results by students as well as faculty.

VI. ACKNOWLEDGMENT

Creators want to heartily thanks Professor Vikram S. Ingole, Dept. Of Electronics and Telecommunication Engineering, Shri Sant Gajanan Maharaj College of Engineering, Shegaon for his great cooperation during the development of this project.

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Door Security System For Home Monitoring based On Arduino Uno

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Abstract

The security of the confidential area based on the system which secured that area. That system is nothing but the door lock . Door lock system contains different security levels like door lock based on password , face recognition ,etc. The password based door lock is based on the Arduino Uno . This door lock security system is made to secure the particular area we want to secure . I this system we used Arduino Uno ,Relay Module, 4x4 Matrix Keypad , Solenoid lock, Regulator IC ,capacitor , DC socket ,etc for making proper door locks to make our love once secured.

Keywords: Arduino Uno , Security system, password based lock

I. Introduction

Door plays an important role in our day to day life .Door is the line to make our love once secured. On the one side of the door the unknown stranger is there and on the other side our love once is theirs. The door is the only hurdle between them. So the door needs to be secured with an advanced security system. In our project we make a door lock based on an Arduino uno . The door will give access to those who entered only the correct

password in the secured system lock . Why are we using the door lock security system ? What was the need to use the door lock of higher security ?

Nowadays we hear and see that criminal activity is increasing day by day. As we all are human beings and as human beings we are addicted to making our work more easier , efficient and secure . For making the day to day life easier ,efficient and secure we make new technologies which helps us to make our work easy and secure . As mentioned before, the criminal activity is increasing day by day .To stop these activities or to be secure or as a prevention we use security based technologies . The criminal activities like robbery , kidnapping , loss of important or confidential documents ,etc. If we need to stop or control the rate of such activities we discover the IoT (Internet of Things) based security system and other home automation systems . Home automation has proved to be the best helping hand for human beings in daily life. The door security system is also one of the home automation technologies.

IoT (Internet of Things) is the platform of communication between two parties . By using the IoT we can make useful devices which help to communicate. Identifying, sensing, networking and processing capabilities that will help to communicate with one another . The IoT based devices are based on different objectives. The objective is nothing to solve the problem statement coming as a challenge in the day to day life of a normal human being. We found security as a problem statement due to an increase in the rate of criminal activities. To solve this problem statement we use the IoT based device which is the door security system based on the Arduino Uno .

The door security system based on the Arduino uno is a password based lock system . In this system we used different components based on the working of those components. We used Arduino uno as a base which means it is the brain of the door lock system . We train the Arduino uno by coding . In that code we set the function of the door lock system to perform the activity we need . For example if we want to close the door automatically after opening the door . It also means that when we open the door by entering the correct password that door will close automatically after a particular interval of time . That duration we can set in the code and send it to the Arduino uno . Which means the activity happening in the door security system is based on the training code of the Arduino uno .

The other example of the Arduino Uno activities controlling is we can set the password as we want to set . In the code we set the password which we want to set and send that code to arduino uno . If someone wants to open the door, that person needs to enter the correct password . Sometimes due to different reasons we want to change the password , like if we forgot the password , if someone wants to change the password regularly ,etc

,in such cases we change the password from that code which we used to send to the Arduino Uno . We also used other components like a relay module , 4x4 matrix keypad , solenoid lock , resistor Ic(7805v) , capacitor (100uf) , dc socket , adaptor (12v), connecting wires , etc. After the collection of components the process of soldering is done to make an IoT based device which is the door lock security system.

II. Previous Work

In this business era new technologies are getting developed for the betterment of the public. The development of the business is nothing but directly or indirectly the development of the nation , development of the people , development of the area, progressing sectors increases ,etc. There are so many reasons for the development of business sectors but the only reason behind the business I know is the problem statement . Finding the proper problem statement is the key for development of the business sectors . Problem statement is finding the day to day life problem and solving it by making devices or giving the solution on it . Such devices are made for making life easier, time saving , and as a helping hand the people.

Different devices are made or developed day by day for solving the problem of the public, industries , etc. As mentioned in the introduction, the criminal activities are increasing simultaneously . These activities include robbery , theft , loss of confidential documents , loss of private information which may cause serious issues , etc . We found the problem statement in the criminal activities . And finding the problem statement is the key for making the devices to solve those problems statements . Which gives the industries new ideas to develop new technologies.

The security of love once is also an important topic to discuss . Security is also an important topic or problem statement which needs to be solved . Iot is the base for making the devices which help to communicate with one another . Iot based home automations devices are getting developed due to the increase in the problem statement . For security the door is the one and only source to protect the important place , documents , information or people.

We studied in the standard research papers about the door lock security system . There are different types of door security which are already proposed in the market to solve the query of the security . We studied that some locks are based on the face recognition , some are based on the password , some on the fingerprint or iris detection , etc . The above-mentioned door locks are based on the different base components like Arduino uno, ESP 32 , Sensors , Camera ,etc. Software used for door locks are C++ coding language , cloud computing , etc .

The Arduino based door locks are generally password based locks . These types of locks contain the components like Keypad , Arduino uno , relay module, resistor ic , capacitor, adaptor, solenoid lock ,etc . To open the door one needs to enter the password , if that entered password is correct then and only then the door gets open . It also gets closed automatically after a particular interval of time . In some devices sensors and password both are used. Or we can say that by using fingerprint and password we can open the door and get access to that area. The other door lock system consists of the esp 32 cam which means it is used as a base for face recognition door lock . The ESP32 based door lock is used to open the door with a face recognition process . In this lock the data of the faces images stored in either the memory of the esp 32 cam or if the no of data is more then the cloud computing is used . To open the door the face must be recognised by the system , if it recognised the face then and only then the door gets open .

III. Propose System

We studied the different types of the door security system in the literature survey . The arduino uno based or esp 32 based door lock systems . From the literature survey we see that the level of the security is single , that is the security having one method at a time in a system . If we add up two or more levels in the security of the single lock then it will become more secure than other locks. To make such locks again Iot is the base for the device . We found the problem that if the one level security based lock gets some problem then the door will create the problem and will not open in the urgent or emergency situation . Then to solve this problem we can use the second way to open the door in a secured way . That also means that we can use different methods to open the door simultaneously in a secured way .

We first studied the components we need to use to make the level or security higher . After the study of the components the soldering process comes , as per the pin diagrams we join the connection at first , virtually on the online platform like tinkercad . First we check virtually the connection and the simulation of the component or device . Then the second step is to solder the components as we perform the simulation virtually on tinkercad. After soldering we run the devices and try whether all the components are in working condition or not . After that as in the introduction the arduino uno needs the code to train how it will work or what will be the output of the device.

As the arduino uno is the base of the device which controls all the activity of the component in that device . C language is used to make the code of the arduino. Then that code is sent to the arduino uno . In that we set the print statement which we want to be displayed while running the device . Like enter the password , the door is opened , the door is closed , incorrect password , reset the password ,etc . The process of the security system based door lock is as follows in the below flowchart :

- After the device gets started it asks for a password by displaying an " Enter the password" statement.
- Then after the password gets entered , if it is correct then the door gets open or it will remain closed.
- For re entering the password one need to press the * button .
- Once the door get open it get closed automatically after a few seconds .

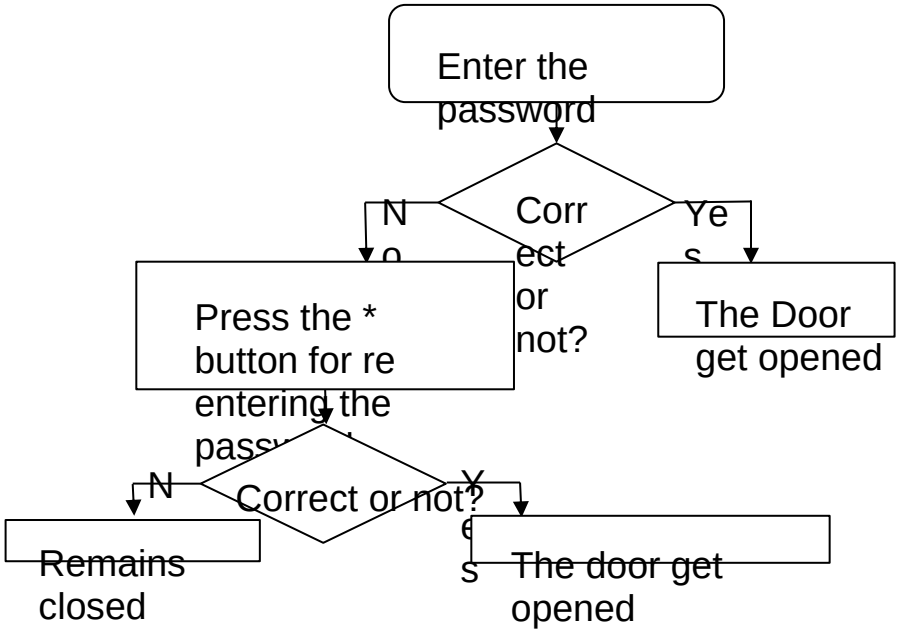

Figure : Flowchart of working of the door lock

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IOT based Home Automation and Security using ESP32

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Abstract:

Today's world is moving faster towards digitalization and everything is getting connected to the internet. With these facilities we can control our home appliances and secure our houses. There are multiple sensors available to sense the parameters such as temperature, Humidity, Gas level(LPG), Light intensity, Motion detection which we can use to control light, fan, and many more appliances as well as to monitor the security system. In this system we have used ESP32 as a controller. DHT11, MQ-2, LDR, PIR as sensors. Relay Module as switch. Blynk App for server and front end. By using this system We can control and monitor our house from anywhere in the world where the internet is present.

Keywords: Home Automation, Security, ESP32, Arduino

I. Introduction

In today's world smart home automation systems currently play a vital role in ensuring a high quality of life. A smart home system consists of subsystems based on Internet of Things (IoT) technology that are appropriate for numerous purposes, which include surveillance, intruder management and fire detection . Sensor technologies have improved rapidly in recent years.With corresponding developments in loT technology, sensors are simplifying tasks such as monitoring and interacting with the environment.IoT (Internet of Things) is the platform of communication between two parties. By using the loT we can make useful devices which help to communicate. Identifying, sensing. networking and processing capabilities that will help to communicate with one another.

The loT based devices have different objectives with different functioning.Many people can not work or conduct their daily tasks without mobile devices. Hence, we developed our proposed system to smoothly work as an android or ios application on mobile devices.To become a multifunctional

smart home automation and surveillance system, the proposed project includes sensors that can monitor environmental temperature and humidity and detect environmental changes in our house.In addition, users can use his/her cell phone to turn on/off appliances at home and to view data like temperature or pressure. To achieve these functions, the cloud platform and database system must be integrated into mobile services such that access is available anytime and anywhere in the world.

IOT based Home Automation and Security using ESP32 consists of sensors like DHT11,PIR,MQ2 and LDR. DHT11 is digital humidity and temperature sensor which provides actual temperature of our house and we can monitor it on our mobile phone.We are gone use Blynk App for monitoring purpose.If temperature is more than room temperature or air is humid then we can turn on fan remotely by using blynk app.Blynk app is cloud based app which provide us interface to create app.It has user friendly interface so that anyone can make application and connect sensor through app.

PIR is passive infrared sensor which detect motion in its area,it has particular range so if any object is moving in that area will get detected by PIR.Mechanism behind PIR is that it can detect change in energy of object or person who is ever passing or moving in its region.In this system we are gone use PIR for security purpose.When we are outside the home,we turn on PIR sensor manually using blynk app.If any motion detected by sensor then it will notify by user on blynk app then user can CCTV and take necessary action.

LDR is light dependent resistance,when there is light ldr resistance decreases and whenever there is dark its resistance increase.We can use LDR for bulb which are outside the home so bulb will turn off during daylight and turn on in night.MQ2 sensor used for gas detection like lpg,methane etc if there is gas leakage then MQ2 sensor will raise alarm and it will also sent notification to user mobile.

II. Previous Work

The internet of things(IoT) is a new era of intelligence computing and it provides a privilege to communicate around the world. The objective of IOT is anything, anyone, anytime, anyplace, anyservice and any network. Home automation or Smart Home systems can be described as the introduction of technology within the home environment to provide convenience,security,comfort and energy efficiency to its users.Smart home environment can provide increased quality of lifestyle.Nowadays the introduction of the Internet of Things (IoT), its research and implementation of home automation are getting more and more popular in the community.

Home automation is used to control more than one computer at a time to control basic home appliances and functions automatically and remotely.Home automation systems are gaining more popularity day by day because of their ease of use and wide range of operations capabilities.Smart

home automation system provides more comfort and convenience to the people's life.

Home automation is the process of controlling the various appliances,equipments,machines and factory operations,etc automatically or sometimes remotely.Automation is an efficient method used in every field to reduce the manpower,energy consumption,efforts and also for improving the quality and efficiency of any system.The home automation systems are used for controlling the indoor and outdoor lights,heat,ventilation,to lock or open the door and gates,to control the electrical and electronics components and also used in security purpose devices.

We studied in the standard research papers about smart home automation system.There are different-different types of proposed system are already available in the market to solve the problems of the people regarding the home automation.We studied that some of the system which uses ESP32,Arduino Uno,Raspberry Pi and some sensors.They also used light devices,webcam surveillance and magnetic door sensors for the security purpose in their proposed home automation system.

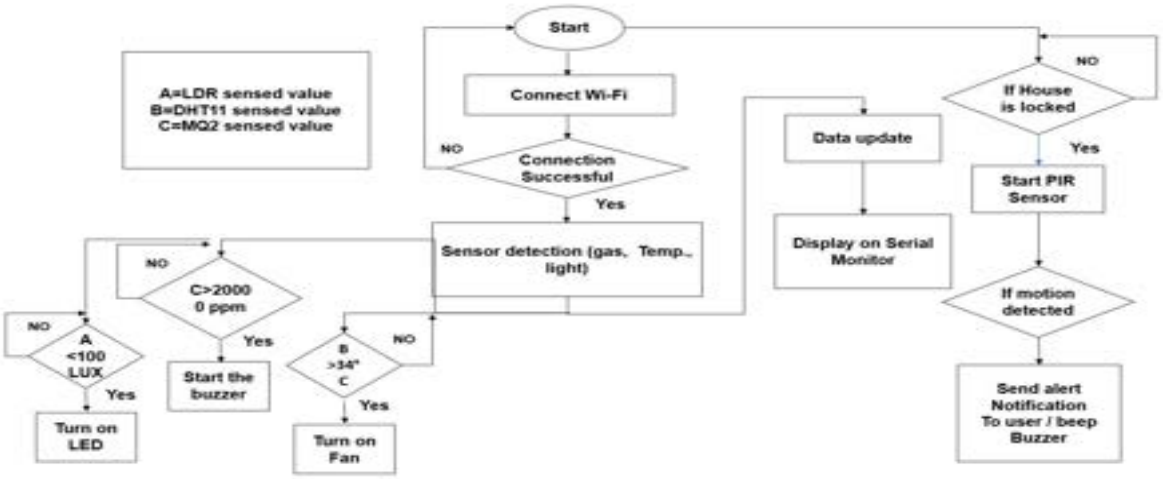
The Arduino based smart home automation systems are based on the interconnection between the Wi-Fi module in which the clients wifi modules is connected to the station wifi module which will give commands through the smartphone which is connected to the same as an external device to control the light and temperature.This whole system is wireless hence there won't be any data loss is possible.

The Raspberry pi based system uses voice recognition command to implement home automation to control smart doorbell,regulating home appliances,reminders for the daily routine,alarms and wireless speakers.This system permits the owner or controller to take decisions and to regulate the home appliances and to use other home automation devices with the help of an android application.

III. Proposed System

The problem statement for this research paper is to get total access to the house on mobile and can be controlled from anywhere in the world. Everything which can be connected to the internet must be controlled remotely. If we see, we spend most of the time on mobile so the idea is to use mobile software to control the system.

Flow Chart:-



I) Controller And Sensors used

Here we have used Esp32 as a controller as shown in figure1 which has 30 pins and have inbuilt WiFi Module as well as Bluetooth module.We have used sensors such as DHT11 for sensing temperature and humidity , MQ-2 for sensing LPG gas, LDR for sensing the light intensity, PIR for detecting the motion. Figure2 shows all four sensors used in the system. For connecting home appliances we have used relay modules. There are multiple channel relay modules available in the market such as two channel, eight channel we can select relay modules as per our requirement.

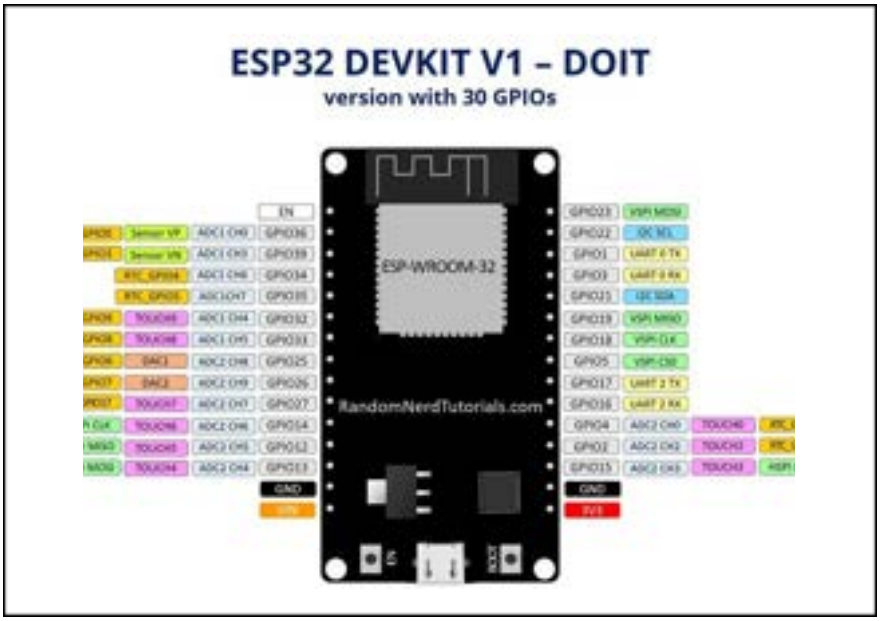


figure 1. Esp32 controller

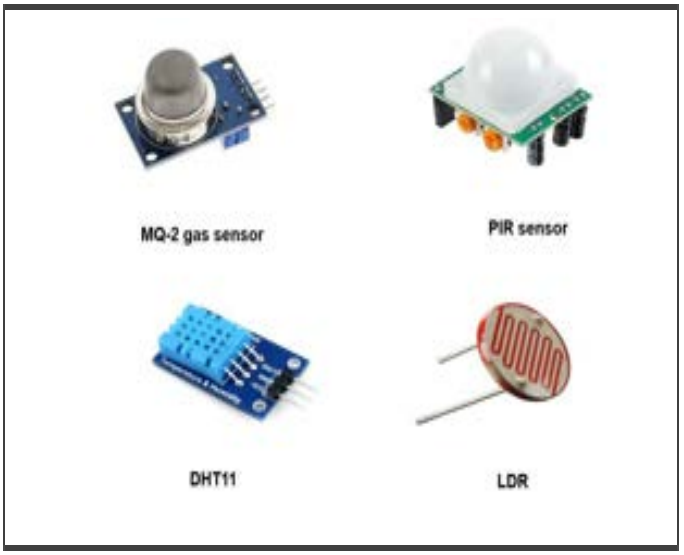


Figure 2. Sensors

II) Blynk App and Arduino IDE

Blynk app is the platform to develop the smartphone applications that works with the wide range of microcontrollers.With this app you also can create smartphone application to develop a smart home automation system to control and monitor the home appliances and various sensors.In Blynk App we have created a buttons for PIR sensor,relay module and for temperature and humidity gas sensor which is in horizontal display manner.Blynk App provides us an authentication token which we write in a code and then provide it to a controller.

Arduino Integrated Development Environment(IDE) this software can be used with any arduino board.This software is text editor like a notepad with different key features,it contains a text editor for writing the code,message area,toolbar,text console and it is used for writing a code,to compile the code to check if any errors are there and then uploading the same code to the Arduino.This is an open source software in which the user can use the software as they want and it also supports every type of available Arduino board such as Arduino mega,Arduino Leonards and Arduino Ethernet.When a user write a code and compiles,the IDE will generate a Hex file for code and then send it to a Arduino board using a USB cable.

```
#define BLYNK_PRINT Serial
#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>
#include <DHT.h>


char auth[] = "vERaSrUtL17NbrDsSFvDlTMnYYGVsVMZ";//Enter your Auth token
char ssid[] = "xyzabc";//Enter your WIFI name
char pass[] = "********";//Enter your WIFI password
```

Figure 3. auth token provided in ESP32 code

III) Working of System

After burning the code in the controller, it will start searching for the WI-FI and try to connect it until it gets connected.Then the system will start collecting data from all the sensors and send it to the blynk server . We can visualize the sensor parameters on the blynk app which is connected to the controller through the blynk server. From the blynk app we can turn on/off our home appliances by clicking buttons in the app.

For security purposes we have a gas sensor and PIR sensor. If gas is detected in house ,the gas sensor will send the data to the blynk server where we visualize the gas level and as the value of gas level goes above the threshold value it will start the buzzer and send the notification on the user mobile through the blynk app. For theft detection we have a PIR sensor.When there is no one in the house and the house is locked from outside we will turn on the PIR button in the blynk app, as well as any motion detected in the house system will send notification to the user. All this working of the system can be controlled from anywhere in the world.

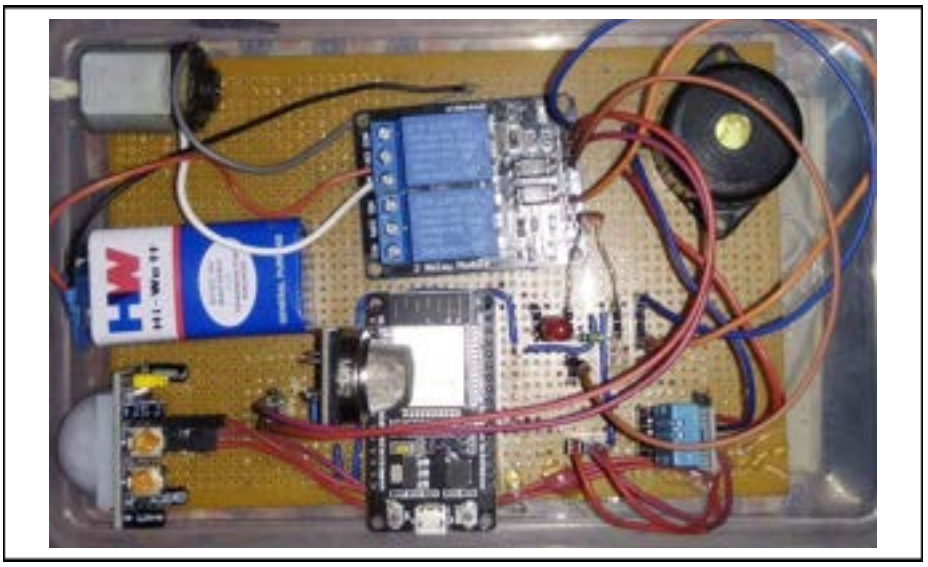


Figure 4. System Module

IV) Results and Conclusion

We were successful in developing a system through which the user was given the ability to control their household appliances through an application to monitor the house for security purposes.The user is connected to the same server(Blynk App) as the module to exchange the signal takes place frequently. This gives users the ability to automate and monitor his home .We implemented this project on PCB and uploaded the data on the Blynk App and got the results.In this project we developed an extensive and novel architecture for a flexible and low-cost home control and monitoring system to regulate the home appliances and security purpose devices.

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The IoT Based Exercise Cycle

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Abstract: *The "IOT Based Exercise Cycle" project combines a variety of technologies, including computer hardware and software, to provide bikers with a new modern home exercise solution that immerses them in their surroundings. As a result, a cyclist can monitor some of the most significant training data online via a web page, including speed, distance covered by the rider, heart rate, and oxygen level during exercise. Additionally, depending on the amount of peddling, a cyclist can view flashing pictures on a web page. This cycle is linked to the cyclist's heart rate and temperature, allowing him or her to keep track of their BPM (Heart Beats Per Minute) and body temperature. The system consists of both hardware and software components. Hardware is in charge of gathering, measuring, processing, and transmitting data from sensors. A server contains a Front-End Web page that displays and controls data for cyclists on the software side. Finally, there is a web page that displays all of the parameters that the rider can use to track his or her route.*

Keywords: IoT, Virtual Reality, Exercise

I. INTRODUCTION

As time passes, technology advances, and people transition from fieldwork to deskwork, a new fitness hazard emerges the sedentary lifestyle. To address this tendency, exercise appears to be a viable option, particularly in the form of an IoT-based smart cycle that can disclose the hobby and support us in working throughout our education. As far as I can see, the IoT-based entire workout cycle is today's answer. However, most cyclists, whether novices or specialists, no longer have this option, making it more difficult to improve and achieve specific goals. This seminar report suggests a technical solution to solve this problem by utilizing sensors and microcontrollers to collect, transmit, store, and display data on the internet. As a result, any bike owner can view relevant cycling data generated by the sensor in real-time. Nowadays, recording series from sensors are widely used. All of the records, however, are focused on the creation of sharing devices, sensor network implementation, security, intelligent town development, or smart manipulation implementation. The positioning strategy of the sensor device, structural fitness tracking, and smart car have all yielded some fantastic outcomes. There have been no research published on IoT (internet of things) and intelligent motorcycling IOT-based training cycles [1]. The sheet is the most used training strategy in cycling currently. This document, which may be customized by an instructor for one or more riders, contains a training schedule in days, weeks, and even seasons. However, this traditional and rigid strategy has a higher risk of failing to achieve its goal. The design of an IoT-based totally workout cycle retrieves and transmits the rate, and distance, and also flashes photographs continuously in accordance with pedaling speed output both to a server-hosted database and to a web web page, so we can compare and notify possible mistakes made by the bicycle owner at some point during the journey [2]. Furthermore, the biker can save statistics to a server and can look back on previous rides by maintaining a record of them. With the use of a webserver, the rider can also control the system by starting, halting, or ending the experience[3]. The technology in the described IOT-based workout cycle-assignment serves the following purposes:

- Data collection from the sensor.
- Using accumulated statistics, calculate the bicycle owner's velocity, pedaling charge (rpm), and distance traveled.

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- Measure the Heartrate, Oxygen level, and Temperature of cyclists.
- Compiling and transmitting data to a web page for online tracking.

Providing access to the monitoring system via a web page.

II. Literature Survey

With the global economic increase, health membership is developing unexpectedly within the international. in themeantime, the fitness industry is booming particularly for the city's white-collar populace. inside the situation of Covid-19, everybody must have better immunization strength to build their fitness. on this challenge, we layout an internet of factors(IoT) based exercising cycle to offer the feel of actual globalcycling with the use of digital reality which encourages humansto do cycling or exercise. When biking the workout cycle,the facts are amassed via a sensor. eventually, this record isprocessed to discover specific parameters like the pace of the cycle, distance covered by using the bike owner, and pedaling charge [4].these parameters can be despatched to the website by the use of protocols wherein these parameters are displayed [5]. The pics which might be saved in the database are tagged with every distance and displayed continuously on a webpage. And, that offers the texture of virtual truth to the bicycle owner. on this mission[6], we will describe the info of the device and similarly reach out to the implementation technologies. The design of this form of the gadget is a trend for destiny virtual fact programs[7].

III. Objectives

To offer biking fans a modern opportunity solution for training by way of developing virtual reality and permitting them to get pleasure from the outer environment by way of sitting at home. Also tracking their performance during the training by measuring the parameters like speed, total distance traveled during the workout and pedaling rate i.e rpm of the wheel. Using a heart rate sensor module to monitor the heartbeat, and also calories burned by the cyclist during the workout. Also using a temperature sensor measure the temperature of the cyclist's body. To flash the images of the locations from where the cyclist will be traveling during his/her journey.

IV. Methodology

The cyclist's riding monitoring feature should have more mobility and be simple to access and engage with. A web page has been constructed to suit these requirements. This can be done by anyone, even cyclists, who have pages and functionalities specifically built for them[8]. A cyclist can access a list of parameters such as speed, distance, position, and heartbeat on a web page, as well as observe blinking visuals based on speed. Finally, the user has access to a page where he can view his personal information. A biker can watch his boarding statistics and see his performance in real-time. The project is divided into three hardware modules: 1. The first is in charge of receiving data from the IR sensor, measuring rpm, and inserting a formula to compute speed and distance using data from the cycle wheel delivered to the second module through a wireless channel and displayed on the Website. Bicyclists' BPM and temperature are also measured by the various sensors presented on the website. 2. The second module is in charge of reading and processing data from sensors, as well as the first module and the laptop that receives the data, converts it to a standard message format, and delivers it to a web page through the Internet. 3. The third module, last but not least, is a little open computer that handles the webserver and HTTP server's end. The first two modules are powered by dual sources, whereas the hybrid module requires internet connectivity via a mobile hotspot or Internet Stick. The entire system is constructed on three levels: hardware, application, and network.

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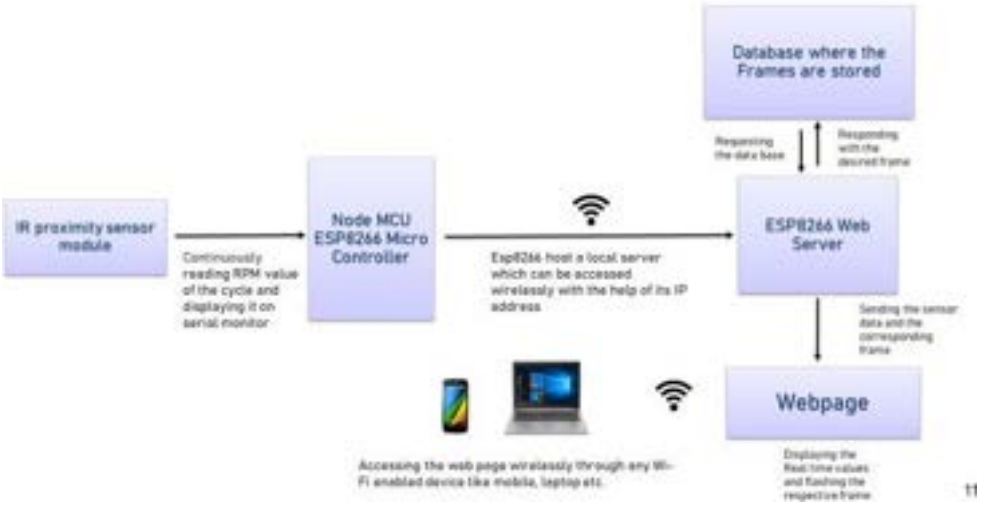

Figure 1: Block Diagram

V. ALGORITHM

The tachometer is been used to determine the speed of the cycle and also calculate the distance traveled by the cyclist.IR proximity sensor is interfaced with Node MCU ESP8266 microcontroller. In Tachometer, a black screen will be attached to the rotating wheel which will be detected by the IR beam of the IR proximity sensor. The reflection and absorption of the IR beam from the white and black surfaces respectively will determine the speed of the cycle. Further, this speed can be analyzed to determine the distance traveled by the cyclist. The data collected by the sensor is then displayed on the serial monitor of the Arduino IDE. The time difference between two successive pulses is takento calculate angular velocity. (angular velocity=width of black screen/time difference). Then time is found by using a simple formula, Time = 2*pi*radius/angular velocity m/s.Later rpm is calculated by dividing 60,000 by time. (time converted from millisecond to minute and then rpmconversion)To find speed we use the formula, Speed = 2*pi*radius*RPM/60 m/sec Distance is found by, Distance = speed*time/1000 meter heart rate sensor Max30100 is been used to determine the BPM and Oxygen level of cyclist. Temperature sensor DS18B20 is been used to the temperature of the body of the cyclist.

VI. HARDWARE AND SOFTWARE REQUIREMENTS

6.1 ESP8266(Wi-Fi Module)

A serial connection connects the Wi-Fi module (ESP8266) to a tiny controller. It can also access the Internet if it is connected to the Internet service provider's login area [9]. This module retrieves data from a web page and displays it. that data is transferred to the subdirectory It also loads the data sent to the selected URL from the subdirectory.

Figure 2: ESP8266(Wi-Fi Module)

6.2. IR Sensor

In a nutshell, the IR sensor module comprises an IR transmitter and receiver, a variable resistor (trimmer pot), and an output LED. Working Mechanism: In this circuit, the IR sensor module is interfaced with Node MCU to measure

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the speed of cycle, and distance covered using RPM. The calculation is done on this basis. After 1-second Node MCU calculates RPM using the given formula. rpm = (60000)/(total time)*10 (time in ms to minutes and then to rpm conversion step).

Figure 3: IR Sensor

6.3. Heart rate and Temperature Sensor

The MAX30100 — a contemporary, integrated pulse oximeter and cardiac charge sensor IC from Analog devices – is used in the module. It detects pulse oximetry (SpO2) and heart rate (HR) signals using LEDs, a photodetector, customized optics, and coffee-noise analog signal processing. The MAX30100 has two LEDs on the proper – a red and an IR LED. A completely sensitive photodetector is on the left. The idea is that you illuminate a single LED at a time, detecting the amount of light shining back on the detector, and then measuring blood oxygen level and coronary heart rate based on the signature. Maxim integrated's DS18B20 is a 1-cord programmable Temperature sensor. It's widely used to detect the temperature in challenging situations such as chemical solutions, mines, and soil. The sensor's construction is tough, and it may also be ordered with a water-resistant variant to make installation easier. It was capable of measuring temperatures ranging from -55°C to +125°C with a 5°C precision[10]. Every sensor has a unique code It has a one-of-a-kind deal and only uses one pin of the MCU to transport data, making it an excellent choice temperature at more than one factor without compromising much of your digital pins on the microcontroller.

Figure 4: MAX30100

Figure 5: DS18B20

6.4 Web Page

From each net-enabled a tool that may get entry to the professional website's tracking net web page can carry out Web Server the duties of tracking the sub-station device's present-day popularity and control the gadget.

Figure 6: Web Page

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6.5 Web Server

A web server is an online storage and delivery system for files. Clients can request such a file or other piece of data, and the server will respond with the appropriate data/files. Different protocols, such as HTTP, MQTT, and others, are used to make requests HTTP, or Hyper Text Transfer Protocol, is useful for downloading online pages and uploading photos, although it is slow. The HTTP protocol is chosen for IoT[11]. It's a fantastic lightweight publishing and subscription tool that allows anyone to send and receive messages. For this project, we used an HTTP server.

Figure 7: Web Server

VII. APPLICATIONS

The most well-known application of IoT based exercise cycle is in gyms and the fitness business. In our project, we have created a virtual reality for the cycle but with more advancements, we can use this VR for Car Simulation, Airplane simulation, etc. VR also has wide applications in the field of Gaming. VR can simulate actual workspaces for a place of business occupational safety and health functions, educational purposes, and education functions. VR can be used to provide beginners with a virtual environment in which they are able to increase their capabilities without the actual-world outcomes of failing. VR has been used and studied in number one schooling, anatomy teaching, army, astronaut training, flight simulators, miner education, architectural layout, driving force education, and bridge inspection.

VIII. CONCLUSION

The IoT-based exercise Cycle was created in response to a difficulty that both new and experienced bikers faced. The limitations in modern training methodologies are the source of this issue. A wide range of approaches can be employed on this project, starting with electronics and hardware and progressing to the internet and mobile applications. setting all those collectively, a prototype of a complete solution might be constructed to assist riders and trainers while also monitoring their performance. during the training with the aid of measuring the parameters like speed, overall distance traveled during the workout, pedaling rate i.e. rpm of the wheel, To flash the pictures of the places from in which the bike owner could be touring all through his/her journey. Also monitoring heartbeat and temperature of cyclist.

IX. FUTURE WORK

Read the latitude and longitude from the GPS module or GPS string to track the cyclist's position in real-time. Installing an internet service that allows the rider to build a new experience, start or stop the current one, and get information on the state of the bike's body module. To make an app and proportion it on a worldwide server. Implant virtual reality on an advanced basis. Similarly upgrades to show facial expressions, sweat, and panicking conditions may be carried out via studying the facial trends, body developments the use of esp32-cam, and the system getting to know.

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DEPARTMENT OF INFORMATION TECHNOLOGY

SESSION 2021-2022

3.3.2 Number of research papers per teachers in the Journals notified on UGC website during the year

Title of Paper	Name of the Author/s	Name of Journal	Year of Publication	ISSN Number
Smart Mirror using Raspberry PI: Review Paper	Amit S. Manekar, Akshay Agrawal, Vaishnavi Kanherkar, Kalyani Bonde, Radhika Jadhav	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 1	2022	https://ijarsct.co.in/Paper2163.pdf
Smart Information Desk using Raspberry Pi	Akshay Agrawal, Kalyani Bonde, Vaishnavi Kanherkar, Radhika Jadhav, Amit Manekar	International Journal on Emerging Trends in Technology (IJETT), Volume 9, Issue 1	2022	https://www.ijett.in/index.php/IJETT/article/view/731
DeepFake Detection using Inception-ResNet-v2	Dr. A. S. Manekar, Anand Wankhade, Aman Surkar, Pranjali Pande, Kunal Nemade	International Journal of Advanced Innovative Technology in Engineering (IJAITE), Volume 7, Issue 3	2022	https://ijaite.co.in/downloads/volume_7/issue_3/30.pdf
Extractive Text Summarization	Vivek Bhore, Pratik Bondre, Rutik Gawande, Vushabh Guntiwar, Priti Kale	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 1	2022	https://ijarsct.co.in/Paper3022.pdf
A Comprehensive Survey on Smart Attendance Monitoring System	Prof. Aniket Shahade, Karan Gadodia, Vaibhav Kotecha, Ishita Koradia, Sayali Patil	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 5	2022	https://ijarsct.co.in/Paper4076.pdf

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Deep Neural Network Based Smart Attendance Monitoring System	Karan Gadodia, Ishita Koradia, Sayali Patil, Vaibhav Kotecha, Prof. Aniket Shahade	International Journal of Interdisciplinary Innovation Research & Development (IJIIRD), Volume 5, Issue 2	2022	http://ijiird.com/wp-content/uploads/060216.pdf
E-Lib Digital Library Management System using Flutter and Dart	Mamata Rajput, Rutuja Dhanorkar, Shivani Nirmal, Manisha Ubharhande, Aniket Shahade	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 6	2022	https://ijarsct.co.in/Paper4253.pdf
Real Time Hand Gesture Recognition System	Vikrant Ughade, Prathamesh Raut, Prasad Rudrawar, Prachi Joshi, Prof. A. K. Shahade	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 5	2022	https://ijarsct.co.in/Paper4049.pdf
Search Engine Algorithms	Anand Sharma, Vaibhav Chandekar, Vikas Damre, Shrutam Dhone, Kapill Patil	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 6	2022	https://ijarsct.co.in/A4250.pdf
Detailed Review on Cloud Computing and Cloud Security	Prof. Anand Sharma, Nikita Ingle, Arati Wadhe, Ritik Hujwant, Kaustubh Agrawal	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 6	2022	https://ijarsct.co.in/Paper3321.pdf
Online IDE for Web Based Learning	Prajyot Burbure, Shreyash Mohod, Om Sonone, Sanket Tikar, Faizan Khandwani	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 5	2022	https://ijarsct.co.in/Paper4102.pdf
Hospital and Blood Donar Finding System using Android	Punam Deokate, Rakshanda Kare, Ruchi Kumari, Sanjivni Warthe, Prof. Faizan I. Khandwani	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 2	2022	https://ijarsct.co.in/Paper3343.pdf
Analysis of Problems Faced by the Indian Students to Apply for Higher Education at	Muskan Bhagat, Hritik Kahalkar, Siddhant Gupta, Rohit Salampuriya, Sagar Padiya	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 4	2022	https://ijarsct.co.in/Paper3956.pdf

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Foreign Universities				
CityServices	Vishal Kothalkar, Rohitraj Deshmukh, Akhil Jamatkar, Monish Sathe, Sagar Padiya	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 4	2022	https://ijarsct.co.in/Paper3951.pdf
Predictive Web Portal for Indian Students to Apply for Higher Education at Foreign Universities	Muskan Bhagat, Hritik Kahalkar, Siddhant Gupta, Rohit Salampuriya, Sagar Padiya	International Journal of Advanced Innovative Technology in Engineering, 2022, 7(3)	2022	https://ijaite.co.in/downloads/volume_7/issue_3/31.pdf
Use of OCR Technology for Data Extraction using Amazon Textract	Sumit Muddalkar, Kiran Kolte, Ayush Batra, Ayush Naphade, Neha Lokhande	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 3	2022	https://ijarsct.co.in/Paper3262.pdf
Electric Vehicle Charging Station Finding App	Sumit Muddalkar, Nishant Chaturkar, Khushal Ingole, Shreyash Wadaskar, Rahul Lanjewar	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 2	2022	https://ijarsct.co.in/Paper3359.pdf
Social Media Application Development in Android with Firebase	Dhanshri Therokar, Devshri Pohare, Manjiri Kolte, Priyal Sonar, Prof. Pallavi Bute	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 2	2022	https://ijarsct.co.in/Paper3612.pdf
Effect of COVID Work from Home on the Health of Students based on the Active Step Counts Per Day	K. J. Sapkal, Vandita Joshi, Gauri Panpaliya, Suyash Chilwarwar, Kartik Chauhan	International Journal of Innovative Research in Technology (IJIRT), Volume 8 Issue 11	2022	https://ijirt.org/master/publishedpaper/IJIRT154503_PAPER.pdf
SQL Detection Tool	K. J. Sapkal, Rushikesh Ambuskar, Priti Vyas, Nitesh Mankar,Ashwin Bagade, Sahil Annaldewar	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 5	2022	https://ijarsct.co.in/Paper4017.pdf

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Remote Healthcare Monitoring System using IoT	Rohit Bhutada, Pream Karale, Prof. Ms. Krutika Sapkal	International Journal of Advanced Innovative Technology in Engineering (IJAITE), Volume 7, Issue 3	2022	https://ijaite.co.in/downloads/volume_7/issue_3/18.pdf
A Study of Pose Estimation and Its Recent Advancements	Om Masne, Mohit Bohra, Gita Fase, Amitkumar Manekar, Kshitij Khillare	International Journal on Emerging Trends in Technology (IJETT), Volume 9, Issue 1	2022	https://www.ijett.in/index.php/IJETT/article/view/726

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Smart Mirror Using Raspberry PI: Review Paper

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Abstract: *We are living in 21st century where all the work is done using technology and has become an integrated part of life. The internet of things which is very trending now-a-days is used in various electronic devices as we want all our work to be in fractions of a second. Based on needs, the new technologies are continuously introduced in a market that is demand and supply. We come up with solutions to problems which are very familiar to everybody as we all go to corporate offices at one time of our lifetime. As we go there we don't know anything about the office like about the infrastructure, various departments and all. When we don't know anything we ask the receptionist for help and this is time consuming. To solve this time consuming problems Smart Mirror is introduced which will act as the information desk for new visitors, employees and clients. This paper contains the problem statement and detailed technology stack along with our basic project idea. The internet of things, AI is used to implement this project.*

Keywords: IOT; Smart Mirror; Raspberry pi; Voice command; Magic Mirror; Matrix Server

I. Introduction

In this globe of fierce competition, each one needs a comfy life and stay updated with technology. Modern man has proposed high tech technology to make his life at ease. People need to be attached with the world and they are willing to grab the information easily. Whether it is throughout the television or internet, people must have to be in contact with the present events happening all over the world. Internet of Things (IoT) is a theory where an entity having the capability to gather and transmit information over a network without the human contact to human or human to system. Due to this technology people can do their task in faster and efficient way.

In this we will design and develop a smart mirror that symbolized an useful interface for glancing data in a co-operate office. A smart mirror is a mechanism that acts as a mirror which display date, time, image gallery, current temperature, weather details, and to-do list along with that we will add the feature of voice command. Voice commands boost the productivity of product. To propose a smart mirror that accepts online news and displays it using the Internet of things (IoT) circuitry with RSS feed.

In this project we will develop a smart mirror with the idea of making corporate offices smarter and save time. Smart Mirror is introduced which will act as the information desk for new visitors, employees and clients. IoT build up the idea of distantly keep an eye on objects through the Internet. In this project we are trying out new modules to make our lives more easy and comfortable and which are low in cost and user-friendly too.

In this article we will primarily focus on the basic idea of our project which we are going to develop. To give you our project's basic idea we have organized this paper in chapters; second chapter is literature survey which includes several documents, manuals, analysis papers which are associated with our plan of the project, third chapter focus on the method which we will going to follow during implementation of our project, and fourth chapter is technology stack, which focus on the hardware and software technologies we will be using during our project, fifth chapter is discussion, in which we will discussing in what manner we will be working on this project. Finally last we have focus on the future

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Smart Information Desk Using Raspberry Pi

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Abstract— IoT is a very emerging trend in today's world it has a variety of application in our life. We are living in 21st century where all the work is done using technology and has become an integrated part of life. The internet of things which is very trending now-a-days is used in various electronic devices as we want all our work to be in fractions of a second. We come up with solutions to problems which are very familiar to everybody, as we all go to corporate offices at one time of our lifetime. As anyone go in any office for the very first time we don't know anything about that office like about the infrastructure, various departments and all. When we don't know anything we ask the receptionist for help and this is time consuming. To solve this time consuming problems Smart Mirror is introduced which will act as the information desk for new visitors, employees and clients. Also we have made our mirror multitasked more information about that is available in this paper. Moreover we have added matrix server in our mirror so that calling and chatting can also be done with this mirror. This paper contains the problem statement and detailed technology stack along with our project development idea and our results and conclusion. The internet of things, AI is used to implement this project.

Keywords—IOT, Smart Mirror, Raspberry Pi, Voice command, Magic Mirror, Matrix

I. Introduction

In this globe of fierce competition, each one needs a comfortable life and stay updated with latest technology. Modern man has proposed high tech technology to make his life at ease. People think necessary to be attached with the external world and they are willing to grab the information easily. Whether it is through the television or internet, people must have to be in contact with the present events happening all over the world. Internet of Things (IoT) is a theory where an entity having the capability to gather and transmit information over a network without the human contact to human or human to system. Due to this technology people can do their task in faster and efficient way. In this we will design and develop a smart mirror that symbolized an useful interface for glancing data in a co-operateoffice. In market various smart mirrors are available that acts as a mirror which display date, time, image gallery but it is not sufficient as we can make our mirror more interactive. The main property of the mirror will be that it will totally work as a computer or we can say more than a computer. Now all will think that we have computer already then why one go for this mirror, so the reason for this will be mirror will be available at the 50% cost of the computer. Our mirror broadcast current temperature, weather details, and to-do list along with that we have added the feature of voice command. In addition to that we have added matrix to our server, which is capable to do chatting, voice and video calling. Matrix is basically a instant messaging application which is totally decentralized so the data that will be generated by chatting or calling will be in that office's server only it will not go on to third party server and this will prevent leaking of data. In this project we have developed a smart mirror with the idea of making corporate offices smarter and save the expenditure as well as time . Smart Mirror which is designed will act as the information desk for new visitors, employees and clients. IoT build up the idea of distantly keep an eye on objects through the Internet. In this project we tried out new modules to make our lives more easy and comfortable and which are low in cost and user□ friendly too. This mirror is also capable to do live streaming, detail is available in this paper.

Let's take a look on the hardware and software that we used for developing our mirror.

I. Hardware

A. Raspberry Pi The major component in magic mirror is Raspberry Pi. There are various generations of raspberry pi but we are using the latest version i.e. Raspberry Pi 4 model B. The raspberry pi 4 forms the processing unit of the smart mirror. It is simply a debit card size computer that can do various tasks. The raspberry pi 4 model B has some inbuilt facilities like Bluetooth & Wi-Fi for linking purpose also it allows 4 USB port to plugged in 4 devices. Through this plugs one can connect keyboard, mouse to the pi.

B. 2 - Way Mirror The 2-way mirror is the one component

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DeepFake Detection Using Inception-ResNet-v2

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ABSTRACT

Control of pictures, recordings, and sounds utilizing face alter applications and web administrations have been being used, for quite a long time yet ongoing progress in deep learning have prompted AI-produced counterfeit pictures and recordings with traded faces, lip-adjusted sounds prominently known as Deepfakes. Deepfakes are created primarily using one of the following two methodologies: Autoencoders and Generator Adversarial Networks, both of which are based on pretrained deep neural networks. The level of authenticity accomplished by deep learning controlled deepfakes increments with expanding measures of information i.e., counterfeit pictures and recordings promptly accessible on the web at removal to prepare GANs. Deepfake algorithms make media leaving an uncovered edge of distinction between the true or unique source and the manufactured or deepfake objects. In this way, new systems and methods to distinguish through such deepfakes are the need of great importance. The methodology proposed based upon strong deep learning-based CNN designs to be specific, Inception-Resnet-V2 for recognizing the deepfakes. Our proposed approach not just surpasses the current methodologies regarding effectiveness and precision yet additionally offers the best concerning the given existence intricacy.

1. INTRODUCTION

The terminology of deepfakes comes from "deep-learning" in addition to "fakes". A general term covers counterfeit recordings, pictures, sound, and different media incorporated utilizing AI-controlled deep learning procedures. Deepfakes ("deep learning" and "fake") are artificially generated media wherein an individual in a recorded video or image is replaced to look like someone else in a ditto way. Generally used Deep Learning methods to create deepfakes entail the use of generative neural network designs for training, such as Auto-encoders [21] or GANs (Generative Adversarial Networks) [20]. The source individual consequently imitates the objective individual and does activities or gives talks which can prompt deception publicity during political races influencing the fair appointive cycle, hampering the social picture of conspicuous characters or big-name slander and fake news. In 2018, an extremely brief video where previous US President Barack Obama is seen conveying a misleading message that won't ever say was released! [22]-[23]. It is plainly obvious that deepfakes can prompt a protected emergency, common and military agitation, cause strict and socio-political pressures between

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Extractive Text Summarization

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Abstract: *In this fast paced technological era, where huge quantity of information is generating on the internet day by day. Since the dotcom bubble burst back in 2000, technology has radically transformed our societies. So, it is necessary to provide the better mechanism to extract the useful information fast and most effectively. Automatic text summarization is one of the methods of identifying the important meaningful information in a document or set related document and compressing them into a shorter version preserving its overall meanings. It reduces the time required for reading whole document and also it reduces space that is needed for storing large amount of data. Automatic Text summarization has two approaches 1) Abstractive text summarization and 2) Extractive text summarization. In extractive text summarization only important information or sentence are extracted from the given text file or original document. Here we will discuss on extractive text summarization using sentence scoring and sentence ranking method.*

Keywords: Dotcom Bubble; Automatic Text Summarization; Abstractive Text Summarization; Extractive Text Summarization; Sentence Scoring; Sentence Ranking

I. Introduction

Data mining, also known as knowledge discovery in the data, is a process of uncovering patterns and other valuable information from the large data sets. Automatic text summarization is one of the Data mining techniques. There are two main types of automatic text summarization, as shown in the below diagram.

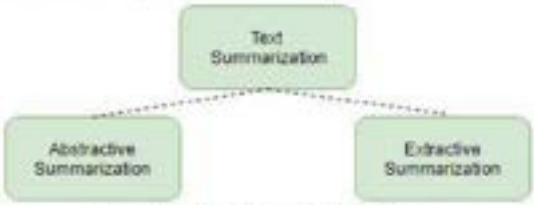

Figure 1: Types of Text Summarization.

In this article we will focus on extractive text summarization using sentence scoring method and sentence ranking method. An extractive text summarization approach uses linguistic or statistical features for selecting useful informative sentence. . Automatic text summarization problem has two sub-problems that is single document and multiple documents. In single document the single document is taken as the input and summarized information is extracted from that particular single document. In Multiple document the multiple documents of single topic is taken as an input and the output which is generated should be related to that topic. In this paper, we will see single document summarization using extractive method. Extractive text summarization using sentence ranking involves two phases: Pre-processing and Processing whereas the text summarization using sentence scoring involves four phases: - Pre-Processing, Sentence Scoring, Sentence Ranking, Summary Extraction.

To maintain proper flow of the content this paper is organized in various chapters; Second chapter is related works which includes several past documents, manuals, analysis papers which are already published and are associated with extractive text summarization. Third chapter will focus on the proposed approach for summarization, Fourth chapter will focus on the

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A Comprehensive Survey on Smart Attendance Monitoring System

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Abstract: *It is obligatory to talk over to a fruitful system that sets down the attendance of a student spontaneously. To focus on the attention of students and make them associated with discovering technologies, we try to move on to the latest upcoming trends on advancing the attendance systems. Without student intercession, this system operates on the face recognition method for automatic attendance of the students in a classroom environment. Traditionally, a roll-call is called to check if the student is present in the class or not, which ultimately takes our crucial time. So, in an urge to save time, the idea to measure individuals in a class spontaneously depending on face recognition is assimilated. To recognize the face of an individual we will be using face recognition technology.In this paper, using Deep Learning Algorithm we have evaluated a procedure for a precise smart attendance monitoring system. The in and out of individuals in a university or an organization is spotted in this approach as the first step. When an individual proceeds towards a CCTV camera near the doorway, automatically Individual's face is going to be detected and thus the arrival time is going to be put down. In the same way, while leaving their faces are going to be detected in other deep learning model imbibed in CCTV cameras ,and hence the leaving time is going to be put down. With the assistance of this method, we can get the attendance in terms of percentage for the time for which we have attended the lecture. The smart attendance monitoring system anticipated a bonus for the current method of attendance management.*

Keywords: Attendance, Convolutional Neural Network, Deep Learning, Image Processing

I. INTRODUCTION

In the Era of digital technology, where we are acting like computer's slaves. But by this, the life of humans has become much easier there's not necessarily safer. Within the whole world, one of the core problems is fake identity. In Today's technologies, more popular technology is digital biometric technologies for managing attendance most effective biometric is Face Detection. Traditional attendance system is longer monopolized because it needs time to sign on paper or call respective IDs. There is also a problem of getting a hardcopy of the attendance records when the attendance sheet may get misplace. [1] For supervising attendance tracking, a bio-metric approach allows the in-charge to track the in and out time only. Perhaps it does not count the real-time they are present if irregular in and out are not permitted. [2]Usually the image processing means process of constructing a picture finer along with variousother methods. A system of components or software which are in position to mark and detect an individual is called Face RecognitionFacial Recognition methods tends to figure in diversified appearance, but the one concept that holds true for any method is that the equivalent of facial expressions are selected uniquely [3] In general Face Recognition is built as a two-part problem, the primary is to detect a face within the image andthe second is to properly categorize the image. This could be translated into an Object Detection problem and ObjectClassification Problem. The matter statement for an object detection framework may be raised a hardship ofimage localization, meaning the neural network needs to know during which a part of the image lies the thing to be detectedand in addition to the boldness with which the Neural Network anticipates that the article is owned by a selected class [4] CNN is that the most popular and commonly employed algorithm. The benefit of CNN compared to its previous methods is that it spontaneously recognizes the appropriate features with no human supervision. CNN's are commonly used in a range of various fields, including computer vision, speech processing, Face Recognition, etc. [5] In this paper, we had reviewed various research papers for the Attendance Management System approach.

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Deep Neural Network Based SmartAttendance Monitoring System

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ABSTRACT

Students admitted to educational institutions are raising every year and taking each student's attendance plays a crucial role. Manually taking attendance is a great burden to the management of the Institute. To solve the above issue, a smart attendance management system comes into the picture. But maintaining privacy and security in the model is a big challenge. Biometrics is generally used to take smart attendance. One of the biometric methods is Face Recognition which we are using in our model. Face Recognition, which is the principal component of biometric verification is being used widely in various applications such as video monitoring and CCTV footage system. The issue of proxies is resolved using this proposed method. Detection and Recognition of the Face are the prime execution stages in this proposed system. In this paper, we are proposing a Smart Attendance monitoring System by using methods such as OpenCV, Haar-Cascade Classifier, and Convolutional Neural Network (CNN). After these, the detected faces are compared with the data stored in the database. The proposed system will be successfully implemented for organizing the attendance of students.

Keyword *: - Attendance, Convolutional Neural Network, Deep Learning, Image Processing*

1. INTRODUCTION

As we are moving towards digitalization, our tasks are shifted from human-operated tasks to machine operating tasks.[1] We have accommodated processes of a smart approach like in tourism, bank, and health care. We have algorithms developed for computer vision but we felt a need for the smart attendance monitoring system.[1] To record the attendance, we need an appropriate system to maintain consistency.[2] Two categories of the attendance monitoring system are used i.e. Manual Attendance System (MAS) and Automated Attendance System (AAS). Practically in the Manual Attendance System, taking attendance is a hectic task because we have to manage attendance sheets and records which is time-consuming. So to deal with this, we need an automated attendance management system. AAS reduces the burden on the management of attendance. [2] Automated attendance can be taken through biometrics such as face recognition, iris recognition, GAIT analysis, etc. From which we have implemented on Face Recognition Based Attendance Monitoring System. The identification quality is improved by two methods: face detection and identification of human faces. In the face detection model, HOG (Histogram of Oriented Gradient) is used for feature extraction and CNN is used for face recognition.

2. LITERATURE REVIEW

Halder, et. al [1] implemented a system that can be categorized as a real-time perspective. The system takes no extra time for any organization. This system will observe the in and out timings of people in an organization. When an individual enters, his/her face is captured and detected and entry time will get captured. In the same way, our time is also stored.

Pranav KB, et. al [2] proposed a system in which the initial evaluation is performed using standard AT&T datasets and after same is forwarded to the real-time method. Various parameters of CNN are used to improve the recognition accuracy of the proposed system. Sharma, et. al [3] proposed a system in which the image is directly fed as input, and CNN performs 2-D transformations such as translation, rotation, and scaling. Overall, fed image as input and divide it into two sets: Training image and Tested image. Later BOW approach is applied to extract features. Sawhney, et. al [4] implemented a System using Face Recognition Techniques by using Eigen face values, Principle Component Analysis (PCA), and Convolutional Neural Network (CNN). Thanh, et. al [5] proposed a system in which the face detection model used HOG (Histogram of Oriented Gradient) toextract facial features and CNN is used for the face recognition model.

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E-Lib Digital Library Management System using Flutter and Dart

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Abstract: *This research aims to see the implementation of the digital library application made using Flutter and dart. In the day-to-day life, people who are interested in reading books face many problems of carrying the books along and also not even every time possible to go to libraries. Hence, to overcome this problem we propose this model of "A digital E-library management system" which is an android application. The E-library management system which serves the purpose of a virtual library that users can carry anywhere, anytime. This application contains several different genres of books well processed, and systematically arranged. Method used for the implementation of the application are flutter and Dart The motive of this technology application is to create a taxi provider library for engineers running Android and iOS, the usage of Dart Object-Oriented Programming, Dio, and Retrofit. Design of a visual interface to gaining access to particular functionality from the library and create Android and iOS apps from its projects requires accelerating software development. consequently, the high- quality answer is for the designer to apply it. Flutter is an open-source SDK for enhancing high performance with the most reliable mobile apps for iOS and Android, primarily based on a single code base. Use for downloading providing certain information on the web service. All communications made via the REST API using the HTTP application only.*

Keywords: Digital Libraries, Flutter, Dart, Retrofit, REST API

I. INTRODUCTION

When we talk about the resource of knowledge the very first thing that comes into mind is the library. It is very certain libraries have been the only and profound resources of knowledge right from ancient days, In the ancient days a library means a building or room where the collection of different types of books or information resources are managed or stored to help the readers to get the required information and it is not for a sale .but this type of traditional library faced some problems like appoint the staff which is costly and required humans resources in the physical library, books cannot be used simultaneously only one at a time, physical libraries are limited to storage, library resources can not avail twenty-four by seven , also readers of the physical library need to go to the actual library often which can lead to overcrowding of the library so due to the global pandemic like the situationis not possible to go to libraries and the readers facing a problem of carrying the books along so the solution of this above problems of the traditional library we design digital library management system . A digital library is the extension or renovation of traditional libraries. A Digital library is converting the written book into digital format or archive files of the organization's database so the interested reader who wants to read the book can read the book through computers, mobiles the presence of an e- library should be used because it saves and makes readers more efficient by time because the readers himself does not need to be literally in the library, the readers can access the book by phones online so we design This project is an android application which full fills almost all demands of a reader. This app contains hundreds of books well processed, and systematically arranged. Books are categorized as per the languages so that reader can easily identify their native language and access the book easily. The app provides the facility of putting the books on the shelf i.e. those books which are put on shelf will appear in the forefront on the first page for ease of access. The app uses the latest technology Flutter for overall UI and Backend purposes. The data is well processed and fetched from remote server storage. those users who are interested in reading premium books can have the facility of taking a membership which is the paid one and hence this app also includes e-commerce. By keeping the UI simple and attractive the app gives the user a feel of having books indeed in their hands. To sum up, all things mentioned above, that project is an e-Library management

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Real Time Hand Gesture Recognition System

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Abstract: *With the rapid development of computer vision, the need to interact with the human machine is growing. Since hand gestures can convey rich information, hand gestures are widely used in robot control, smart furniture and other features [1][2]. Sign language is one way to communicate with deaf people. In these sets of functions, the features included and the linguistic diversity of the areas have been major obstacles that have led to small ISL research. One has to learn sign language to communicate with them. Learning often takes place in groups of peers. There are very few reading materials available for learning the signs. Because of this, the process of learning sign language is a daunting task. The first step is to learn to read a handwritten signature and, moreover, they are used if there is no corresponding sign available or the signatory is unaware of it. Most sign language tools are available using expensive external sensors. Our project aims to extend a step forward in the field by collecting data and using a variety of features to generate useful information to integrate useful information into various supervised learning strategies. Currently, we have reported four times the results of different approaches, and the difference in the previous work may have been due to the fact that in our four-fold verification, the verification set is accompanied by photos of a different person on the street. training set.*

Keywords: Data, Sign Language, Convolutional Neural Network, hand gestures

I. Introduction

With the advent of technology and the advancement of technology, the computer system has become a powerful machine designed to make human tasks easier. Because HCI (human communication - computer) has become an integral part of our lives. Now-a-days, advances and advances in computer technology have grown so fast that as human beings we could not even escape the consequences of this and it has become our big story. Technology is all around us and it has made so much of us in our lives that we use it for communication, shopping, work and even entertainment1. There are many applications such as media player, MS-office, Windows image manager etc. requiring a natural and accurate interface. Now-a-days many users use the keyboard, mouse, pen, Joystick etc. sharing computers, is not enough for them. In the near future, existing computer-assisted technology, communication and display will be a hindrance and advances in this technology will be needed to make the system as natural as possible [3].

However, the invention of mouse and keyboard by researchers and engineers has been a great success, there are still cases where computer interaction with the help of a keyboard and mouse may not be enough [3]. With the advent of human machine interaction, computer interactions with humans are becoming more and more common. Among them, hand gestures are often used in this aspect [2]. With the wide range of hand gestures and the rich information contained in it, hand gestures have been used extensively in many fields, such as UAVs, somatosensory play, sign language recognition, and so on. In this regard, it is very important to carefully study the touch of the hand.

The paper-based interaction system is also composed of three components such as hand splitting, hand tracking and hand detection. With regard to the action of the touch action, it is characterized by cutting a special hand gesture into a single video frame, and which is the first step in achieving the touch gesture. It mainly covers types based on skin colour, edge detection, movement information, mathematical model with different advantages and disadvantages respectively. The paper uses a fusion algorithm to obtain the separation of the touch of the hands in a complex area [1][2].

Sign Language (ASL) can represent English A-Z characters using finger spelling. It can be one or two hands and ASL follows two portable styles. It was issued to represent words that do not have the same punctuation or that are used to emphasize a word Although spelling is limited in common manuscripts, it is an important factor in learning sign language. This project aims to identify the characters of the alphabet in American Sign Language from the corresponding touches. Recognizing the touch and recognition of sign language has been a well-researched topic but few published research activities related to American Sign Language (ASL). But instead of using advanced technology such as gloves or Kinect, we aim to solve this problem using modern computer-assisted technologies and machine learning algorithms.

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Search Engine Algorithms

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Abstract: *A search engine algorithm is a complicated method that search engines like Google, Yahoo, and Bing use to estimate the importance of a web page. There are about 150,000,000 active websites on the Internet, according to Netcraft, an Internet research firm. There would be no way to tell which of these sites are worth users' attention and which simply spam without search engines are. Search engines collect a lot of information, which allows them to quickly decide if a site is spam or contains useful information. Search engines reward relevant sites with high rankings, whereas spam and unrelated sites might obtain extremely low rankings. There are three components to a search engine algorithm: crawling, indexing, and ranking.*

Keywords: Algorithm, Search engine, Crawling, Indexing and Ranking

I. INTRODUCTION

On the web, there are numbers of thousands of articles ready to present data on a wide range of informative and fascinating themes. Search Engines are messengers that provide the same information to you should you need it. The sad fact is that while there are millions more pages waiting to mislead you with misleading info formed by the writer's taste and desire. Search Engines are indeed the saviours in this circumstance, as they prohibit these fraudulent internet sites from coming out to you. When a certain user types in a search engine the search query, all of the shown pages in the index that are judged relevant are identified, as well as the algorithm is also used for rank the important passages hierarchically as a result in a set. Each search engine's algorithm for ranking the most effective findings is different.

II. LITERATURE REVIEW

Web search engines (WSEs) are used by people for study, browsing, and amusement. Without the assistance of a WSE, conducting such actions manually would be impossible due to the vast number of Websites. Furthermore, the usefulness of WSEs is always improving. One can acquire many URLs containing the appropriate contents by just querying the WSE with a few keywords. WSEs, on the other hand, aren't just confined to returning a list of URLs.

The WSE does a search and processes and stores a query (unstructured data). The WSE will save a chronology, the URL chosen by the user, and any other potential information gathered about the consumer throughout the search along with the query. The query log belongs to all this added meta data, and also the query itself. The WSEs process and analyse streams of query logs in order to construct and improve user profiles. Users should expect a better service as a result of this.

R. Khalil and N.A.K. Muhammad suggested a revolutionary technique that improves the efficiency of user search data. This approach establishes a link between searches, documents, and the user query. Take into account the semantic document structure as well as the user inquiry. The findings of the proposed approach are superior than those of earlier approaches. A modified page ranking algorithm was proposed by R. Seema and G. Upasana. On the ground of incoming visit links on pages, the new algorithm calculates page rank. The VOL algorithm was introduced PR algorithm that outperforms the original.

The results reveal that VOL is superior to the original PR method, and that pages with more incoming link visits have a higher rank value than pages with fewer visits. A method for determining the link-visit counts of Web pages is also shown, as well as a comparison of VOL and the PR algorithm.

J. Ayush offers a new technique for determining web page rank based on several parameters. Modified HITS is a suggested algorithm that improves on the HITS algorithm. It was created by extending the capabilities of the HITS algorithm. Six parameters are taken into account and used to calculate the web page rank.

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Detailed Review on Cloud Computing and Cloud Security

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Abstract: *In the era of Information, we have analyzed that many people are facing the problem of data handling, data storage, and data security. Another problem we have analyzed is that people want an integrated platform with greater accuracy and better security. To solve this problem, we have come up with a solution of integrated cloud storage and browsing application where the user will be allocated some space on the server where one can store their files in a separated and well-mannered form, which will help them to manage their content in an organized manner. We will also provide a marketplace for the user so they can get some required media files from there, which may give integrity to users. For the backend, we will use the concept of data compression using a backpropagation algorithm (using neural networks) which will help to user store more files in a compressed manner on the server. The data will be encrypted using cryptography algorithms, which will increase the security of data by multiple times.*

Keywords: Data Compression, Cryptography, Data Security, Space Allocation, Data Encryption, Neural Networks

I. Introduction

Cloud computing is one of the emerging technology which enables the user to remotely access the information, resources, and infrastructure of any computing device. The resources are located on a central server to which the clients have to access. Clients are given particular login credentials with which a client can log in to the server and can perform the task, and further log out once the task is done. Cloud computing reduces the individual hardware as well as the software production and even reduces the task of maintenance for any individual client. Depending on the usage, resources and software can be dynamically allocated to the client as any cloud uses a pay-as-you-go model in which the user has to pay only for that resource which he is using and dynamically increase or decrease. The further will cover in-depth knowledge regarding cloud computing. The three main objectives of this cloud storage system are

1. **Durability:** Data should be stored at multiple places in multiple parts so that it will become more secure. Natural disasters, mechanical faults, or human error should not result in data loss.
2. **Availability:** The user's data should be available whenever needed free of cost. Users can access to his/her data through the internet using a secured ID and Password anywhere.
3. **Security:** Ideally all data is encrypted, using the most secure encryption technology to increase the security level of users' data. Also, there is a requirement of a unique ID as well as its matching password to access that data from a server that is only known to the user

II. Literature Survey

G. Deepika in the paper "Holographic Versatile Disk" in 2011 stated that the future of optical drives can be holographic versatile disks due to various reasons such as capacity, durability, and operational functionality. The data has to be converted to its equivalent binary format. This 3 D structure is called a hologram. This hologram is further implanted in the disk in the form of an interference fringe pattern (Light and dark patterns of light). In this way, data can be recorded on the disk, and to read this data, the same reference beam is used at a particular angle and the projection of previously stored data can be retrieved for further use. This can be implemented in cloud servers for storage.

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Online IDE for Web Based Learning

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Abstract: *A atmosphere of program-based mobility could have numerous advantages. For instance, a substantial online application is wanted, and the client needs persuading clarification to finish difficult. instrument installation and update procedures. This project will also eliminate the need for expensive and imaginative standard programming equipment's, such as workspaces or workstations, because clients can do so with the help of our foundation Cloud IDE, which requires only a working web affiliation and a standard web program and is accessible on a variety of devices, including phones, tablets, and computers. With security layers, denial of unauthorized access, and data debasement, the stage will be completely safe. In this paper we present a web-Application, Website utilizing which IT jobseeker's/understudies will actually want to rehearse information construction and calculation in organized and proficient way. Site will comprise of an IDE(Integrated Development Environment) utilizing which individuals will run their program(related to DSA) in any dialects like java, c/c++, Go and JavaScript and so on..*

Keywords: Multi Language Cloud IDE, E-Mentoring, Online Learning Platform, Data Structures and Algorithms

I. INTRODUCTION

Site will comprise of three significant parts. Initial one is all the problems(related to DSA) statements and test-cases related with the issue for that we need to make a Database which compeises of all information that is connected with that problem, and second one comprise of IDE(Integrated Development Environment) which will compile code in various languages(like C/C++ ,Java, Go, JavaScript and so forth) for that we gone use Joodle/Sphere api service to get the results in various languages , and third one comprise of data of client structure site. datalike how many problems are solved by the user and what contributions are made by the user and what blogs are published by the user.

Cloud Based Integrated Development Environment

On a more fundamental level, IDEs provide customers with interfaces via which they may write code, coordinate message groupings, and automate programming redundancies. IDEs, on the other hand, combine the benefits of several programming methods into a single package. Some IDEs are focused on a single programming language, such as Python or Java, while many are multilingual. When it comes to content editing, IDEs often include or allow the insertion of structures and component libraries to extend base-level code. Throughout the creative process, one or more clients create progressive systems in the IDE and distribute code to their designated district. Groupings can be strung together, gathered, and constructed from these. Most IDEs come with built-in debuggers that operate on the form. Visual debuggers are a valuable feature of many IDEs. Clients are shown which sections of code have difficulties if any bugs or errors are found.

Advantages of Integrated Development Environments

There are several reasons to use an IDE, the most of them are on programming development. Most engineers use source code editors, debuggers, and compilers; therefore, this step puts them all together. This allows users to write, test, and cycle code in a single environment..

Bringing together these instruments likewise makes it simpler to explore the source code being referred to. Many incorporate extra capacities to test, put together and refactor code. Extra highlights, for example, autocomplete, alongside construct and arrangement capacities, fundamentally extend a designer's abilities and further develop their improvement speed.

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Hospital and Blood Donar Finding System using Android

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Abstract: *The fast increase of information and communication technology (ICTs) makes it viable to apply them to a international healthcare corporation. Many features are covered in this android app .Distinctive styles of health facility search apps built on android smartphones that assist humans in want. The affected person can seek advice from scientific centers based on his or her wishes. This app presents available health center and physician statistics based totally at the affected person's immediately region. The nearest role of the clinical center is calculated by means of the internal-grained GPS energy of the smartphone. A elucidative in keeping with-lustration of different hospitals in Pondicherry become advanced to attain a scientific list of scientific personnel available at every scientific facility. This app is released with simply one click on when you are facing a restriction. With a one-click hospital provider, the consumer can locate close by hospitals with centers and show a listing of available specialist doctors and the consumer can view and phone your nearest blood donor. Interested users also can sign in as members the use of this app. Our application considerably reduces the time required to searching out blood donors and hospitals for the required blood organization and the scientific facilities wanted regionally. Consequently, our utility affords the vital records (effects) in a short time and allows making selections quicker.*

Keywords: Android application, Global Positioning system, Hospitals, Blood Donors.

I. Introduction

The cutting-edge smartphones have made excellent gains with excessive RAM, as well as a low-quit save and a number of additional capabilities. Android OS is usually utilized by the phone builder as it is an open supply.Sensors are used as closed hardware in android phones. There are numerous conflicting sources (programs) available for release inside the Google Play store. Each day 1000 superior applications are broadcast on an internet website. Such packages are abused on fitness cell phones. Many machines decide the region of fitness clinics, health centers, and concrete hospitals. Dependable and timely facts is available from every clinical man or woman and the medical facility. The following information enables to assess and choose an AOS platform for this health center finder app. an in depth image of the Android software framework from the perspective of the developer is offered inside the Android discussion board and application. A simple song participant is provided to emphasize the in-app features of the Android app

II. Need For Medical Applications

With the supply of Android, it's far a testimony to the fact that the phone device has extra apps in comparison to previous fashions and the web publishing of most hand-held devices via the majority within the global. Consequently, the principle purpose of the "hospital and blood transfusion program" is to make a request from that user who may have a place to trade the gap or who can use the limit set through the regulator. With the help of this application and the restriction stated by using the user or administrator can see close by hospitals the usage of the Google Maps application software Interface (API) as well as to be had assets and health facility lists. In addition, inside the event of a blood transfusion, the person can be able to pick out the closest donor who has his or her address, touch numbers, and blood organization. The consumer can also register them as donors by way of coming into their blood data, contact number and address.

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Analysis of Problems Faced by the Indian Students to Apply for Higher Education at Foreign Universities

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Abstract: *The main problem for students who want to apply to abroad universities for further studies is that they do not know which university suits their profile and which university they should target. More than 750,000 Indian students were reported to be studying in foreign schools in 2018, according to the Indian Ministry of External Affairs. There is a need for a discussion on this topic, between applicants and the universities to help them accordingly and to clarify the doubts which are arising in their minds reaching them with maximum help for their admits. Also, there are multiple factors that affect the individual's thinking for the same. This paper is based on the research work done to enlist the problems faced by students while applying for further studies abroad at universities.*

Keywords: International students, Study, Challenges, Students from India, Higher education, Student migration

I. INTRODUCTION

Studying abroad is becoming increasingly popular, and many nations are working hard to attract more international students. Nearly 4.5 million postsecondary students are anticipated to be studying outside of their home country, with Asian countries accounting for about 53% of them (OECD, 2013). Between 6.5 and 7% of overseas students are expected to increase each year. During the academic year 2014-2015, around one million international students, mostly from China, India, South Korea, and Saudi Arabia, studied in various educational institutions in the United States (Institute of International Education, 2016). The United States, the United Kingdom, Australia, Germany, France, and Canada are the top six nations that host about half of all overseas students. International student migration (ISM) has increased dramatically in recent years, and there is now a large body of literature on the subject, including multiple monographs and edited collections. (Alberts and Hazen 2013; Baas 2012; Bilecen 2014; Brooks and Waters 2011; Byram and Dervin 2008; de Wit et al. 2008; Gürtür 2008; King and Raghuram 2013; Robertson 2013; van Mol 2014; Waters and Brooks 2011) [1]. There are various advantages to receiving an education in a country with a strong educational system and a positive learning culture. International students, on the other hand, encounter a variety of hurdles while pursuing their education in another country.

New rivals are entering the global talent competition at the same time as individuals' interest in higher education grows. Competition is intensifying among an increasing number of educational institutions, and it is spreading to national governments, which are implementing active promotion campaigns and implementing targeted immigration laws. Many industrialized countries are altering their policies to make themselves more appealing to highly skilled migrants, with increased student mobility being one of the techniques used to accomplish this aim. To attract international students, governmental initiatives such as easy and transparent visa access, the ability to work while studying, and extended job-search periods following graduation have been implemented.

Different teaching styles, low language proficiency, academic expectations and assessment that differ from home countries, unfamiliar living conditions, personal apprehensions, financial hardship, personal safety issues, unfamiliar local healthcare system, difficulty adjusting to different weather and food, social and cultural isolation, and separation from family and friends are just a few of the challenges. The review is based on the findings of challenges and studies of the students pursuing abroad studies.

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CityServices

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Abstract: *In this covid pandemic situation, small-scale entrepreneurs suffered due to lockdown as well as common people were unable to get most of the services at their doorstep. In the current scenario, we people are so into technology that we don't want to make too many efforts to get things done we always wanted an easy way to get things done in lesser time as well. Suppose any of your appliances breaks down, let's say your cooler breaks down in hot summer then it would be a very tedious task to go out in summer and find a repairing person to overcome such situation our application "CityService" will come into the picture. So this project is all about providing the household services at your doorstep by finding the nearest professional at your fingertips. Similarly, the app would help small-scale entrepreneurs to grow faster and reach out to many customers in the city.*

Keywords: CityService

I. INTRODUCTION

CityServices app is the new trend in the market of on-Demand applications. With proper market research, the inclusion of vital features, followed by appropriate marketing can make the app successful. The demand for CityServices Application will be on the rise as we imagine we all want an Irona in our lives. The age-old casters are not going to cause you any worries anymore. The trusted CityServices application with professional and qualified personnel can repair and fix everything around your home in an efficient manner. Problems get accentuated with rapid urbanization, rising incomes, and an abundance of low-cost workers. People are constantly in a hurry and are willing to pay more to ensure a certain level of service. The only other option available when scouting for these handymen is to avail of the services of inept search directories and run the risk of being bombarded by incessant calls. Moreover, with smartphones being the preferred gateway to these services for most people and with monumental growth in its penetration across the country. As the existing application "Urban Clap" is only available in metro cities, this application extends its reach to all the cities across India. This Application also aims to implement a contract-based model for flats around the city as an add-on service to their apartments at a reasonable amount.[1]

2. EXISTING SYSTEM

2.1 Urban Clap

"Urban Clap is an app-based service marketplace that connects customers to service professionals. Their strategy is to connect more and more customers to use the platform of Urban Clap to make their life easier and more comfortable. With the rise in Nuclear families, Dual Career couples, the focus of customers is to spend quality time with their families whenever possible. Services at the doorstep at one click of the mouse are welcoming change accepted by customers today, giving rise to a business model like Urban Clap, which is here to stay for a long time. However, the success of these businesses is well dependent on how successfully Urban Clap can meet the expectations of its customers, reduce their pain and provide overwhelming satisfaction to its customer base."

2.2 Forfix

"Forifix is an Integrated Pest Management venture, launched on September 5, Defense Day as a shield against the domestic terrorists (Pests and their pollutants) in and around the facilities. It addresses a significant gap between a serious pain point in every household and the horrid solutions available that one could ever risk. Forifix offers Pest Prevention with Safer, Odorless, and environment-friendly products approved by WHO/EPA and FDA. In addition to this, they provide Heat Proofing and Water Tank Cleaning and Home Improvement with allied repair and maintenance services."

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Predictive Web Portal for Indian Students to Apply for Higher Education at Foreign Universities

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ABSTRACT

The fundamental issue for understudies who need to apply to colleges in the USA for additional examinations is that they don't have the foggiest idea, of which college suits their profile and which college they ought to target. The principal issue for understudies who need to apply to colleges in the USA for additional examinations is that they don't have the foggiest idea, of which college suits their profile and which college they ought to target. We intend to have a choice page (admits and rejects), a college search page (a rundown of the multitude of colleges and their data, for example, college joins, necessities, application charges, school expenses, and so on), and a segment that will assist understudies with interfacing with different understudies. It intends to convey significantly more as we develop. At GetAdmit, our only object is to make a web application that could take special care of the relative multitude of necessities of a hopeful understudy who needs to concentrate abroad.

1. INTRODUCTION

Web applications are evolving at a faster pace than the Internet. The phrase "web application" refers to a product framework that provides a user interface via a web browser. Sites, online commerce, web crawlers, and other web apps are examples of web applications. Web apps might be simple, consisting solely of static site pages, or dynamic and intelligent. A web application saves money for both the end-user and the company. In light of the fact that changes are applied midway, web apps are normally uncommon. Clients may access a comparable form for everything, which eliminates any difficulties with similarity. With an internet browser, customers can access web apps from anywhere. Web applications recover and store data by utilizing server-side contents (in prearranging dialects like PHP and ASP), while client-side contents (in JavaScript and HTML5)

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Use of OCR Technology for Data Extraction Using Amazon Textract

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Abstract: *In the digital era of twenty first century, everything is becoming automated, and information is stored and transfer in digital forms. But there are many situations where data is not stored in digital form and it is essential to extract text from those hardcopies to store in digitized form. The latest technology such as Text recognition software has completely changed the process of text extraction using Optical Character Recognition. Therefore, this paper introduces the concept of OCR technology, explains the process of extraction using Amazon Textract tool and current research in the area. Detailed information and working methodology of Amazon Textract. Its comparison with other OCR tools and its scope. This paper will help other researchers in the field to get an overview of the technology.*

Keywords: Amazon Textract, Optical Character Recognition, Machine Learning, Google AI

I. Introduction

Optical Character Recognition (OCR) is the machine learning tool use for conversion of text or making a digital copy of the text. It takes resources through handwritten documents, printed text, or from natural images. Optical character recognition is a science that enables us to translate various types of documents or images into analysable, editable and searchable data. The objective of this research paper is to study the use of Optical Character Recognition with Amazon Textract tool and its comparison over other OCR tools available in the market.

In this Research paper, we collected and analyzed research articles on the topic of OCR technology and closely related topics which were published between year 2015 to 2021. Articles were searched using keywords, forward reference searching and backward reference searching in order to search all the articles related to the topic. OCR is a field that has applications in pretty much every other field like in Health care division, Data Extraction, Data Storage, Banking segment, etc.

II. Literature Review

For what reason to involve Amazon Artificial Intelligence and Machine Learning administrations for report robotization?

By utilizing Amazon Web Services Artificial intelligence and Machine Learning administrations to control report handling helps associations and reduce work to each shape type. Amazon Textract gets it and understands records and structures without requiring any broad pre-work to get the structure's design. All things considered, the AI-based approach gets the substance in view of the actual design, in any event, separating the information held in tables or structures and planning that into machine meaningful constructions to demonstrate what has been written in each piece of a structure by planning those qualities to their individual information fields.

- Increase and down depending on the situation: Business tasks are frequently tested by overseeing tops sought after, for instance, during application cut-off times or during occasions like the COVID-19 pandemic. Adaptability and current serverless cloud models are critical, which help rapidly increase to handle enormous volume of reports and afterward proportional down, limiting the continuous expenses right away.
- Join human and AI mastery to affirm or address information passage all the more effectively and rapidly: Tightly incorporated expanded AI banners to a human analyst the parts of structures which the AI couldn't peruse without

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Electric Vehicle Charging Station Finding App

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Abstract: *We are living in 21st century where all the work is done using technology and has become an integrated part of life. In this article we proposed the design and implementation of an electric vehicle (EV) charging station finder application developed in android studio using Java and Kotlin language. Due to the limitation of electrical power distribution network, Electric Vehicles charging stations are limited and to find them is hard for new EV owner. In order to provide information to users about the charging stations and to help user to navigate, it was also created a mobile application to help the EV owners on these processes. This Proposed EV finder Application helps EV owners to locate a charging station near them and to plan a journey and with many features.*

Keywords: Android Application Development, Kotlin, Java, In-Built Map, Navigation

I. Introduction

New industries are emerging, like Electric Vehicles (EV). As in India Electric vehicles Sales are increasing. As mentioned in a below chart.

Figure 1.1: Indian Electric Vehicle Market Summary

As of now electric charging stations are limited in India due to which people can't find the right charging station which will save their time and money. EV charging stations requires space like parks, malls, societies. For private and semi-public charging stations, this space is available in the parking areas of the societies, apartment buildings, or of commercial or public or institutional areas. Due to this there is more difficulty for EV owners to find charging stations nearby them.

The problem is not only to find the charging station but also to charge it quickly because of the time required to charge the EV's. This leads to inconvenience of EV users as requires a lot of time so need of slot booking is require in the charging of EV's. As electrical vehicle industry is growing in India and less charging stations are available India and also new

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Social Media Application Development in Android with Firebase

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Abstract: *Sharing thoughts and information through internet has become crucial these days. An online writing enables the users to communicate with other people in a fast and convenient way. Considering this, the online writing application must be able to share the content or any other useful text in a faster way with minimum delay or with no delay. Firebase is one of the platform that provides a real-time database and cloud services which allows the developer to create these applications with ease. Instant writing can be considered as a platform to maintain communication. Android offers a better platform to develop various applications for instant writing compared to other platforms such as iOS. The main objective of this paper is to present a software application where people across the globe with similar interests can connect with each other and share their thoughts, insight, and emotions. The application developed will enable the writers to share their amazing content with the readers and also with the fellow writers. This application will be based on Android with the backend provided by Google Firebase.*

Keywords: Android App; Content Writing; Firebase; Social Media; Reader Response

I. INTRODUCTION

These days, no application is focusing on the valuable content of writers. There are a variety of social networking applications available, but none of them are solely dedicated to writing. So, keeping this in mind we will be developing an application which will give that privilege to writers to share their amazing content with the readers and also with the fellow writers.

In this project, we will be introducing an application for content writers and readers. "Writocity" will be an app where users can create a "Writer" or "Reader" account, and writers will be able to add new articles to their profile for readers and fellow writers to read, like, comment on, and rate.

The application will be developed to revoke the problems prevailing in practicing the typical writing system. This App can be an attempt to wipe out and in some cases reduce the troubles faced by the existing system. Moreover, this App will be designed for the particular need of the individual to carry out operations in a smooth and effective manner. The application will be built using Android studio for the structural and the main part. It will be an effective effort to showcase the remarkable content of writers and increase people's interest in reading.

This isn't the first paper to advocate for a reader-centered approach. In the 1960s and 1970s, literary theory shifted from focusing solely on the literary object to incorporating the reader's response to the literature. Reader-response theory, often known as reader-response criticism, focuses on the audience's response and interpretation of the text rather than the literature itself. The reader isn't merely a passive recipient of information; he or she is also involved in an active evaluation process. Reality and meaning exist neither solely in the text nor solely in the reader, but are built through the dialectic interactions between the two. Similarly, the reality and significance of writing are found not merely in the writer or the reader, but rather in the reader's active comprehension and interaction with the blog. Commenting, linking, tagging, and trackbacks, for example, allow for a level of direct involvement with both the text and the author that was previously unavailable in textual media. This paper asserts for a shift in the building of a creative writing system similar to that in literary criticism represented by reader response theory.

Now, you must be pondering over the reason behind developing the Writocity application. For that, we would like to put-forth some distinctions between our application and other existing applications.

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Effect of COVID work from home on the health of students based on the active step counts per day

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Abstract —**Over recent years the world has seen a spike in the working from home due to COVID-19 and usage of electronic devices like Laptops and mobiles has been increased. The COVID-19 pandemic has a negative influence on physical health because to the long-term pandemic situation and onerous measures such as lockdown and stay-at-home directives. Their physical activity was diminished, their screen timing was increased, now when we track these activities, their physical health was reduced. We propose that we will calculate the impact of this adverse effect using BMI, number of active step counts taken in a day. Technology used in this project will be Data Science, Python and latest Web Frameworks mainly Flask, Django, etc.**

Index Terms*—*COVID-19, Health monitoring system, Data Science, e-Health, Analysis, Healthcare, Machine Learning

I. INTRODUCTION

Mental health problems are taking a severe toll on students during the epidemic of COVID-19. Anxiety symptoms, depression symptoms, post-traumatic stress symptoms, and dread of COVID-19 have all increased among them. Adding to it, their physical activity was diminished. Comparatively, Screen timing has been increased.Physical exercise, food intake, communication with co-workers, children at home, distractions while working, adjusted work hours, workstation set-up, and satisfaction with workspace indoor environmental factors were all linked to decreased overall physical and mental well-being after working from home.At this time, one can't justify the health with the working issues. It is difficult for them to look upon the hazardous effects caused due to the pandemic on their health.

Our objective is to analyse whether a person is leading to a healthy lifestyle, or is affected by the Covid scenario. For doing this we need to collect data from ample amount of students in the form of survey. We need to pre- process this data & create it in a model.This model will be analyzed further on the best fit and for accurate estimation score. The main objective of the project is to calculate the impact of this adverse effect using BMI, number of active step counts taken in a day.

II. LITERATURE SURVEY

We explored various documents, manuals, and analysis papers that are related to our project ideas. The following are some of the literatures that we have found to be helpful in understanding the various approaches or methodologies for developing this project.

Gianni D'Angelo et al., in "Enhancing COVID-19 tracking apps with human activity recognition using a deep convolutional neural network and HAR images" in 2022. A Convolutional Deep Neural Network-based human activity classifier is used. It also includes method to enhance the performance of the COVID-19 tracking apps through the detection of human activity recognition (HAR). The accuracy of the k-fold cross-validation results obtained with a real dataset was very close to 100 percent [1].

Geery Wolfe et al., in "COVID-19 Candidate Treatments, a Data Analytics Approach" in 2020. The goal of this project is to organise the literature on pulmonary diseases and their impact on COVID-19. There was a massive amount of unstructured information. The unstructured data continued to grow, and the data schema evolved. This necessitated the data being pickled at some point. Without the extensive use of computational power and machine learning algorithms, the project would have yielded certain insights that would not have been apparent otherwise. It's also focused on some human mobility dynamics and their impact on COVID-19 cases. We used the MTI transportation and social distancing dataset [2].

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SQL Detection Tool

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Abstract: *There are so many website which are poorly coded by some coders through we find software vulnerabilities that can be exploited maliciously data. Web application vulnerability scanners are thought to be a simple way to test website with great parameters against security checks. Previous research has shown these tools are useless in web services contexts. And also , the great false positive rate and deep similarities observed in fact show the tools' serious limits. The goal of this paper is to illustrate that a vulnerability tool for website can be make in such way that the tool which we are making is good enough in case of another tools which are roaming in the market. As a consequence, we propose a method for detecting SQL Injection vulnerabilities, are so much common and used types of web problems. Our project demonstrates the development of a web SQLi scanning tool with additional features that will allow for more effective web scanning and penetration testing of websites to identify if they are vulnerable. This tool can automate the vulnerability testing process, making it simple for even inexperienced testers who aren't knowledgeable in hacking techniques to secure their online application against any such attacks.*

Keywords: SQL Scanner, Pen Testing, Bug Fixing, Vulnerabilities.

SQL Injection Attack on servers.

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Remote Healthcare Monitoring System Using IOT

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ABSTRACT

The recent advancements in technology and the availability of the Internet make it possible to connect various devices that can communicate with each other and share data. The Internet of Things (IoT) is a new concept that allows users to connect various sensors and smart devices to collect real-time data from the environment. In hospitals, continuous monitoring is needed for heart attacks, after major/minor operations, temperature-related illness, and physical disorders. But the 24x7 monitoring of patients is difficult and also leads to high costs. Of many chronic illnesses hypertension has become common yet a serious disease that remains the root cause of major cardiac mortality and stroke mortality. This paper proposed a low-cost and easy-to-use remote healthcare monitoring system for hypertensive patients based on IoT. A bio-signal sensor and a microcontroller are the major components of the system. The data has been collected by the bio-signal sensor and is transmitted to an intelligent server. The IoT system can monitor the location of the patient. The proposed system consists of a body sensor network that is used to measure and collect Physiological data of the patient. In case of an emergency, the caretaker and doctor are intimated through a short message service for providing adequate help.

1. INTRODUCTION

Day by Day the world's population as well as chronic health problems would be increasing and needs to develop an efficient and good healthcare system for maintaining the healthy life of people. The number of users allows connecting the various resources like sensors and collecting the real-time data for processing. Especially for the old age health problem patient needs continuous monitoring but 24 * 7 continuous monitoring is difficult because such a system leads to high cost. A remote health monitoring system is an extension of a hospital medical system where a patient's vital body state can be monitored remotely. Traditionally the detection systems were only found in hospitals and were characterized by huge and complex circuitry which required high power consumption. Continuous advances in the semiconductor technology industry have led to sensors and microcontrollers that are smaller in size, faster in operation, low in power consumption, and affordable in cost. This has further seen development in the remote monitoring of vital life signs of patients, especially the elderly. Remote health monitoring can provide

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Development of Mechanical Fuel Injector Testing Machine in Cost Effective Manner

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Abstract: *When gasoline injectors get contaminated, it creates block in gasoline glide and incapable to allow spray sample for idea combustion. In the current marketplace Fuel Injector testing computing device is used to test the injectors with the contribution of controlled spray system for gasoline. Our team designed and fabricated a manner fuel injector testing machine at very cost-effective price which is 10 time less than existing machine present in market. Our project work explaining how we convert electrical gasoline injection machine into mechanical kind fuel injection machine is price effective, physically operated, multiple flow, single man powered and equally environment friendly with electrical system.*

Keywords: Injector, Air Cylinder, Fuel Cylinder, etc.

I. INTRODUCTION

Fuel injectors are designed to deliver a high-pressure mist of gasoline into consumption air, growing the explosive air-fuel mixture quintessential to electricity a vehicle. However, gas impurities will go away deposits in injectors, inflicting them to breakdown. Even if an injector isn't absolutely clogged, any obstruction of the gas go with the flow will trade the traits of the gasoline mist into the engine. Fuel that mixes poorly with the intake air is more difficult to ignite and burns less efficiently than well-mixed fuel. This is the most important problem caused by way of a soiled fuel injector. In turn, a vehicle will suffer from terrible gas mileage, more difficult starts, sluggish performance, greater dangerous emissions, and terrible idling. To fix fuel injectors' maximum overall performance and assist a car run like new, a driver needs a solution that will dissolve these deposits on their gas injectors. Fuel injector cleaners will do just that. Effectively detoxifying your vehicle, these solvents have a tendency to include a detergent like polyisobutylene to dispose of sediment and construct up, polyether amine to rain the molecular bonds of strong deposits, and/or polyisobutylene amine to get rid of moisture.

II. LITERATURE REVIEW

Schuckert et al. explored the connection between aging of injector and fuel conveyance rate. The results showed that decreased cross segment of the injector openings because of store development doesn't be guaranteed to prompt diminished fuel conveyance rate at short infusion times. Water driven peculiarities cause the infusion time to be longer at a similar stimulating time, in this way making up for the lower fuel stream rate.

Hofmann et al. proposed a calculation for infusion procedure amendment to make up for changes coming about because of aging of injector.

A later pattern in fuel infusion reproduction has been trailed by **Smith and Timoney (1992)**. Their methodology has been to re-enact the nozzle just and utilize tentatively estimated boundaries as contributions to these models. These information sources can comprise of the line pressure (nozzle end), the needle lift or even the ignition chamber pressure. The utilization of trial inputs diminishes the requirement of modelling and decreases the requirement for 're-tuning' constants for the most part connected with factors like leakage of fuel.

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Fabrication of Robot to Assist the Firefighter

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Abstract: *As the human population and technology have improved, the number of fires has increased. Because of human limits and a poor environment, fire suppression is a difficult and demanding undertaking. Manually extinguishing a fire is a potentially fatal task. Robotics is a rapidly evolving solution for protecting people and the environment. The purpose of this project is to develop a remote-control firefighting robot using Bluetooth technology. The robotic vehicle is equipped with a water tank and a water pump that is operated via wireless communication. This robot is connected to over mobile phone through Bluetooth model for giving the command to perform the task.*

Keywords: Robot.

I. INTRODUCTION

Robot is a machine which perform a multiple task easy or complex work for human being. In this paper proposed a robot to assist the firefighter or to help the firefighters to handle the fire situation and our life's. This robot has a Bluetooth module that sends signals to the microcontroller, which then activates the pump, which sprays water on the fire to put it out. A mobile phone is used to control this robot. Environmental fire sensing and proportional motor control are implemented in this robot. The motor driver is responsible for bidirectional control of the robot's motors. With the help of Bluetooth, the robot receives all motion control instructions.

Thus, the element is Bluetooth module and Arduino UNO board microcontroller. But the part is the programming of the Arduino, for programming we were using the C and C++ language and the software is Arduino IDE programming software. It is easily available in internet or google. This software runs on any designed computers like Window, Mac etc. The main thing on this programming software is operated anyone easily and program.

II. LITERATURE REVIEW

Firefighting is a risky business in today's world. Many authors are working on various firefighting strategies. Ratnesh Malik et al. created a method for developing a firefighting robot. The robot has been conceived and built to be able to put out fires. The robot has semi-autonomous capabilities. It incorporates concepts like as sensing and proportional motor control. The robot collects data from sensors and sends it to the Arduino UNO, which then sends commands to the motor drivers, allowing the robot to function. The robot then activates an electrical valve, which sprays water over the blaze. This robot is utilized in dangerous situations where human lives are at risk.

Kristi Kokasih and colleagues created an intelligent firefighting tank robot. Tank robot is constructed of acrylic, plastic, aluminum, and iron. Two servo motors, two DC motors, a flame detector, a white detector (IR and photo transistor), and a micro switch sensor are among the robot's components. The goal is to search a specific area, find and extinguish the flame for various flame positions and room configurations with disturbance.

Swati Deshmukh et al. created a wireless firefighting robot. It consists of a machine that can detect and extinguish fires. The firefighting robot can move in both forward and reverse directions, as well as turn left and right. As a result, fire fighters can control the robot from afar, eliminating the need for humans to be present near the fire. For fire detection, light dependent resistors are used. These resistors are extremely sensitive devices that can detect very small fires. The robot guards the home, buildings, factory, and laboratory. It is a multisensory intelligent security system that includes a firefighting system in everyday life.

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Development of Low Maintenance Desert Cooler

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Abstract: *In this research paper we have discussed the utilization of a cooler for air cooling as well as refrigeration. The purpose of this paper is to design modification of the existing design of, in which aspen pad frame, wire connection box, pipe water distribution system, fruit and vegetable box is made. All the modification done for easy maintenance of desert cooler and fruit and vegetable box made Keep Fresh vegetables for long time. The proposed model is experimentally validated by conducting a series of experiments in a controlled atmosphere inside a room for fruit and vegetable box. Box is loaded with fruits and vegetables. Also the number of trial is conducted for easy maintenance of desert cooler.*

Keywords: Aspen pad frame, wire connection box, Pipe water distribution system, Fruit and vegetable box

I. INTRODUCTION

India is a typical country in which most of the regions experience very high temperatures during the summer seasons. That is the temperature range between summer and winter seasons are very large. Hence, it is not a very pleasant experience and highly uncomfortable. Though cheaper methods of cooling down the hot temperatures during the summer do not have wide variety of option. Air conditioners have high initial and running costs, which cannot be afforded by all the people in a developing country like India. Air coolers are relatively cheap, but provide unsatisfactory results; there is a need for developing a cheaper room cooling system. Conventional air conditioning is one of the major contributors of CFCs into the atmosphere. An alternative type of cooling, which does not expel CFCs is highly desirable as one important step in the correction of this problem.

II. LITERATURE REVIEW

In this paper Ashok Kumar Sharma and Pawan Bishnoi describes that the methods of designing and manufacturing of desert cooler. A test setup is presented which was prepared to test the effectiveness of this developed cooler. The methodology of testing and test data are also presented.
A Modified Desert Cooler (MDC) was introduced that cools the air is therefore more effective than the traditional desert cooler. The modified desert cooler is developed for providing better cooling effect than conventional desert cooler. It also provides cold pure water for drinking purpose comparatively at low cost than Refrigerator with the help of modifies Matka attached with it. It also decreased moisture content of the air coming through desert cooler upto some extent.
Poonia M.P. A et al. have produced a Cooler cum fridge that offers air cooling, cooling Drinking water and with storing vegetables and medication affecting the productivity of the hotter desert. It's an energy saver. Equipment that is useful.
A Desert Cooler performance was investigated by Khond. Four distinct pad materials are used, i.e. stainless steel wire mesh, Khus, coconut coir, and wood fur. It was noted by them that in stainless steel wire mesh, the minimum water consumption was found and maximum cooling performance was found using wood wool.

III. PROBLEM STATEMENT

The desert cooler is need the one time maintenance when summer season is starts or if any problems occurs in desert cooler or cooler is under maintenance its require lots of efforts and time to dissembled the cooler and repair it. Whole system get unstable because all sides wall are bounded to each other and it. To overcome this problem we proposed the solution is given bellow.

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Design and Development of Puncture Kit

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Abstract: *Demand of customers in term of ergonomics, aesthetics and efficient engine are also increasing. Customer expects that vehicle which they purchase should be resistance to all type of failure or company should provide easy solution whenever they get any problem in their vehicle. In other words, human factor involved while handling sick vehicle should be very ergonomic. If a customer's vehicle has a punctured tyre or a flat tyre, it is a dangerous situation that disrupts their thoughts, causes anxiety, and causes health problems if they are forced to tow the punctured vehicle. When dragging a ruptured vehicle, the tyre is also damaged. It's a novel idea for assisting drivers in effortlessly pulling their vehicle to a repair shop. The puncture kit is a rescue equipment meant to assist vehicles that may experience wheel troubles in continuing their journey by providing quick remedies to the issue. When wheel encountered a problem (flat tyre, burst tyre, dislodged tyre, brake jammed, bearing jammed) and our solution is to provide a simpler and more stable structure which the front plate and rear plate of the smart auxiliary kit will hold the hold the punctured tire and then user can drive normally at the speed of 20 km/h. This product not only provide quick solutions, it is also assisted user to be out from dangerous situation quick as imaging user were alone at the breakdown site with nobody surrounding.*

Keywords: Puncture Kit, Dislodged Tyre, Front Plate, Inflation, etc.

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Design and Fabrication of Portable and Foldable Sand Filter Machine

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Abstract: *In construction of buildings, sand plays a very important role as a ingredient needs for construction work. Sand is employed at completely different stages in construction right from the mase to the finishing work i.e., plaster. This sand needs to be filter properly according to their usage in construction, i.e., size of sand for construction work is slightly of large grain size whereas that used for plaster work is very fine. Conventionally screening is often done manually with the help of single inclined screen. This manual method is time overwhelming and takes a great deal of your time and value. it's conjointly determined that the standard machine prove of no or very little facilitate because the sand has to be manually transported and material handling takes place doubly to urge completely different sizes of sand. The paper reviews some machines which associate in nursing analysis within the same space then goes into the necessity and utility of a multi-screen machine for totally automatic multi-level screening.*

Keywords: Multi-Screen, Inclination, sieve/screen

I. INTRODUCTION

The building construction can't be barren of use of sand because the sand becomes the integral a part of the development method. Sand is employed at totally different stages in construction right from the inspiration building work to the finishing work i.e., plaster. It's obvious that demand of sand size at different stages at the location is required to be screened. Presently it's determined that the sand screening activity is finished manually or in some cases with the help of some machine. however, these machines are having single screen and so just one size are separated at a time thus it takes heaps of your time and labour. Taking this into thought a range of researches and developers have developed a spectrum of machines to resolve this drawback many of them are mentioned within the section below.

The procedure of sand separation was done physically. Separating of sand is completed by the inclined screened, the problem with this technique is that most of the sand pass by without touching the screen, which causes the sand to filter again resulting in lower cleaning efficiency. Sand is employed in development, manufacturing and diverse ventures. Sand needs to be separated from secondary particles, stones and alternative immense particles before it utilizes. Our framework advances management worked sand separating framework that naturally channels the sand utilizing responding movement of screen poured on that. the first sand separation is finished to get rid of the sand with a much bigger grain particles also the second sand separation is finished to get rid of the sand with a size. In case of agriculture purpose only there should be replacing of screened so that it can also be used as a grain filtration.

II. METHODOLOGY

The Method is followed to complete a project is as follows
SELECTION: Selection of Project
SURVEY: Existing product = Scope for Improvement
DESIGN: Design of Machine and Calculations
FABRICATIONS: Procurement of Material = Cutting and Welding
ASSEMBLY: Fitting all parts together
TESTING: Testing of machine
RESULT: Success of Project

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Design and Fabrication of IoT Enabled Air Purification System

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Abstract: *In most metro centres, the incidence of dust pollution is rapidly growing, necessitating the installation of a system that can filter the air. This study offers the concept of a smart air purifier for residential settings, as well as a practical physical model. The filter employed in this case is a HEPA filter, which captures solid pollutants and cleanses them, reducing VOC pollutants more effectively than other purifiers on the market. This purifier is controlled by an IoT system, which allows it to run automatically and save energy while also displaying real-time data on impurities in the environment.*

Keywords: IoT , HEPA filter, optical dust sensor, Arduino Uno

I. INTRODUCTION

Air pollution is growing as a result of increased industrialisation and civilisation. Dust particles will always be present in homes, workplaces, and other locations. The World Health Organization recently issued a study on air quality, warning that it is dangerous to human health, citing more than 5 million premature deaths caused by air pollution in the environment.

Sources of Air pollution and effects:

Every day in the modern period, there is progress and changes in industrialization, offices, and housing. The majority of the air in Delhi, like in other metro cities, is contaminated by car pollution. numerous sectors of industrialisation and development Dust, pollens, smoke, carbon dioxide, and other pollutants are found in the air, and these pollutants are the most deadly and severe, causing climate change and life-threatening illnesses.

Air pollution causes minor difficulties in humans such as itchy eyes, sneezing, and headaches, and may also be a major contributor to allergies and life-threatening asthama. These have serious health consequences, including stroke, lung cancer, and heart disease, as well as ozone layer degradation. Indoor air is a hundred times more toxic than outside air, according to the United States Environmental Protection Agency (EPA). To appropriately maintain air quality, accurate and efficient indoor air monitoring is required. It also causes ozone layer depletion, which causes stroke, lung cancer, and heart disease.

II. OBJECTIVE

To solve the problems of air pollutants as mentioned above, a smart air purification system will require to work on this issue. The objective of our project is to reduced the power consumption by implementing microcontroller and sensor. This sensor will sense the presence of dust and smoke in the environment and thereby turns on the air purifier automatically when the value exceeds threshold value . Due to the presence of sensor in this system it can be operated only at the time of necessity thus can save electricity and also keeps space clean and also monitors air quality in the environment.

III. LITERATURE SURVEY

Previous work in this topic was published in [1], in which the author attempted to minimise energy usage by allowing IoT-based systems and sensors and displaying real-time sensor data analytics on a mobile device. Similarly, the author of another research [2] has supplied a circuit diagram of sensors that compares the quality of air in the environment to the Air Quality Index and switches on the purifier as needed.

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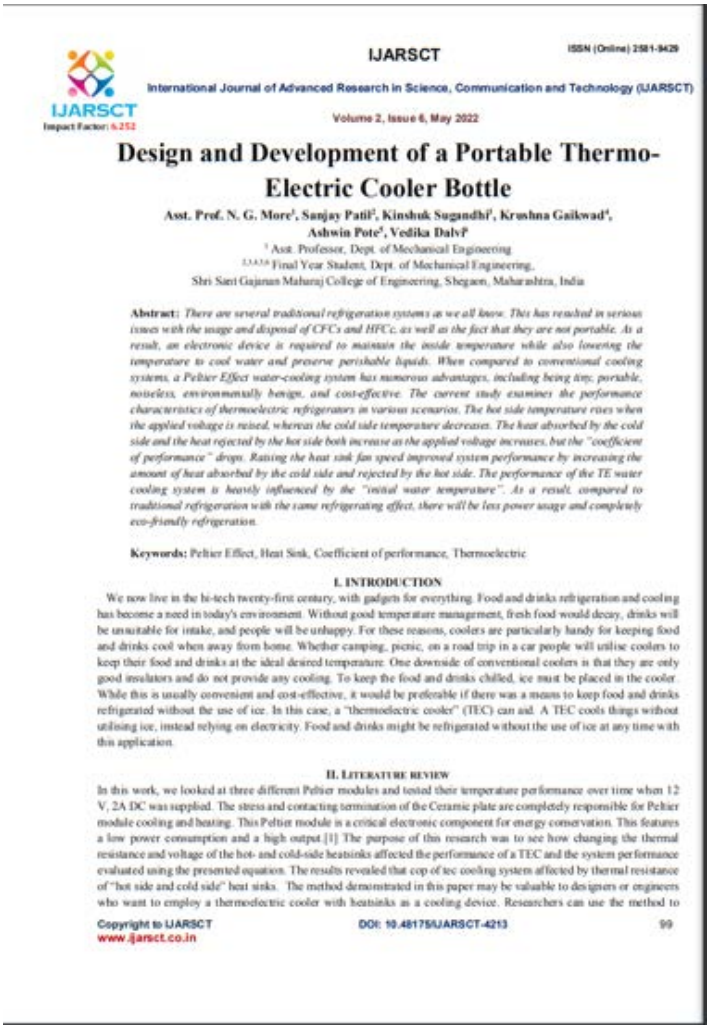

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Design and Development of a Portable Thermo-Electric Cooler Bottle

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Abstract: *There are several traditional refrigeration systems as we all know. This has resulted in serious issues with the usage and disposal of CFCs and HFCs, as well as the fact that they are not portable. As a result, an electronic device is required to maintain the inside temperature while also lowering the temperature to cool water and preserve perishable liquids. When compared to conventional cooling systems, a Peltier Effect water-cooling system has numerous advantages, including being tiny, portable, noiseless, environmentally benign, and cost-effective. The current study examines the performance characteristics of thermoelectric refrigerators in various scenarios. The hot side temperature rises when the applied voltage is raised, whereas the cold side temperature decreases. The heat absorbed by the cold side and the heat rejected by the hot side both increase as the applied voltage increases, but the "coefficient of performance" drops. Raising the heat sink fan speed improved system performance by increasing the amount of heat absorbed by the cold side and rejected by the hot side. The performance of the TE water cooling system is heavily influenced by the "initial water temperature". As a result, compared to traditional refrigeration with the same refrigerating effect, there will be less power usage and completely eco-friendly refrigeration.*

Keywords: Peltier Effect, Heat Sink, Coefficient of performance, Thermoelectric

I. INTRODUCTION

We now live in the hi-tech twenty-first century, with gadgets for everything. Food and drinks refrigeration and cooling has become a need in today's environment. Without good temperature management, fresh food would decay, drinks will be unsuitable for intake, and people will be unhappy. For these reasons, coolers are particularly handy for keeping food and drinks cool when away from home. Whether camping, picnic, on a road trip in a car people will utilise coolers to keep their food and drinks at the ideal desired temperature. One downside of conventional coolers is that they are only good insulators and do not provide any cooling. To keep the food and drinks chilled, ice must be placed in the cooler. While this is usually convenient and cost-effective, it would be preferable if there was a means to keep food and drinks refrigerated without the use of ice. In this case, a "thermoelectric cooler" (TEC) can aid. A TEC cools things without utilising ice, instead relying on electricity. Food and drinks might be refrigerated without the use of ice at any time with this application.

II. LITERATURE REVIEW

In this work, we looked at three different Peltier modules and tested their temperature performance over time when 12 V, 2A DC was supplied. The stress and contacting termination of the Ceramic plate are completely responsible for Peltier module cooling and heating. This Peltier module is a critical electronic component for energy conservation. This features a low power consumption and a high output.[1] The purpose of this research was to see how changing the thermal resistance and voltage of the hot- and cold-side heatsinks affected the performance of a TEC and the system performance evaluated using the presented equation. The results revealed that cop of tec cooling system affected by thermal resistance of "hot side and cold side" heat sinks. The method demonstrated in this paper may be valuable to designers or engineers who want to employ a thermoelectric cooler with heatsinks as a cooling device. Researchers can use the method to

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CERTIFICATE OF PARTICIPATION

This is to certify that Mr./Miss/Mrs./Dr. ***Bilal T. Husain*** of ***Department of Business Administration and Research, S. S. G. M. C. E, Shegaon*** has participated in International Conference on Advancement in Science, Technology and Management (ICASTM-2021) organized on 23rd and 24th December, 2021 and presented a research paper titled ***A Study on Awareness of Risks and Risk Management Practices among Contractors in Buldhana District*** authored by ***Bilal T. Husain , Dr. Shriprabhu G. Chapke***

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Convener-ICASTM

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Principal

RESEARCH ARTICLE

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A Study on Awareness of Risks and Risk Management Practices among Contractors in Buldhana District

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ABSTRACT

This research focuses on the study of different risks which occurs in road construction projects. Further it tries to identify the awareness level and relevance of those risks and its management among the civil contractors in Buldhana district. Focusing on broader construction risks, the research deals only with specific risks concerning the civil contractors as they form the baseline of the construction projects

Keywords: Risk management, Risk awareness, Risk identification, Risk assessment, Risk response, civil contractors.

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INTRODUCTION

Civil construction projects occupy major portion of financial budget in India. In India the most preferred method of undertaking civil construction projects is by allotment through tender process. At the base level of this tender process most of the work is being done by civil contractors hence the study focuses on awareness of risks and the ability to handle risks among civil contractors in Buldhana district.

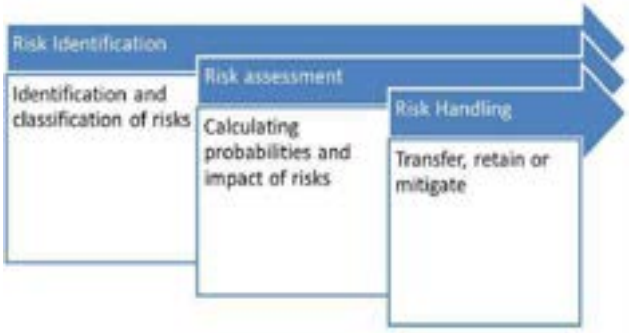

Figure 1: Risk Management Steps

Figure 1 shows steps in risk management process in construction projeects as recommended by PMI 2013 [1]

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Figure 2: Types of risks in construction projects

Figure 2 represents different types of risk faced by civil contractors in a construction project.

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REVIEW ARTICLE

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OKM and AI Techniques – Innovation in Human Resource Management

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Abstract

Drawing lessons from Indian epic "Hanuman Chalisa" the author has evolved a technique called OKM (Ocean of Knowledge and Merits) technique for an effective internal communication in the organization with its human resources that ensure building a positive and energetic environment leading to maximum contribution by each of them in the organizational development. A similar approach has been developed by the western countries called as AI (Appreciative Interaction) for developing both individuals as well as organization. OKM, however, endorses the innate infinite potential of human being against AI which attempts to harness the same. An extended application of OKM technique can overpower the five devils of Kama, Krodha, Mada, Moha and Lobha which are the root causes of all the evils in an organization.

Keywords: Appreciative Inquiry (AI), Human Resource Management, Internal Communication, Ocean of Knowledge (OKM), Organisational Development

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Introduction

Management is defined as creating environment where people can give their best. Hence at the core of management is people management and managing people means managing their behavior for desired results. People behave differently on different occasions with different people and for different purposes. In all this, what is common from an organization point of view is the attainment of desired result through these behaviors. There have been several researches to unfold the dimensions of human behavior at work place. The attempts have been from both the western thinkers like Elton Mayo etc. and also the eastern thinkers like Prof. S. K. Chakraborty etc. While most of the western researches are based on experimentation like Hawthorne Studies, the eastern researches draw their inferences from *Vedas, Upnishads, epics* etc. which are treated as reservoir of experiences of our Saints and Seers. The present paper puts forth similar experiences of the Hanuman character in Indian epic named "*Hanuman Chalisa*" in the form of Ocean of Knowledge and Management – OKM – technique and draws a parallel with a synonymous western concept of Appreciative Interaction – AI – technique.

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Communication Dimensions of Human Behavior:

Human behavior is reflected through his / her communication including semantics. Communication (Koontz and Weihrich, 1990) is defined as the process of sharing and / or exchanging information, message, feelings, knowledge, emotions etc. between two or more persons. This sharing could lead to pleasant feeling, knowledge building, confidence building, team spirit and so on which are the positive dimensions (Robbins et. al., 2019) of communication. Or it could also be detrimental to the existing environment leading to