

RFID Based Face Recognition Based Smart Attendance System

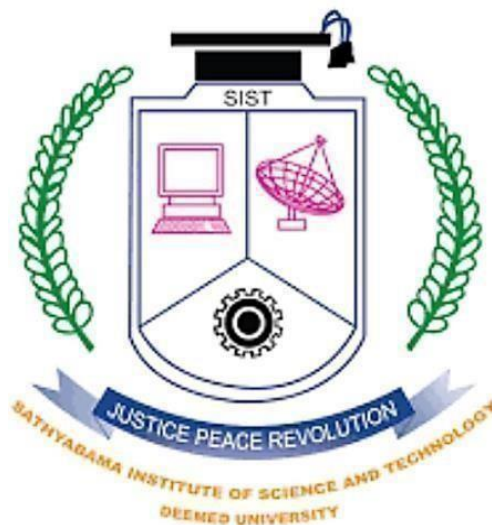
A Project Report Phase - II

Submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering
Degree in Electronics and Communication Engineering

by

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING SCHOOL OF
ELECTRICAL AND ELECTRONICS**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY (DEEMED
TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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APRIL - 2023



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION

ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work BRAHMATEJA TIRUKKOVALLURI (39130482) and SANJAY KUMAR KORRAPATI (39130397) who carried out the project entitled "RFID BASED FACE RECOGNITION BASED SMART ARRENDANCE SYSTEM" under my supervision from November 2022 to April 2023.

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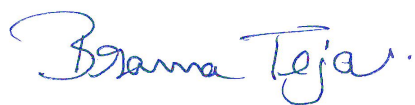
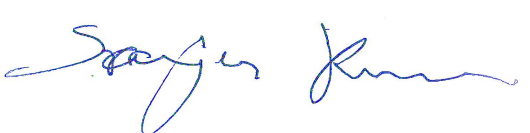
DECLARATION

We, BRAHMATEJA TIRUKKOVALLURI (39130482) and SANJAY KUMAR KORRAPATI (39130397) here by declare that the Project Report entitled “**RFID Based Face Recognition Based Smart Attendance System**” done by us under the guidance of Mr.ILAYARAJAA K.T M.E.,(Ph.D),Dept. of Electronics and Communication Engineering SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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SIGNATURE OF CANDIDATES

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ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to the **Board of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N. M. NANDHITHA, M.E., Ph.D. Dean, School of Electrical and Electronics Engineering** and **Dr. T. RAVI, M.E., Ph.D., Head of the Department, Department of Electronics and Communication Engineering** for providing us necessary support and details at the right time during the progressive reviews.

We would like to express my sincere and deep sense of gratitude to our Project Guide **Mr.K.T. ILAYARAJAA, M.E., (Ph.D.)**, Assistant Professor, Dept. of Electronics and Communication Engineering for his valuable guidance, suggestions and constant encouragement for the successful completion of our project work.

We wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Electronics and Communication Engineering who were helpful in many ways for the completion of the project.

ABSTRACT

In the corporate world, effective and appropriate attendance management is crucial. The use of RFID technology enables the university administration to prevent misplaced and damaged attendance forms. Many automatic identification (AI) and radio frequency identification (RFID) systems gained popularity (RFID). To fully utilise this technology, extensive research and various applications have been developed, however they also highlight a number of short comings. RFID, usually referred to as an RFID tag or a label, is a sort of wireless technology that transmits data from an electronic tag to an RFID reader for the purpose of identification. In this project, RFID tags will be incorporated into student ID cards, and RFID receivers will be deployed in the appropriate classes to track attendance. Here, a UID is assigned to each individual ID card (RFID). This system would use microcontrollers like Arduino or the Raspberry Pi to detect that UID and check for an individual's data. The person's attendance will be automatically recorded if they come to class with that ID card. Face ID is used for verification in order to prevent proxy attendance.

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CHAPTER 1

1.1 INTRODUCTION

There are dominantly two different methods to attain this. One includes various manual operations, which are complicated and involve roll calls and paper work that consumes a lot of time and can even lead to a plethora of errors. Another technique utilizes particular amenities such as bar code scan, IC card scan, iris recognition, and facial recognition to record employee attendance data. Therefore, this model which uses both RFID and face recognition simultaneously can eliminate the limitations of single-tier security. Moreover, the biometric fingerprint attendance system invokes a greater risk spreading of contagious diseases, hence justifying the usage of a contactless attendance system. Productivity in a company can be assured by monitoring the mental well-being of the employees, Also, one cannot access the workplace at any time as they wish as different categories of staff are given different entry timings. For facial recognition, a dataset is created with four classes, each class consisting of about 1000 images where 700 are set for training and 300 for testing.

To develop a standalone contactless doorbell system with security access protocol. In addition, we suggest a Smart power-saving protocol based on human activity. Unauthorized person entry will be framed on the screen to the cloud database for future reference. This system comes under IOT (Internet of Things) and the face recognition part comes under DL (Deep Learning). Our project is contactless so in the COVID-19 pandemic, we can maintain social distance by using our touchless doorbell. This model will also help people to keep their homes safe and secure from the trespassers. People are able to see who is standing in front of the door without going outside. Using this device, they can see everything by the device which is connected to the doorbell. This concept and the algorithm will match in attendance store and data management system.

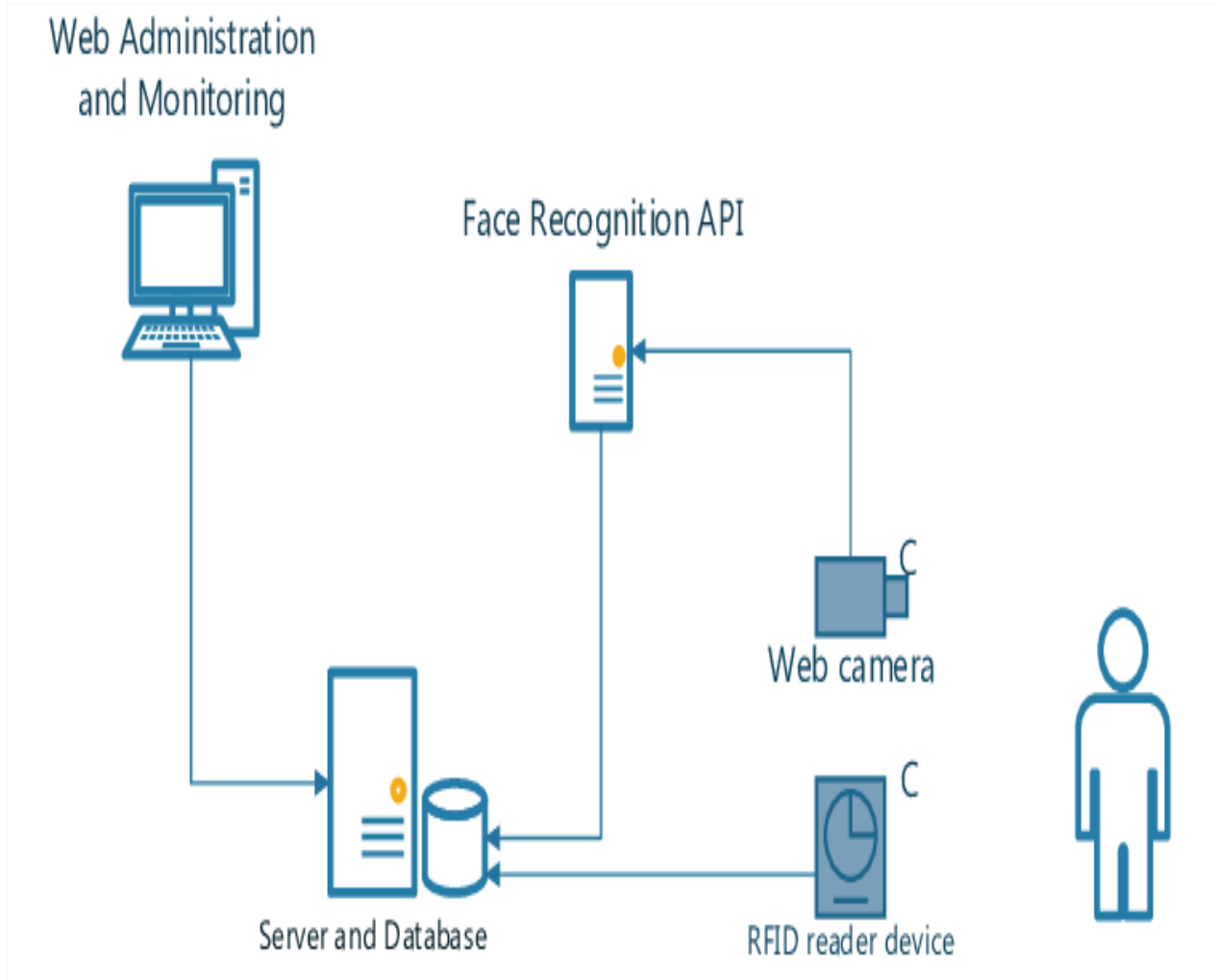


Fig: 1.1 Rfid based web Interface for attendance system

1.2 PROBLEM STATEMENT

In our proposed system discussed concepts will be helpful for persons with disabilities, particularly blind people. The created data set will be the face recognitionImage data of the code, the training and recognition process is done by the LBPHalgorithm, and the demanding age will store in the database by the person's name. After easily that person's identity and will send a notification to the user via showing the green/redlight. This will turn on the integrated camera and capture images. The image captured will be compared with the one stored in the backend database. On matching, the name of the person at the doorstep will be announced. In case, the face is not present in the database,it will be stored newly.

The proposed system uses hardware components namely NodeMCU, temperature sensor, RFID card reader, and RFID tags for individual employees. Software platforms namely Arduino for processing inputs received in the NodeMCU, Google Colab for checking access time, training the models for facial and emotion recognition, and MIT appinventor for creating an application to send messages to the authorities in case of high temperature. The database used in this project is Firebase for cloud storage. All the hardware components are connected to NodeMCU, and having a built-in WIFI module, facilitates pushing the relevant details of the employee to the database. The RFID reader used in this work is MFRC522 which has a read range of 5cm. The RFID cards are unique for each employee where the card reader uses an electromagnetic field to transfer data with a frequency of 13.56 MHz and a signal-conditioning application processor. Since Firebase allows free cloud storage, it is used for storing the necessary details of the employee that are read as inputs.

A verification process by RFID alone can sometimes be misused. Therefore, this model which uses both RFID and face recognition simultaneously can eliminate limitations of the single-tier security check. Moreover, the biometric fingerprint attendance system involves a greater risk of the spreading of contagious diseases, hence justifying the usage of a contactless attendance system. Productivity in a company can be assured by monitoring the mental well-being of the employees.

1.3 OBJECTIVES

Management of employee attendance is a major facet of the proper functioning of enterprises. There are dominantly two different methods to attain this. One includes various manual operations, which are complicated and involve roll calls and paperwork that consumes a lot of time and can even lead to a plethora of errors. It can also result in proxy attendance. Another technique utilizes particular amenities such as bar code scan, IC card scan, iris recognition, and facial recognition to record employee attendance data.

A verification process by RFID alone can sometimes be misused. Therefore, this model which uses both RFID and face recognition simultaneously can eliminate limitations of the single-tier security check. Moreover, the biometric fingerprint attendance system involves a greater risk of the spreading of contagious diseases, hence justifying the usage of a contactless attendance system. Productivity in a company can be assured by monitoring the mental well-being of the employees.

Also, one cannot access the workplace at any time as they wish as different categories of staff are given different entry timings. For facial recognition, a dataset is created with four classes, each class consisting of about 1000 images where 700 are set for training and 300 for testing. The FER2013 dataset has been used for training the model for emotion recognition.

Google Collaboratory is used to train and test the above dataset due to its advantages like pre-installed modules, excellent performance, and free-of-cost GPU.

1. To develop a standalone contactless doorbell system with a security access protocol
2. In addition, we suggest a Smart power-saving protocol based on human activity
3. Unauthorized person entry will be framed on the screen to the database for future reference
4. Learning can be supervised, semi-supervised, or unsupervised. The system is upgraded on a regular basis thanks to deep learning
5. As a result, the accuracy is improved. One example of an Internet of Things (IoT) Scope of the Project

1.4 SCOPE OF THE PROJECT

The proposed system for attendance initially performs RFID validation that is followed by a contactless temperature check. Following this, the details of the employee corresponding to the RFID card along with the status of the temperature (high or normal) are pushed to the database. In case of high temperature, an alert message containing the details of the employee corresponding to the RFID card is sent to the concerned authorities. On the other hand, if the temperature is normal, the access time verification for the corresponding employee will be done. In case the access time doesn't match, a message "Please come after some time" will be displayed else a message "Authorized access" is displayed. The next step of verification is facial recognition in which a random image of the employee is given as input from the dataset created. If the predicted face matches the face associated with the corresponding RFID card, a message "Thank you for cooperating for the second tier of security" is displayed and his/her access is granted, else "The wrong face detected" is displayed. The image given as input to the facial recognition system will further be given to the emotion recognition system.

- a. Now-a-days biometric systems bring in an added layer of security to networks, applications, personal computers, and physical facilities.
- b. Face recognition has swiftly made an entry into the real world and has proved to be the most successful and bang-on technology which is no more just in the world of sciencefiction.
- c. People can use it as a surveillance system, criminal identification, identity verification access or attendance system, home automation, etc.
- d. From 2D algorithms like PCA, Eigenfaces, Fisher faces, LDA, and IDA to SVM, CNN, and now deep learning, ML, and artificial intelligence, face recognition technology has evolved immensely. In this project, the face recognition process is initiated by a Contactless doorbell.
- e. This will turn on the integrated camera and capture images. The image captured will be compared with the one stored in the backend database.
 - i. On matching, the name of the person at the doorstep will be announced. In case, the face is not present in the database, it will be stored newly.
 - ii. Compared to the old traditional doorbell, this improvised one notifies us of the person at the door.

1.5 VISUALIZATION

Regular attendance in class is, undoubtedly, the most prior condition for the students to ensure a good academic result. Lack of proper and efficient monitoring system causes the students to refrain from attending the class regularly which in turn brings a very sad performance in the exam. Consequently, valuable time and energy of the students are wasted, sometimes they are dropped out and the reputation of the academic institute sharply declines. Apart from this, engaging of the teacher to take attendance halts the continuity of the class and that hampers the quality of the class as well. On the other hand, a minimum of 70 percent attendance for each course is mandatory to avoid being barred from the exam. A system was proposed, where a student can also know the information regarding his attendance beforehand so that he can be cautious of it.

The traditional attendance system drastically fails to solve these problems effectively

that has eventually become a great concern nowadays. Our improved system working on recognizing face with identification number leaves no loophole of fraudulence and it can initiate a smarter system that addresses each issue mentioned above more accurately without any sort of manual mistakable effort. Images of the face of every student with their name and identification number once recorded, our present system can recognize each student and count while he enters the class by verifying his face and RFID based identity card. All sorts of mismanagements, fraudulence, and carelessness will disappear and no more hindrance for the teacher to continue class smoothly. Students will not be deprived from a quality class. Several projects have been done by using Arduino for developing smart attendance system. Since students from different countries, specially, from developing and underdeveloped areas are rapidly growing, the necessity and popularity of automated system based smart classroom projects are increasing. Majority of the non-face features is eliminated in the first few stages of cascading process, and then lets the program focus on the relevant face window. This method is very efficient since it is executed very fast and precisely. The cascade classifier for multi-view face detection can scan the sub-windows in every position and scale of the input image, and classify each sub-window into face or non-face. Both frontal face and profile face can be detected by this system.

In the process of classification in the first few levels, the system can quickly eliminate a large number of non-face sub-windows, and then let the rest level of the cascade classifier focused on the suspicious face sub-window. Majority of the non-face features is eliminated in the first few stages of cascading process, and then lets the program focus on the relevant face window. This method is very efficient since it is executed very fast and precisely. The cascade classifier for multi-view face detection can scan the sub-windows in every position and scale of the input image, and classify each sub-window into face or non-face. Both frontal face and profile face can be detected by this system. In the process of classification in the first few levels, the system can quickly eliminate a large number of non-face sub-windows, and then let the rest level of the cascade classifier focused on the suspicious face sub-window. This detection method



Fig: 1.2 Database on Server Management With ERP Interface

For example, IR module-based project for smart classroom has been implemented in different places. Besides, Bluetooth module attendance system by pairing the mobile phonedevices has been used by different universities. Another project that we got to know duringour research is GSM based automated classroom system. Previously, RFID based classroom system has been proposed using raspberry pi and ATmega32 development kit.However, raspberry pi or ATmega32 development kit does not make our project cost efficient We are going to make this project for the educational institutes; hence besides theinsurance of accuracy and authenticity, cost effectiveness is also a big concern to us. Radiofrequency identification (RFID) system is based on two components which area reader anda tag. Here the tag is attached to an object and the reader identifies the proper object. Thedata here is transmitted by using radio wave.

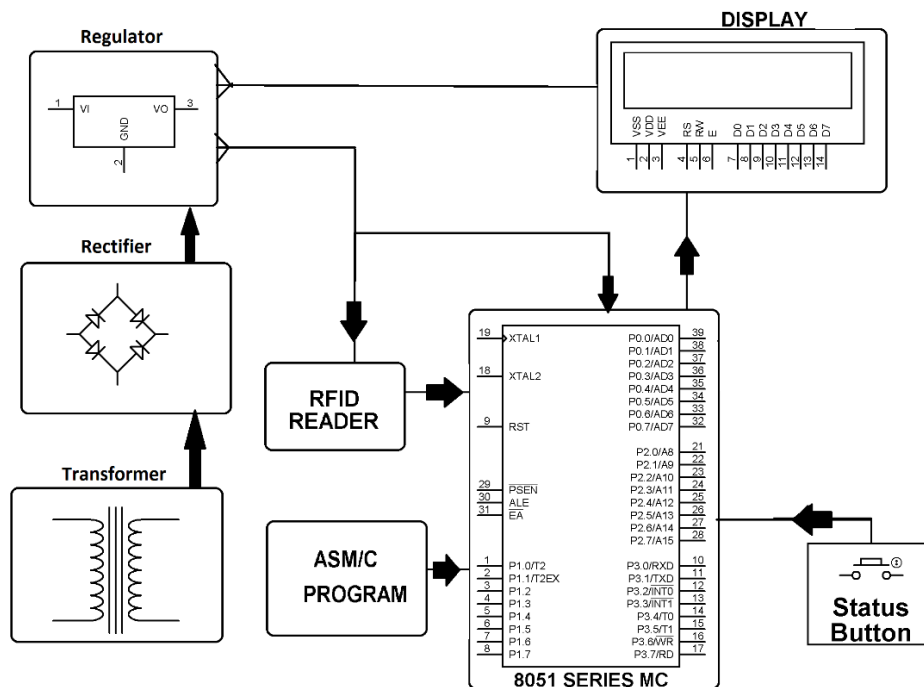


Fig: 1.3 Block View of Interfacing Modules

The RFID tag has an embedded transmitter and receiver. A typical RFID tag consists of two parts, an integrated circuit and an antenna. The integrated circuit is used for collecting and running information. And the function of the antenna is to receive and transmit a signal. RFID tags can be of three types and they are active, passive, battery assisted passive. RFID tags are equipped with non-volatile memory storage. The RFID reader transmits an encoded radio signal to the RFID tag by using a two-way transmitted receiver which is also known as transceiver and interrogator. All the RFID tags that are available fall in three categories. They are classified according to the type of tag and reader. Those are, Passive Reader Active Tag (PRAT), Active Reader Passive Tag (ARPT) and Active Reader Active Tag (ARAT). We have used the second one for our proposed model. The Facial Recognition is done using OpenCV library and running the respective codes on Python. We have used OpenCV 2.4.0 and Python

2.7.13 specifically for this particular project, and the latter versions would need to have the codes changed. In our project, we use Haar-like feature detection algorithm to detect faces. Even though single strong classifier can detect most facial features correctly, it still has considerable high false positive rates; hence we apply the cascading method. Using cascade classifiers, our program scans every sub-window of the input feed image and classifies them as face, or non-face.

Majority of the non-face features is eliminated in the first few stages of cascading process, and then lets the program focus on the relevant face window. This method is very efficient since it is executed very fast and precisely. The cascade classifier for multi-view face detection can scan the sub-windows in every position and scale of the input image, and classify each sub-window into face or non-face. Both frontal face and profile face can be detected by this system. In the process of classification in the first few levels, the system can quickly eliminate a large number of non-face sub-windows, and then let the next level of the cascade classifier focused on the suspicious face sub-window. This detection method can achieve face detection rapidly and precisely. After the test in different kinds of dataset, we found that the cascade classifier can achieve high accuracy face detection and reach the requirement of face detection in real-time. Every organization requires an attendance system to maintain record of presence of student and employees. They have their own method to do the same. Some do manually and some use automated attendance system. Manual method includes pen and papers which consumes lot of time and wastage of resources. Also, it has risk of proxies and human error eliminate a large number of non-face sub-windows, and

then let the rest level of the cascade classifier focused on the suspicious face sub-window. This detection method can achieve face detection rapidly and precisely. After the test in different kinds of dataset, we found that the cascade classifier can achieve high accuracy face detection and reach the requirement of face detection in real-time. Every organization requires an attendance system to maintain record of presence of student and employees. They have their own method to do the same. Some do manually and some use automated attendance system. Manual method includes pen and papers which consumes lot of time and wastage of resources. Also, it has risk of proxies and human error.



Fig: 1.4 Live GPS-Based School Attendance System without RFID Feature

Automated attendance system includes many methods like - I.I RFID – Radio Frequency Identification is one method for attendance making. In this technology an individual has to carry his own RFID card. Therefore, this system is cost effective and can also give rise to fraud as any unauthorized person can use the card for fake attendance. I.II Biometric

This system includes fingerprint, iris and voice recognition. Biometric authentication systems are not 100% accurate. False rejection and false acceptance are some errors that can give rise to fraud. I.III Face Recognition – is one of the most efficient systems of all existing ones for identification of people. It can be used in school, colleges or any organization. To avoid the difficulty of taking attendance of large number, there is a need of automated attendance system that is fast and reduces the chance of fake attendance. In this technology system is developed for deploying an easy and a secure way of taking down attendance. This attendance is recorded, by continuously detecting faces of employees or students via camera as they enter the classroom. The software first detects the faces and simultaneously compares them with the predefined database.

The (IoT) Internet of Things refers to the system of interrelated, internet- connected objects that are able to collect and also transfer data over a wireless network without any human intervention. Artificial intelligence (AI), is a branch of computer science that focuses on building and managing technology that can learn to autonomously make decisions and carry out actions on behalf of a human being. In any organization, the management of attendance will involve an important role. The duration in which an employee is inside an organization, is to be noted to calculate pay rolls. The difficulties in the traditional system are time consuming, higher cost, and insecurity almost at a teacher spending more quality hours for getting and storing student's attendance. This issue must be approached in a new and sophisticated technological manner than a traditional way. There are various softwares and advanced technologies that they even allow blurred images to be rendered enough and investigated to know the personality of the individual. Facial recognition technology is capable enough to verify the identity of an individual by analyzing a picture or video footage.

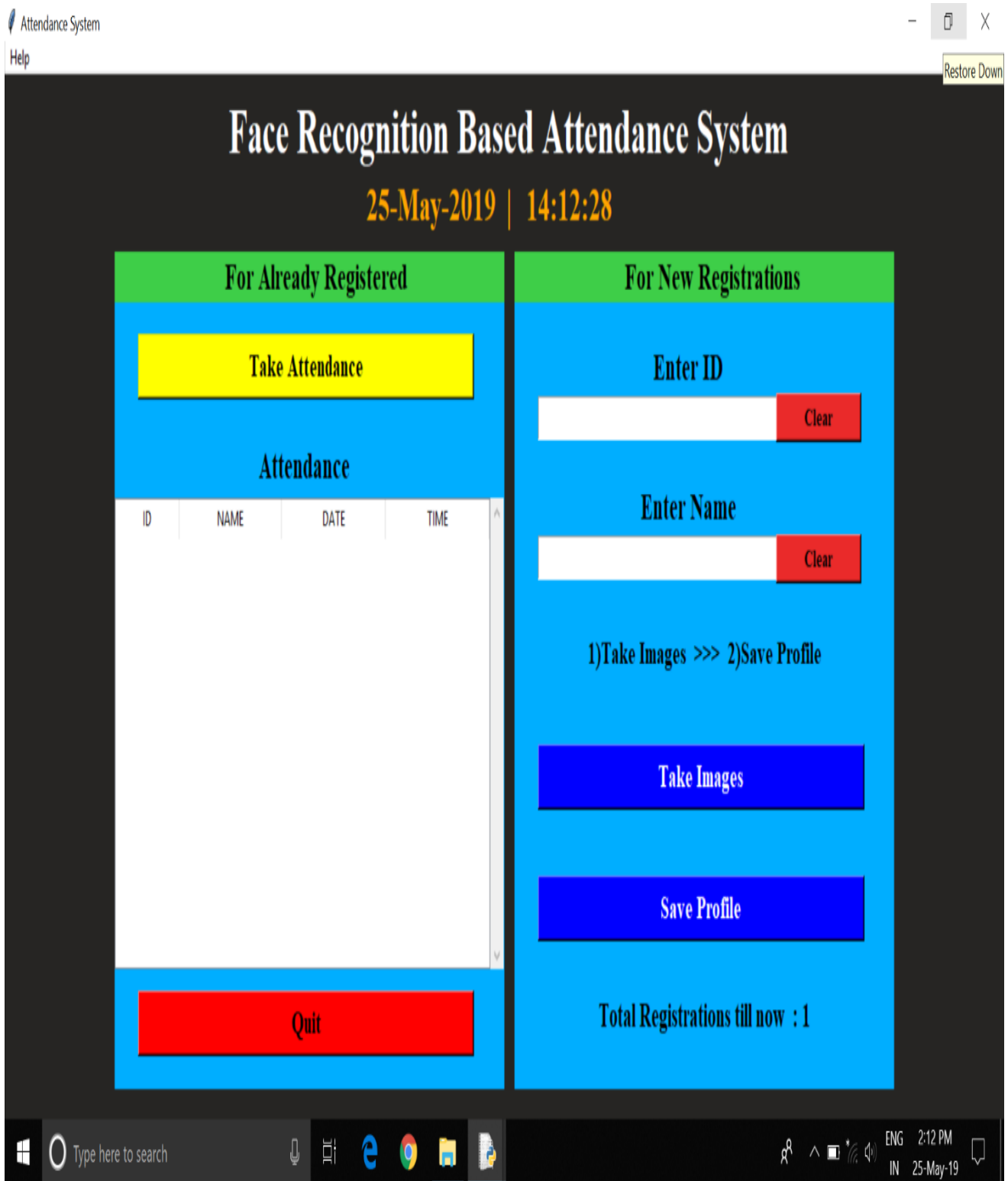


Fig: 1.5 GUI view of the example Database

The (IoT) Internet of Things refers to the system of interrelated, internet- connected objects that are able to collect and also transfer data over a wireless network without any human intervention. Artificial intelligence (AI), is a branch of computer science that focuses on building and managing technology that can learn to autonomously make decisions and carry out actions on behalf of a human being. In any organization, the management of attendance will involve an important role. The duration in which an employee is inside an organization, is to be noted to calculate pay rolls. The difficulties in the traditional system are time consuming, higher cost, and insecurity almost teacherspending more quality hours for getting and storing student's attendance. This issue must be approached in a new and sophisticated technological manner than a traditionalway. There are various softwares and advanced technologies that they even allow blurred images to be rendered enough and investigated to know the personality of the individual. Facial recognition technology is capable enough to verify the identity of an individual by analyzing a picture or video footage.

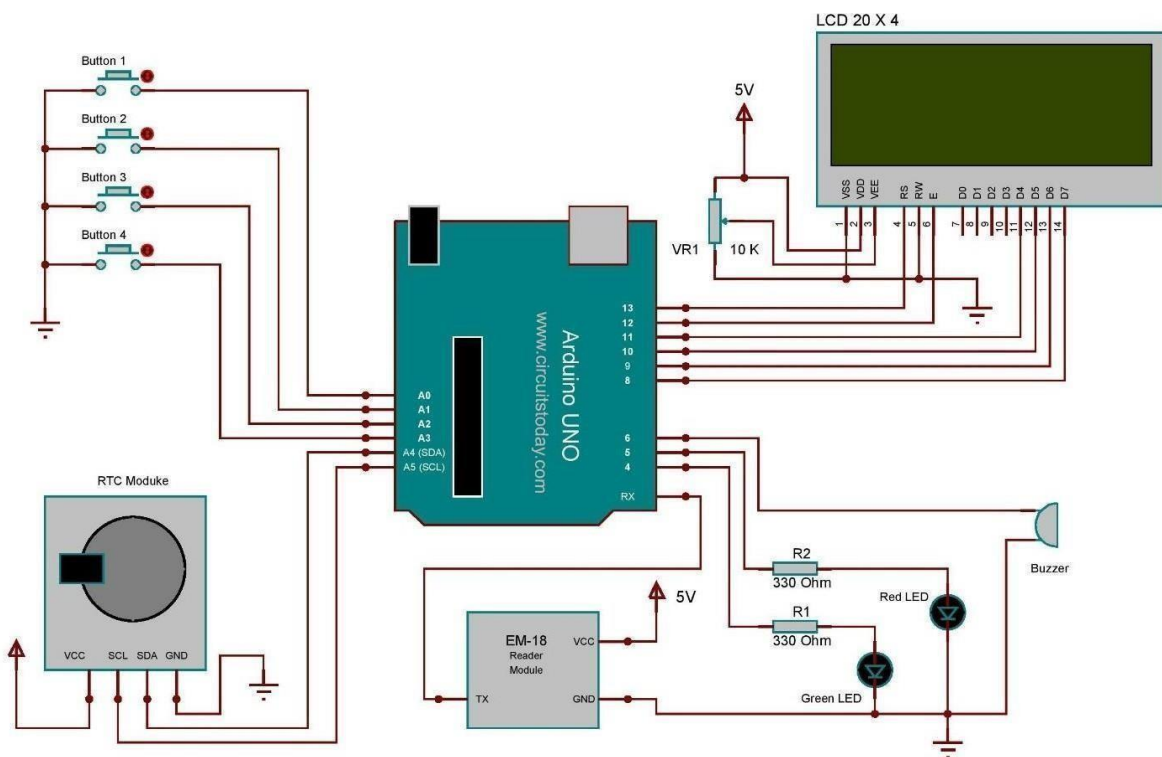


Fig: 1.6 Proteus Simulation View

The objective of this paper is to make a face recognition based automated attendance system. For obtaining a better performance, the test and training images of this project are limited to frontal and upright facial images which consist of single face only. Both the test and the training images need to be captured using the same device to ensure there is no quality difference. If possible, the owner or the person having the rights to access the database can add high quality images captured from a high quality camera and later that image to the database, but as mentioned only the administrator or the person having the rights to access the database can enroll or remove the students or faculty data from it. In educational institutions, managing attendance of students/candidates is a tedious task, as there happen to be a large number of students and keeping track of all of them is hard. There are certain situations where students can act as proxies for their friends even though they are not present. Face Recognition A Facial Recognition System is capable of comparing and matching a digital image or a video frame against a database that consists of facial images. The face gets detected and is segmented from the video frame by means of using HOG (Histogram of Oriented Gradient) algorithm. Attendance by means of calling names or passing around sign-in sheets is time-consuming and receptive easy fraud. This paper presents the detailed implementation of a real-time roll call system supported

CHAPTER 2

This chapter deals with the systematic study of papers and works from the older inventions and presentations of international journals and conferences and the data will be tabulated for a quick summary of revision. Through this, we have gained knowledge on correcting the mistakes and gained knowledge on factors that involved in future scopes

2.1 LITERATURE SURVEY

we propose a smart home security system, which is IoT as well as face recognition enabled. In our system, the web camera is used which is connected to the raspberry pi and accompanied by sensors such as Passive Infrared (Pir) and Ultrasonic sensor. On motion detection camera captures an image of the person in front of the door then real-time face recognition is done using a local binary pattern (LBP). If a person's image matches with one of the members of the home, then the door will unlock, else doorbell 3 will ring. if an intruder tries to break the door, then an alarm will be raised at the same time SMS and Emails containing images of the intruder will be sent to the homeowner. Face recognition works well in multi-face recognition and stranger identification, which meet the requirement of home security. This system is battery- powered in case of power failure. A system with the ability to detect and recognize faces has many potential applications including crowd and airport surveillance, private security, and improved human- computer interaction. An automatic face recognition system is perfectly suited to fix security issues and offer flexibility to smart house control. This project aims to replace costly image processing boards using a Raspberry pi board with ARMv7 Cortex-A7 as the core within the OpenCV library. The system is based on the criteria of low power consumption, resource optimization, and improved operation speed. This paper reviews the related work in the field of home automation systems and presents the system design, software algorithm, implementation, and results. Face detection was used in this project to extract a face from a frame, which is based on the Viola- Jones object detection technique, which employs an AdaBoost classifier with Haar and LBP features and is based on the Viola-Jones object recognition algorithm. The project aims at porting the Open-Source Computer Vision (OpenCV) library to the Raspberry Pi

[1] Ayman Ben Thabet and Nidhal Ben Amor, "Enhanced Smart Doorbell System Based On Face Recognition"

A system with the ability to detect and recognize faces has many potential applications including crowd and airport surveillance, private security, and improved human-computer

interaction. An automatic face recognition system is perfectly suited to fix security issues and offer flexibility to smart house control. This project aims to replace costly image processing boards using a Raspberry pi board with ARMv7 Cortex-A7 as the core within the OpenCV library. The system is based on the criteria of low power consumption, resource optimization, and improved operation speed. This paper reviews the related work in the field of home automation systems and presents the system design, software algorithm, implementation, and results.

[2] Chitresh, S Vipul Kithani, Sagar Ahuja, and Sunita Sahu, “Smart Home Security using IoT and Face Recognition,”

we propose a smart home security system, which is IoT as well as face recognition enabled. In our system, the web camera is used which is connected to the raspberry pi and accompanied by sensors such as Passive Infrared (Pir) and Ultrasonic sensor. On motion detection camera captures an image of the person in front of the door then real-time face recognition is done using a local binary pattern (LBP). If a person's image matches with one of the members of the home, then the door will unlock, else doorbell 3 will ring. If an intruder tries to break the door, then an alarm will be raised at the same time SMS and Emails containing images of the intruder will be sent to the homeowner. Face recognition works well in multi-face recognition and stranger identification, which meet the requirement of home security. This system is battery-powered in case of power failure.

[3] Dawes A.T. “Designing of Face Recognition System,” Proceedings of the International Conference on Intelligent Computing and Control Systems”

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[4] Ciya James and David Nettikadan, “Student Monitoring System for School Bus Using Facial Recognition,”

we are proposing a real-time monitoring system using image processing techniques. - Identifying a student with an image has been popularized through the mass media like cameras. This system monitors the images inside the vehicle and identifies the students and their movements inside the bus. The system recognizes the student's faces and their count is also monitored. The system will also raise an alarm to get the attention of the public if it is so essential. Technologies are available in the Open-Computer-Vision (OpenCV) library and implement using Python. For face detection, the Haar-Cascades classifier was used and for face recognition Eigenfaces, and Local binary pattern histograms were used. Each stage of the system is described by some flowcharts. And also face recognition is used in automation attendance systems which eliminates most of the drawbacks that manual attendance systems pose, easy manipulation of attendance records, proxy attendances, and insecure systems.

[5] Alen Salihbasi c and Tihomir Orehovacki, “Development of Android Application for Gender, Age and Face Recognition Using OpenCV,”

In this project, they proposed a system by making use of Raspberry Pi with ARMv8 Cortex-A53 as the core. The project aims at porting the Open-Source Computer Vision (OpenCV) library to the Raspberry Pi board and use its pre-trained classifier Haar-Cascade and recognizer Local Binary Pattern Histogram (LBPH) for face detection and recognition purposes. Furthermore, using the Raspberry-pi accelerated command line media player, the name of the person will be announced, and faces unknown to the database will be captured and stored. We used a Raspberry Pi to carry out our research. And this method makes use of the advantages provided by many Python modules such as OpenCV and NumPy. The SQLite database management system serves as the memory's backbone. This system is worthy of being integrated with any applications to increase automation and user-friendliness due to its speedier and more authentic performance

[6] Nambiar A.N and Dr.M.D. Jaybhaye, “Face Detection and tracking using Imageprocessing on Raspberry Pi,”

They have used a processor controller and a common USB camera to control the electric motor, which in turn controls the motorized auto application, the Viola-Jones estimation for stand up to AC acknowledgment using the AdaBoost library, which means the structure relies on AdaBoost computation, and changed works faces Haar-like highlights in the item part we have used python vernacular with OpenCV reinforce for the face distinguishing proof using

Haar course records gave

[7] Liu C.M, Noushad Hossain, Mohammad Mustafizur Rahman, Nadimul Islam, Zayed Hossain Sayem, and Md. Asaduz Zaman Mamun's "Face Recognition System Based on Raspberry Pi Platform,"

They have offered a method for detecting and identifying a human face from the real-time video that monitors a face and compares it to stored data of known individuals in this paper. Our method recognizes a person in a fraction of a second, entirely disregarding any background impact. It also provides more details about that person. Furthermore, this approach operates in a variety of illumination settings, making it suited for completing its task in a wide range of environments without meeting any substantial errors. We used a Raspberry Pi to carry out our research. And this method makes use of the advantages provided by many Python modules such as OpenCV and NumPy. The SQLite database management system serves as the memory's backbone. This system is worthy of being integrated with any applications to increase automation and user-friendliness due to its speedier and more authentic performance.

CHAPTER 3

EXISTING AND PROPOSED SYSTEM

3.1 EXISTING SYSTEM

1. The system doesn't require any technological expense.
2. It is easier to administer and can be effortlessly implemented.
3. It is easier to implement for fewer data.
4. Data entry is inconsistent and leads to errors.
5. Lack of multi-tier security.
6. The process is cumbersome and expensive to produce reports.
7. The entry of false information.
8. Lack of entry based on access times.

3.2 PROPOSED METHODOLOGY

1. For facial recognition, deep learning is used that makes the computation of multilayer neural networks feasible.
2. Dataset, being an important parameter for training and testing the model, is created consisting of 4 classes assuming there are 4 employees with different access times.
3. The dataset created includes images with different illumination levels and different angles.
4. Since this system is a prototype of an employee attendance system, a manually created dataset using the face of the employee is preferred instead of a standard dataset.
5. Convolutional neural network (CNN) – a type of artificial neural network that uses machine-learning algorithms for supervised learning and analyzing data.

3.3 BLOCK DIAGRAM

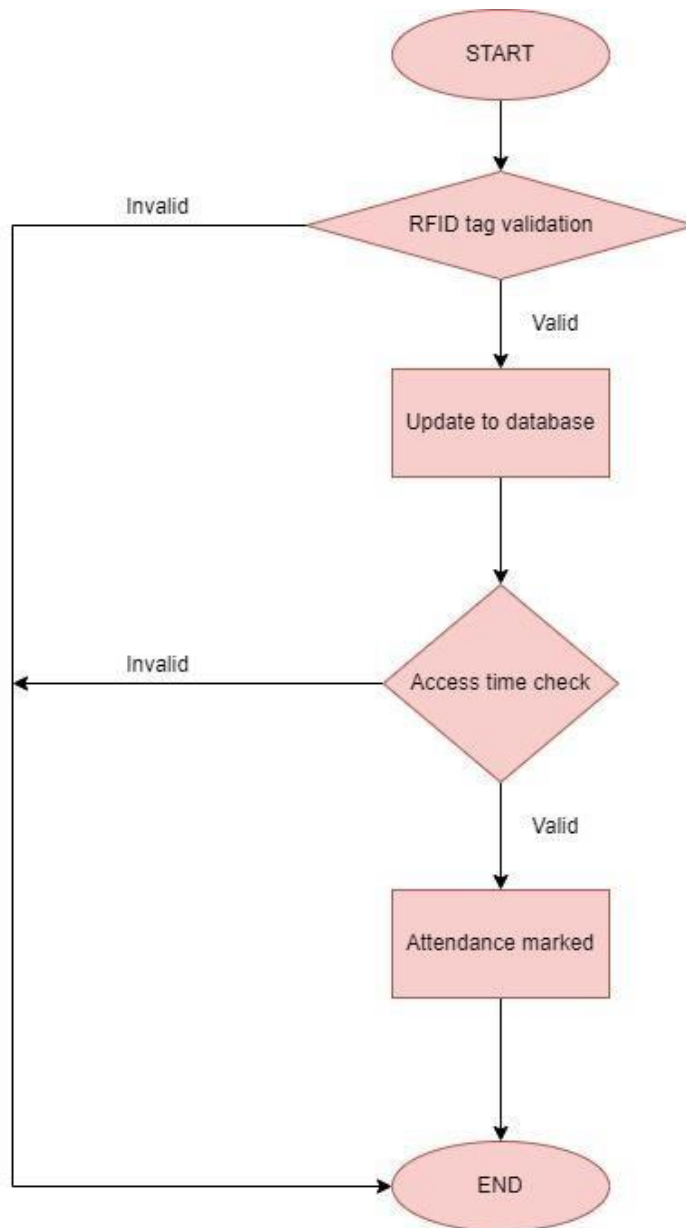


Fig: 3.1 System Working Model

3.4 ADVANTAGES OF PROPOSED SYSTEM

Compared to the regular practice of database management our system will be more precise and it can be more precise than the traditional practices. This system will suit the industries and offices. Here all the working ERP units have started implementing this system. In our proposed system we do dual verification methods to push the data and verify it with the short-range communicative wireless field of RF

We can avoid system malfunction since the data entry is not purely dependent on online

Communication system uses a small chip but it will be reliable for long-term use

Durability of data passage content issue never occurs

Data is encrypted with 64-bit AES system over the cloud

Medium of data passage uses MQTT service broker for fast transmission

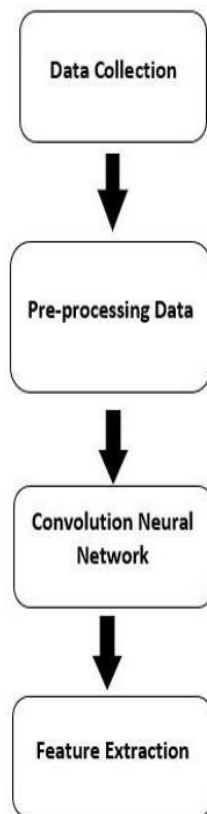


Fig: 3.2 CNN Training

The following step was carried out during CNN Training.

1. First, the CNN model should be pre-trained with the primary 11 convolutional layers. The custom 7-class dataset has been used for training with a input measure of 300x300x3.
2. In the next step, input resolution of the image has been decreased to 250x250x3.
3. The complete network has been trained for the rate of parameter setting are almost 35 epochs employing a batch measure of 37.
4. Learning rate plan: for the primary epochs, the learning rate was gradually raised. Train for almost 20 epochs and after that begin diminishing it.
5. Use information expansion with arbitrary scaling and interpretations, and arbitrarily altering presentation and saturation.

This framework also follows the same method of using the rectified linear units (ReLUs) through all of the CNN structures, and the completely connected layers. This activation feature is popularly utilized in CNN because it works as a rectifier that lets in the simplest advantageous values to skip and enables to enhance the training pace as well as keep away from the gradient-vanishing, as compared to sigmoid function.

3.5 MACHINE LEARNING

Machine learning is the technique in which is perform a scientific analysis on different algorithm and statistical models. In this approach the use of heuristic algorithm and approach like Linear Regression, SVM, Naive Bayes, KNN, KMeans Clustering. These all are the different types of working algorithms of Machine Learning . Simple answer is that it takes data as a input, find a patterns in it using algorithms and heuristics approach and give predictions of our test data based on input training data and algorithms learning pattern. In machine learning we need to do feature extraction by self, then we need to train the model. But this approach is not best and optimal solution for our application, so we choose a Deep Learning approach for it. In Machine learning it always go for a solution, but that solution could be an optimal or may be not also (Fig: 2). Machine learning programs can perform tasks without being explicitly programmed to do so. It

involves computers learning from data provided so that they carry out certain tasks. For simple tasks assigned to computers, it is possible to program algorithms telling the machine how to execute all steps required to solve the problem at hand; on the computer's part, no learning is needed. For more advanced tasks, it can be challenging for a human to manually create the needed algorithms. In practice, it can turn out to be more effective to help the machine develop its own algorithm, rather than having human programmers specify every needed step. The discipline of machine learning employs various approaches to teach computers to accomplish tasks where no fully satisfactory algorithm is available. In cases where vast numbers of potential answers exist, one approach is to label some of the correct answers as valid. This can then be used as training data for the computer to improve the algorithm(s) it uses to determine correct answers.

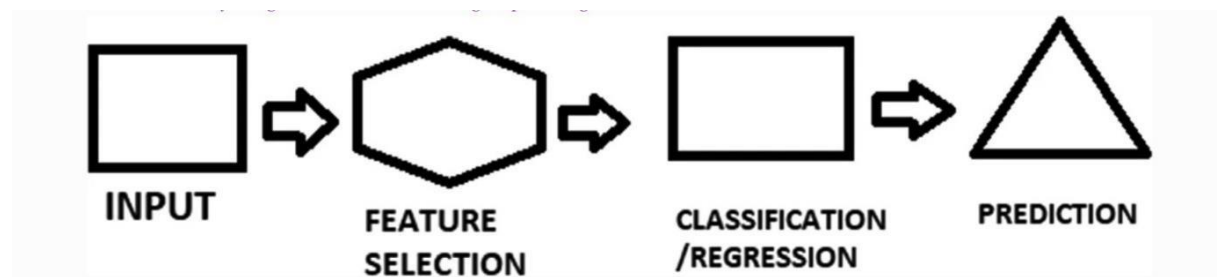


Fig: 3.3 Working of Machine learning

3.6 DEEP LEARNING

Deep learning is a subset of machine learning that involves training artificial neural networks to perform complex tasks. It is based on the structure and function of the human brain and is inspired by the way in which the brain processes information. Deep learning algorithms consist of multiple layers of interconnected nodes or neurons. These layers are designed to learn increasingly abstract representations of the data as it moves through the network. Each layer of the network learns to recognize a different aspect of the data and the network as a whole can recognize more complex patterns in the data. Deep learning algorithms are typically trained using large datasets and can be used for a wide range of tasks, including image and speech recognition, natural language processing, and game playing. They are also used for tasks such as fraud detection, anomaly detection, and recommendation systems. One of the key advantages of deep learning is its ability to learn and generalize from data. This allows deep learning algorithms to perform well on new, unseen data, making them highly effective for a wide range of applications. Another advantage of deep

learning is its ability to automatically learn features from the data. This eliminates the need for manual feature engineering, which can be a time-consuming and error-prone process. With deep learning, the algorithm can automatically learn the most important features of the data, which can lead to better performance and more accurate predictions. Deep learning is typically trained using large amounts of data and requires significant computational resources, such as powerful GPUs. However, recent advances in hardware and software have made deep learning more accessible to a wider range of researchers and developers. One of the most popular deep learning frameworks is TensorFlow, which was developed by Google. TensorFlow provides a wide range of tools and libraries for building and training deep learning models, and is widely used in industry and academia. Another popular deep learning framework is PyTorch, which was developed by Facebook. PyTorch is known for its ease of use and flexibility, and is widely used in research and development. Deep learning has been used for a wide range of applications, including image and speech recognition, natural language processing, and autonomous vehicles.

In the field of healthcare, deep learning has been used for tasks such as disease diagnosis and drug discovery. Despite its many advantages, deep learning also has some limitations. One of the main challenges is the need for large amounts of labeled data for training. This can be a bottleneck for some applications, especially in domains where data is scarce or difficult to obtain. Another challenge is the interpretability of deep learning models. Because deep learning models are highly complex and consist of many interconnected layers, it can be difficult to understand how they make predictions or why they behave in a certain way. This can be a limitation in applications where transparency and interpretability are important. Deep learning is a powerful and flexible approach to machine learning that is based on the structure and function of the human brain. It has many advantages, including the ability to learn and generalize from data, and the ability to automatically learn features from the data. However, it also has some limitations, including the need for large amounts of labeled data and the interpretability of deep learning models. Despite these limitations, deep learning has already had a significant impact on a wide range of applications, and is likely to continue to play an important role in machine learning and artificial intelligence in the years to come through the network. Each layer of the network learns to recognize a different aspect of the data and the network as a whole can recognize more complex patterns in the data. Deep learning algorithms are typically trained using large datasets and can be used for a wide range of tasks, including image and speech recognition, natural language processing, and

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Deep learning has been used for a wide range of applications, including image and speech recognition, natural language processing, and autonomous vehicles. In the field of healthcare, deep learning has been used for tasks such as disease diagnosis and drug discovery. Despite its many advantages, deep learning also has some limitations. One ofthe main challenges is the need for large amounts of labeled data for training. This can be a bottleneck for some applications, especially in domains where data is scarce or difficult to obtain. Another challenge is the interpretability of deep learning models. Because deep learning models are highly complex and consist of many interconnected layers, it can be difficult to understand how they make predictions or why they behave ina certain way. This can be a limitation in applications where transparency and interpretability are important. Deep learning is a powerful and flexible approach to machine learning that is based on the structure and function of the human brain. It has many advantages, including the ability to

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3.7 WORKING OF DEEP LEARNING

Deep learning models are based on artificial neural networks that are designed to learn from large datasets. The process of training a deep learning model involves feeding it with input data, and iteratively adjusting the weights of the network to improve its ability to predict the correct output. The input data is usually represented as a set of features or attributes, which are used to describe the properties of the data. For example, in image recognition, the features could be pixel values that represent the color and intensity of each pixel in the image. The deep learning model consists of multiple layers of interconnected neurons that process the input data. Each neuron is connected to neurons in the previous layer, and the output of each neuron is determined by a set of weights that are learned during training. The weights determine the strength of the connection between neurons, and are adjusted during training to improve the accuracy of the model. During training, the deep learning model is given a set of input data and a set of corresponding output labels. The model processes the input data, and produces an output prediction.

The error between the predicted output and the true output is then calculated, and the weights of the network are adjusted to reduce this error. This process of iteratively adjusting the weights of the network is known as backpropagation. During backpropagation, the error is propagated backwards through the network, and the weights of the neurons are adjusted based on the contribution of each neuron to the error. The goal of training a deep learning model is to minimize the error between the predicted output and the true output. Once the model has been trained, it can be used to make predictions on new, unseen data. One of the key advantages of deep learning models is their ability to learn and generalize from data. This means that they can perform well on new, unseen data, even if the data is different from the training data.

This makes deep learning models highly effective for a wide range of applications, including image and speech recognition, natural language processing, and game playing. Deep learning models can be used for a wide range of tasks, including classification, regression,

and generation. Classification tasks involve predicting a categorical output, such as whether an image contains a cat or a dog. Regression tasks involve predicting a continuous output, such as the price of a house. Generation tasks involve generating new data that is similar to the training data, such as generating new images or text. One of the key challenges of working with deep learning models is the need for large amounts of data and computational resources. Deep learning models are typically trained on large datasets, which can require significant storage and computational resources. In addition, deep learning models can be computationally expensive to train, especially for large and complex models. Another challenge of working with deep learning models is the need for careful tuning of hyperparameters. Hyperparameters are parameters that are not learned during training, but are set by the user. These include parameters such as the learning rate and the number of layers in the network, and can have a significant impact on the performance of the model. Now let us understand some algorithms that we used in our research.



Fig: 3.4 Working of Deep Learning

3.8 CONVOLUTION NEURAL NETWORKS

Convolutional Neural Networks (CNNs) are a type of deep learning algorithm that are designed to process and analyze data with a grid-like structure, such as images, videos, and speech signals. CNNs are widely used in computer vision applications, including object recognition, image classification, face recognition, and semantic segmentation. At the core of a CNN is the convolution operation, which involves applying a set of learnable filters to the input data. Each filter performs a convolution operation on the input data, producing a feature map that highlights a particular aspect of the data, such as edges or texture. The output of the convolution operation is then passed through a non-linear activation function, such as the Rectified Linear Unit (ReLU), to introduce non-linearity into the model. In addition to the convolutional layers, a typical CNN also includes pooling layers, which downsample the

feature maps to reduce the computational cost and improve the generalization ability of the model. Pooling layers can be of different types, including max pooling, average pooling, and L2 pooling.

CNNs can also include fully connected layers, which perform a linear transformation of the feature maps and produce the final output of the model. The fully connected layers can be preceded by a flattening operation, which converts the multi-dimensional feature maps into a one-dimensional vector. CNNs are typically trained using backpropagation, which involves propagating the error through the network and adjusting the weights of the filters to minimize the error. The training process can be accelerated using techniques such as momentum, weight decay, and dropout, which help prevent overfitting and improve the generalization ability of the model. CNNs have achieved state-of-the-art performance on a wide range of computer vision tasks, including object recognition, image classification, face recognition, and semantic segmentation. One of the key advantages of CNNs is their ability to learn hierarchical representations of the input data, where lower-level features such as edges and textures are combined to form higher-level features such as object parts and object categories. Another advantage of CNNs is their ability to learn from large datasets, which can help improve the generalization ability of the model and reduce the risk of overfitting. CNNs can also be fine-tuned using transfer learning, which involves using a pre-trained model as a starting point and fine-tuning the weights on a new dataset.

One of the challenges of working with CNNs is the need for large amounts of data and computational resources. CNNs are typically trained on large datasets, which can require significant storage and computational resources. In addition, CNNs can be computationally expensive to train, especially for large and complex models. Another challenge of working with CNNs is the need for careful tuning of hyperparameters. Hyperparameters are parameters that are not learned during training, but are set by the user. These include parameters such as the learning rate, the size of the filters, and the number of layers in the network, and can have a significant impact on the performance of the model. Convolutional Neural Networks are a powerful type of deep learning algorithm that are widely used in computer vision applications. CNNs are designed to process and analyze data with a grid-like structure, such as images, videos, and speech signals. At the core of a CNN is the convolution operation, which applies a set of learnable filters to the input data. CNNs have achieved state-of-the-art performance on a wide range of computer vision tasks, but also

have challenges such as the need for large amounts of data and careful tuning of hyperparameters. Despite these challenges, CNNs are likely to continue to play an important role in machine learning and artificial intelligence in the years to come.

3.9 WORKING CONVOLUTION NEURAL NETWORKS

A Convolutional Neural Network have a n number of layers which can learn to detect different features from an image data, and the output of each processed image is used as the input to the next layer. The filters or we can say processing like edges, increase complexity, adjust brightness. CNN can perform feature identification classification of images, sound, audio, video and text .

CNN is composed of an input layer, an output layer, and many hidden layers in network. These layers perform learning operation on the given data, Convolution function, Activation function and pooling are hidden layers .

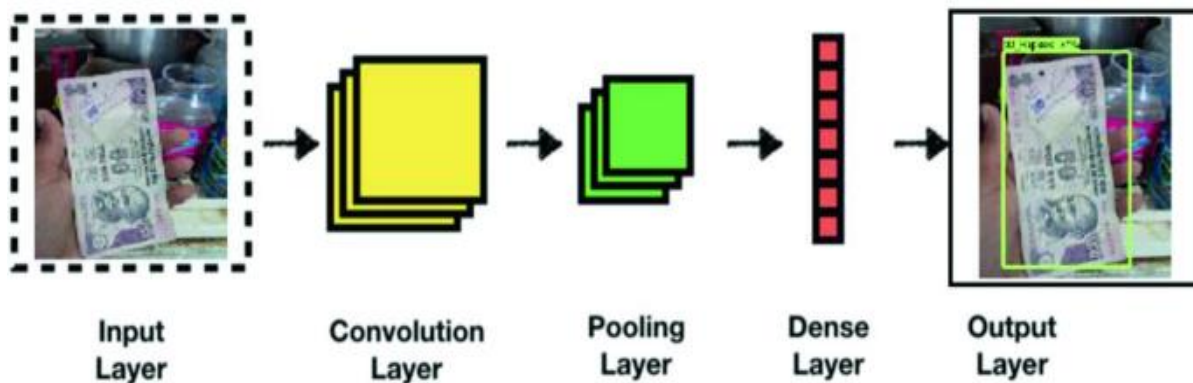


Fig: 3.5 Convolution Neural Network

1. **Convolution** It have set of convolutional filters, which find features from images, so images pass through these all filters.
2. **Rectified linear unit (ReLU)** is useful for mapping negative values into zero so it's maintaining positives values, so this is one kind of activation function, we have many more choices like Sigmoid, hyperbolic tangent, but choosing a layer for a model is a depends on your data. It affects the accuracy.
3. **Pooling** performs the non-linear down stamping which can reduce the number of parameters then the network needs to learn and simplify the output .

4. **Dense** layer is collections of neurons. It describes how neurons connected to the next layer of neurons (In short, each neuron is connected to every neuron in the next layer). It is also known as Fully Connected layer .
5. These operations iterative on neural network layers, in which each layer learning to identify different features.

CHAPTER 4

SYSTEM ANALYSIS

4.1 RFID Reader

The RFID reader is a device that uses radio-frequency waves to communicate with the RFID tag. It sends a signal to the RFID tag and receives the response from the tag. The RFID reader in the attendance system will read the information stored on the RFID tag and send it to the system for processing. RFID Tags: RFID tags are small electronic devices that can be attached to an object or a person. These tags contain a unique identifier that can be read by an RFID reader. In an attendance system, each student or employee will have an RFID tag that contains their unique ID number. The database is a central repository that stores all the information related to the attendance system, including the information about the students or employees, their attendance records, and the images captured by the face recognition camera.

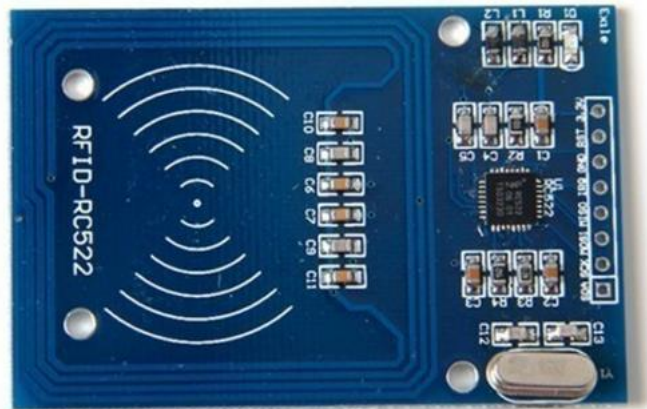


Fig: 4.1 RFID Reader

4.2 RFID Card

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to track inventory goods. Passive tags are powered by energy from the RFID reader's

interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader, up to hundreds of meters. Unlike a barcode, the tag does not need to be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC). RFID tags are used in many industries. For example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line, RFID-tagged pharmaceuticals can be tracked through warehouses, and implanting RFID microchips in livestock and pets enables positive identification of animals. Tags can also be used in shops to expedite checkout, and to prevent theft by customers and employees. Since RFID tags can be attached to physical money, clothing, and possessions, or implanted in animals and people, the possibility of reading personally-linked information without consent has raised serious privacy concerns.[6] These concerns resulted in standard specifications development addressing privacy and security issues.



Fig: 4.2 RFID Card

4.3 Node MCU

The Node MCU component in an RFID and Face Recognition based Smart Attendance System is a microcontroller board based on the ESP8266 WiFi chip. It is used to interface between the RFID reader, face recognition camera, and the cloud-based attendance system software. Here's how the NodeMCU component works in this system: The NodeMCU is connected to the RFID reader, which sends the ID number of the RFID card to the NodeMCU when the card is presented. The NodeMCU processes the ID number and sends it to the cloud-based attendance system software for processing. The cloud-based attendance system software updates the attendance record for the student or employee in the database. If the organization is also using face recognition technology for attendance, the NodeMCU is connected to the face recognition camera, which captures the image of the student or employee and sends it to the cloud-based attendance system software for processing. The cloud-based attendance system software compares the image with the images stored in the system's database and updates the attendance record with the image of the student or employee. The NodeMCU component acts as an interface between the RFID reader, face recognition camera, and the cloud-based attendance system software, making it possible for the system to communicate with each other seamlessly. The use of the NodeMCU also makes it possible to connect the attendance system to the internet, allowing for real-time monitoring of attendance data and easier management of attendance records.

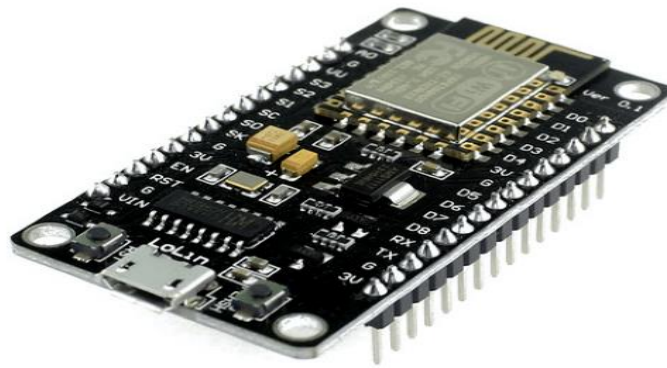


Fig: 4.3 Node MCU

CHAPTER 5

5.1 Library Used

There are several libraries and frameworks available for implementing an RFID-based face recognition-based smart attendance system. Here are some commonly used libraries and frameworks:

- OpenCV:** OpenCV is an open-source computer vision library that provides tools for image processing, object detection, and facial recognition. It is widely used in the development of attendance management systems.
- TensorFlow:** TensorFlow is a popular deep learning framework that provides tools for building and training neural networks. It can be used for face recognition in an RFID-based attendance system.
- PyTorch:** PyTorch is another deep learning framework that provides tools for building and training neural networks. It is known for its ease of use and flexibility.
- dlib:** dlib is a C++ library that provides tools for facial recognition and landmark detection. It is used in many attendance management systems due to its high accuracy and efficiency.
- Scikit-learn:** Scikit-learn is a Python library that provides tools for data analysis, machine learning, and statistical modeling. It can be used for facial recognition and data analysis in an attendance system.
- NumPy:** NumPy is a Python library that provides tools for numerical computing and data analysis. It is often used in conjunction with other libraries for data processing in attendance systems.

These libraries and frameworks provide developers with powerful tools for implementing various aspects of an RFID-based face recognition-based smart attendance system, including data preprocessing, facial recognition, and data management.

5.2 Installation

The installation of an RFID-based face recognition-based smart attendance system requires a combination of hardware and software components. Here are the basic steps for installing the system:

Hardware installation:

1. Install the RFID reader and connect it to the microcontroller.
2. Install the camera and connect it to the microcontroller.
3. Connect the microcontroller to a computer or server.

5.3 Software installation:

1. Install the necessary libraries and frameworks for face recognition and RFID detection. This may include OpenCV, TensorFlow, dlib, NumPy, and PyTorch.
2. Configure the microcontroller and set up communication between the RFID reader, camera, and microcontroller.
3. Develop software for facial recognition and attendance management, and integrate it with the hardware components.

5.4 System testing:

1. Test the RFID detection system to ensure that the RFID reader can detect the tags and send data to the microcontroller.
2. Test the facial recognition system to ensure that the camera can capture facial images and the software can match them with the database.
3. Test the attendance management system to ensure that attendance data is recorded and stored accurately.

5.5 Deployment:

1. Install the system in the desired location, such as a classroom or office.
2. Ensure that the system is properly configured and connected to the network.
3. Train the system on a large dataset of facial images to improve accuracy.

Overall, the installation of an RFID-based face recognition-based smart attendance system requires careful planning and execution. It may be necessary to work with a team of developers, hardware engineers, and IT professionals to ensure that the system is properly installed and functioning as expected.

CHAPTER 6

RESULTS AND DISCUSSION

6.1 INTRODUCTION

This chapter discusses the practical results obtained while implementing the project.

The RFID card component in an RFID and Face Recognition based Smart Attendance System consists of RFID cards that are assigned to each student or employee in the organization. These cards contain a unique identifier, which is read by the RFID reader when the card is presented to it.

Here's how the RFID card component works:

Each student or employee is assigned an RFID card that contains their unique ID number. When a student or employee arrives at school or work, they present their RFID card to the RFID reader. The RFID reader reads the information stored on the card and sends it to the attendance system software for processing.

The attendance system software updates the attendance record for the student or employee in the database.

If the organization is also using face recognition technology for attendance, the face recognition camera captures the image of the student or employee and compares it with the images stored in the system's database.

6.2 RESULT OBTAINED

The attendance system software updates the attendance record with the image of the student employee captured by the face recognition camera.

The use of RFID cards in an attendance system allows for quick and efficient tracking of attendance, as students or employees can simply present their cards to the RFID reader as they enter the premises. The attendance system software can then automatically update the attendance record, reducing the need for manual data entry and minimizing errors.

The below image represents Processing image and extract the features

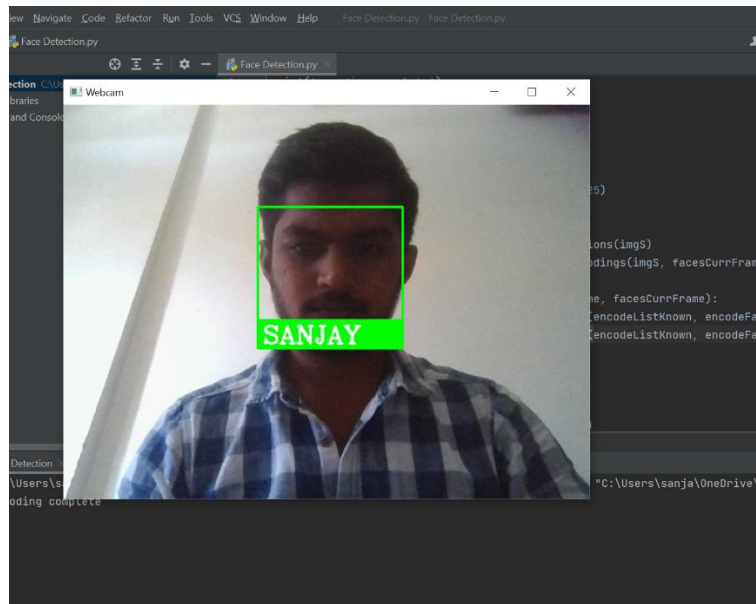


Fig: 6.1 Processing image

The below image represents attendance data in Excel sheet

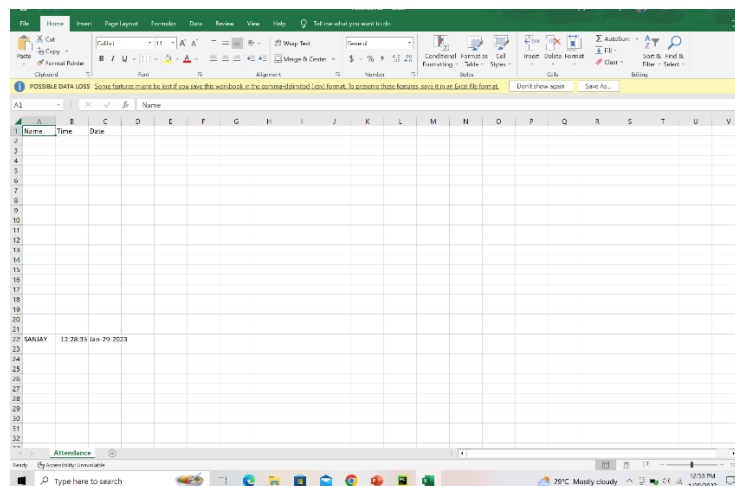


Fig: 6.2 Attendance data in Excel sheet

The system uses RFID cards and face recognition technology to track the attendance of students or employees, and the data is stored in a cloud-based attendance system software.

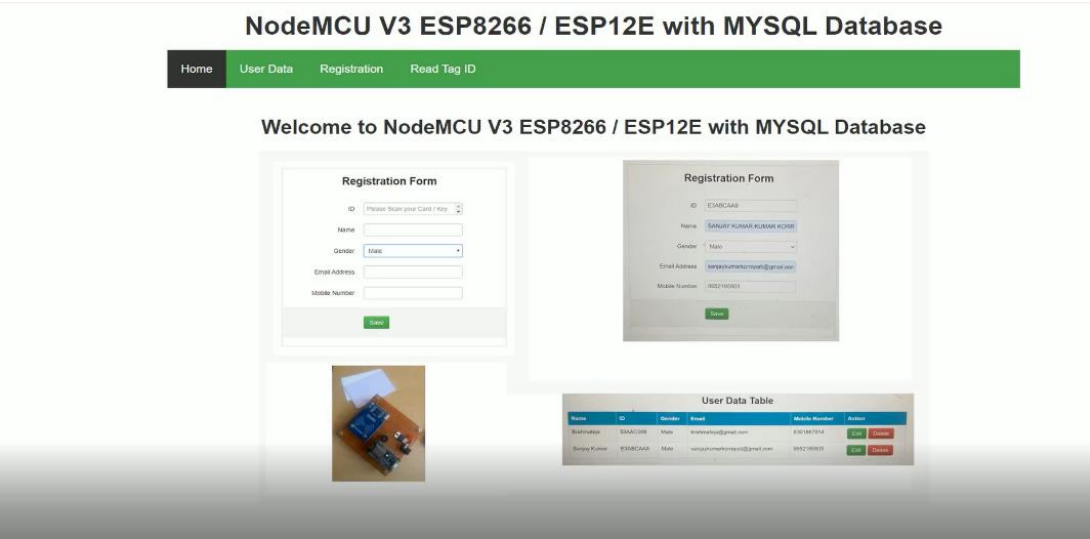


Fig: 6.3 Home Screen

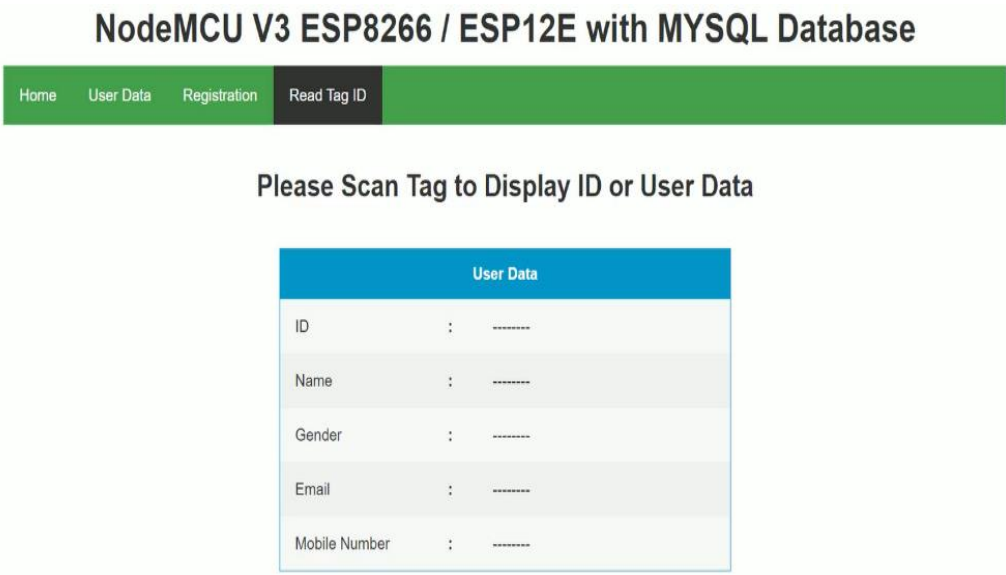


Fig: 6.4 Registration Form For User

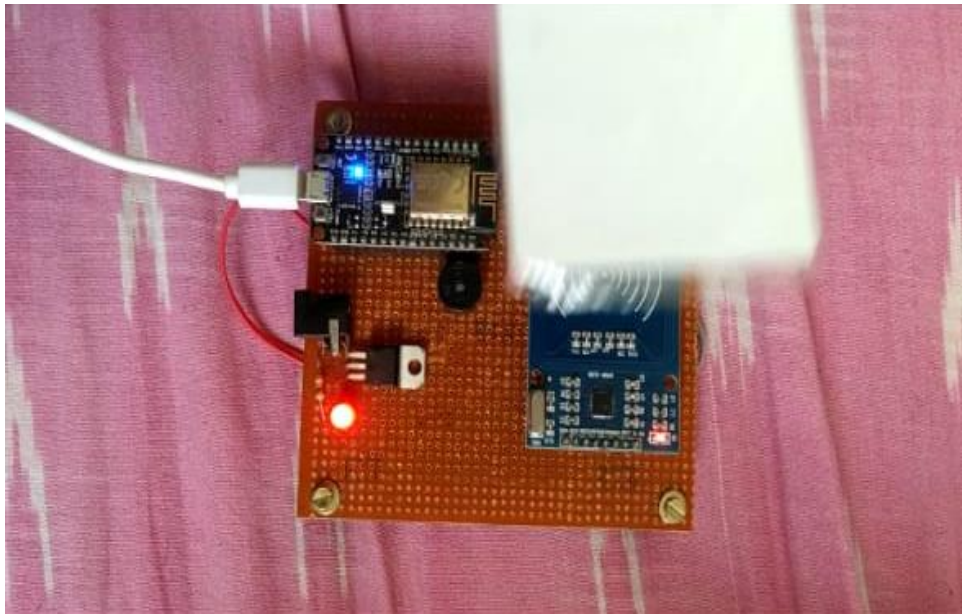


Fig: 6.5 Reading Of RFID Card

NodeMCU V3 ESP8266 / ESP12E with MYSQL Database

Home	User Data	Registration	Read Tag ID
------	-----------	--------------	-------------

User Data Table

Name	ID	Gender	Email	Mobile Number	Action
brahma teja	E3ABCAA9	Male	brahmateja@gmail.com	6301867914	Edit Delete
sanjay	53AAC009	Male	sanjaykumarkorrapati@gmail.com	9652195803	Edit Delete

Fig: 6.6 Data Registrated In The Database

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

The Smart Attendance System, which uses TensorFlow, OpenCV, and image processing to prevent proxy attendance using a two-factor authentication process. This procedure will help the staff and management correctly record attendance while cutting down on class time. Moreover, the management web portal's clearly will automatically submit the attendance data. As many schools and universities now have an attendance system that requires them to post the attendance on their separate Web portals, this product is quite appealing and helpful to many of them. So, the majority of the product will actually help them. The time spent on attendance during a class hour will be decreased or eliminated by this product. As a result of its two-way verification (RFID - Facial ID), it will lessen attendance fraud. It is reasonably priced and cost-effective.

7.2 FUTURE SCOPE

The Smart Attendance System, which uses TensorFlow, OpenCV, and image processing to prevent proxy attendance using a two-factor authentication process. This procedure will help the staff and management correctly record attendance while cutting down on class time. Moreover, the management web portal's clearly will automatically submit the attendance data. As many schools and universities now have an attendance system that requires them to post the attendance on their separate Web portals, this product is quite appealing and helpful to many of them. So, the majority of the product will actually help them. The time spent on attendance during a class hour will be decreased or eliminated by this product. As a result of its two-way verification (RFID - Facial ID), it will lessen attendance fraud. It is reasonably priced and cost-effective.

REFERENCES

- [1] Ayman Ben Thabet and Nidhal Ben Amor, "Enhanced Smart Doorbell System Based On Face Recognit
- [2] Chitresh, S and Amit K (2010),"An efficient Automatic Attendance Using Fingerprint Verification Technique ",International Journal on Computer Science and Engineering (IJCSE),Vol. 2 No. 2,pp 264-269.
- [3] Dawes A.T. (2004),"Is RFID Right for Your Library", Journal of Access Services, Volume 2(4), pp 7-13.
- [4] Henry. S, S. Arivazhagan and L. Ganesan (2003), "Fingerprint Verification Using Wavelet Transform", International Conference on Computational Intelligence and Multimedia Applications, 2003.
- [5] Longe O.O.(2009),"Implementation of Student Attendance System using RFID Technology",B. Tech Project Report, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.
- [6] Liu C.M and Chen L.S (2009), "Applications of RFID technology for improving production efficiency in an Integrated-circuit packaging house," International Journal of Production Research, vol 47, no. 8, pp. 2203- 2216,.
- [7] Maltoni D, D. Maio, A. K. Jain, S. Prabhaker (2003), "Handbook of Fingerprint Recognition", Springer, New York,Pp 13-20.
- [8] Mohamed A.B, Abdel-Hamid A and Mohammed K.Y.,(2009), "Implementation of an Improved secure system detection for E passport by using EPC RFID tags", World Academy of Science, Engineering and Technology Journal, Volume 6,pp1-5.
- [9] Nambiar A.N. (2009)," A supply chain perspective of RFID Systems", World Academy of Science, Engineering and Technology Journal, Volume 6,pp1-5.
- [10] RFIDSensNet Lab (2005), A white paper on Automatic Attendance System. Texas A MUniversity, Texas, USA