Attendance system using Face recognition using Arduino

T. Murali Krinshna[1], Aelsari Shirisha[2], Golimela Shruthilaya[2], Pulaboina Praveen[2]

[1]Assistant Professor, [2]UG Student, [1,2]Department of Electrical and Electronics Engineering

[1,2]Malla Reddy Engineering College and Management Science, Kistapur, Medchal-50140l, Hyderabad, Telangana, India

ABSTRACT

This paper shows a Smart Attendance Counting System dependent on IOT and IR sensor. This Counting framework is intended to count the objects or individuals in places like a classroom, auditorium, workplaces, shopping centers, businesses, and so on. The designed framework can count with the assistance of the Internet of Things (IoT), anybody can remotely screen the presence of people on the premises. The entry and exit of the individual are determined by this framework. It will show the count on a website page which has the remote access to the approved individual. In the proposed system is integrated ESP32era module, RFID Reader, Tags, LCD, Buzzer, IOT and Arduino controller. When the student entry he scan the card to RFID module then immediately Camera capture the pic and information of the student send to department mail. If the student shows the invalid ID card the system automatically alerts the using buzzer. This is very secured Attendance monitoring system we can use in colleges, school and anywhere. The entire input module, output modules integrated to Arduino controller operated by 5v dc with the help of Arduino IDE software.

Keywords: face reorganization, Arduino, RFID, ESP32, iot.

1. INTRODUCTION

Maintaining the attendance of the students in an institution is a hefty task. Always there is a difficulty in handling attendance manually. This project aims at designing a smart attendance system that automatically monitors and manages attendance of the students in an institution efficiently. The whole system is developed with an Arduino uno microcontroller and RFID readers. Unique RFID tags can be deployed in students id card. Also, Wi-Fi communication modules are used to make convenient communication depend on the availability of the network. Database of students must be created. A GSM Module is used to send messages to parent's mobile about the students attendance status. A GPS module is used to detect the live location of the student. This system will reduce a lot of manual work of teachers and administrators of any institution. The proposed work comprises of two most popular trend in technology research; IoT and RFID.

Attendance plays a very important role in any organization. Attendance in many organizations, college and schools are paper-based. When paper-based attendance is considered, the chances of error are high. Using technology this issue can be solved and the papers can be avoided in this process. There are many technologies that support to solve this issue. But best among them is RFID (Radio Frequency Identification) as the names suggest it uses the radio waves to identify and track the object or individual. The communication with respect to RFID is wireless using an electromagnetic and electrostatic coupling, where a radio frequency of spectrum is used to communicate. For demonstrating the results, the system is built using RFID card reader module of the model RC522 RFID card reader and RFID cards/tags. The RFID system consists of RFID tag (or card) and RFID reader. The tag (or card) has a unique ID which is initially stored in the database before assigning it to the user. The user has to place the tag at a specific distance from the RFID reader so as to log the attendance. The tag consists of a microchip that helps to store unique sequence number that is useful in identifying objects.

The microchip includes micro circuitry and an embedded silicon chip. The tag has a rewritable and permanent memory which can be repeatedly programmed by multiple times. The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags atvarying frequencies are interrogated by the reader. The reader is further connected to the computer for processing the data this can be done via a USB connector or any wireless connection. This type of simple system where scanning of the tag towards the reader makes the work quite easier and improves the rate of error. Also, the long procedure of attendance is cut short to a single move/step. The smart attendance management system removes the traditional way of registering the attendance. It also provides a secure, error-free method of attendance management. The administrators can be at ease by employing such a smart attendance system. The system is best suited formanagingattendance of employees. It can also be used to record attendance for students at their hostels. Attendance plays a very important role in any organization. Attendance in many organizations, college and schools are paper-based. When paper-based attendance is considered, the chances of error are high. Using technology this issue can be solved and the papers can be avoided in this process. There are many technologies that support to solve this issue. But best among them is RFID (Radio Frequency Identification) as the names suggest it uses the radio waves to identify and track the object or individual. The communication with respect to RFID is wireless using an electromagnetic and electrostatic coupling, where a radio frequency of spectrum is used to communicate. For demonstrating the results, the system is built using RFID card reader module of the model RC522 RFID card reader and RFID cards/tags. The RFID system consists of RFID tag (or card) and RFID reader. The tag (or card) has a unique ID which is initially stored in the database before assigning it to the user. The user has to place the tag at a specific distance from the RFID reader so as to log the attendance. The tag consists of a microchip that helps to store unique sequence number that is useful in identifying objects. The microchip includes micro circuitry and an embedded silicon chip. The tag has a rewritable and permanent memory which can be repeatedly programmed by multiple times. The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags at varying frequencies are interrogated by the reader. The reader is further connected to the computer for processing the data this can be done via a USB connector or any wireless connection. This type of simple system where scanning of the tag towards the reader makes the work quite easier and improves the rate of error. Also, the long procedure of attendance is cut short to a single move/step. The smart attendance management system removes the traditional way of registering the attendance. It also provides a secure, error-free method of attendance management. The administrators can be at ease by employing such a smart attendance system. The system is best suited for managing the attendance of employees. It can also be used to record attendance for students at their hostels.

2. LITERATURE SURVEY

[1] This work introduces a new paradigm of monitoring student attendance using Radio Frequency Identification (RFID) based on the Internet of Thing (IoT). Educational institutes are concerned about student irregular attendance. Truancy can affect a student's overall academic performance. The traditional method of taking attendance by calling names or signing on paper is very time consuming and inefficient. RFID based attendance system using IoT system is one of the solutions to handle the problem. The proposed work comprises of two most popular trend in technology research; IoT and RFID. [2] If we talk about the current scenario of our education system than we found that we have lot of technologies to use but still we are following the traditional system. We if we talk about the attendance system in universities and schools, lecturers did that work manually. Lecturers took the attendance and update it manually in the database. If we talk about the technology than we found that there are lot of tools to use and reduce the burden of lectures. Using RFID is the one example of that. We if combine the RFID and IOT (Internet of Things) than we can do it automatically and there is no need to do it by lectures. Here we are planning to use the Cloud as storage for better performance. Using IOT and Cloud we can access it from anywhere and anytime which will provide us the better proficiency and flexibility. [3] Attendance is a must for students. Without the attendance process, the lecturer or teacher cannot assess the participation of a student. But in the process now, attendance is still done manually using paper. The first problem is the use of excess paper and the second problem is the difficulty for the administration to recapitulate student attendance results. This is because so many attendance papers must be analyzed by the administration. Therefore, a student attendance system is needed that can collect data quickly, efficiently and accurately. This student attendance system is done by conducting data collection, system analysis, system design, and system implementation [4]. This system is created using the PHP and Java Android programming languages. The System is also using I beacon as classroom identifier. The purpose of this study is to make attendance system applications of students and class schedule notifications based on IBEACON, it is expected that the attendance process will be more efficient and can be easily monitored by lecturers and by the central administration. Biometric system that reads finger prints to monitor attendance in an institution. But these systems aren't efficient and safe considering the post Covid pandemic. There are also several projects and existing models that uses barcode for this attendance tracking. Smart phones can also be used for this purpose but,it seems there are chances to make fraudulent access in the system. Many types of the research proposed video and image based automated monitoring where it's not economically feasible and depend on location of the camera, the posture of the student and sometime it may fail when there are two or more students with similar facial features. Smart Attendance Management is a solution to one of the most challenging and long standing problems in management of employee or student's attendance. For IoT based Smart Attendance Management, there are several attempts made by many researchers in this direction. A. Kassem, et al., has proposed their work titled "An RFID Attendance and Monitoring System for University Applications" [5]. The authors have proposed a system basically focuses on the factors such as reliability, time saving and easy control. A prototype is defined using RFID system where the reader and tag are considered. Here the attempt is made to modify the RFID so as to setup the complete application on a large scale. The application has three modules Student, Faculty and Administrator. The implementation is only applicable for a small scale setup. Sumita Nainan, et al., has proposed their work titled "RFID Technology Based Attendance Management System" [6] .In the paper the author describes the distinctive components of RFID technology and highlights the core competencies such as scalability and security. A deep study towards the feasibility and practicality of RFID technology is carried out. The outcomes are identified as the key benefits of RFID technology where the main focus is to improve the efficiency at lower cost. T.S. Lim, et al., has proposed their

work titled "RFID Based Attendance System" [7]. The authors through this paper attempts to focus on the issue of student irregular attendance. The proposed system tends to implemented in schools, colleges and universities. The system used RFID system to complete the system which uses a real time clock which helps to gain accurate results. The proposed system is connected to the computer using RS232 (USB) to store the data into the database. The data is viewed using software called HyperTerminal. The system tends to be vital and customer oriented, with physical advantages as light weight, compact design and portable. H. K. Nguyen, et al., has proposed their work in the paper titled "RFID-based attendance management system" [8]. The authors have developed an automated attendance management system that can be put into use at any gatherings such as conferences, exhibitions, training courses, etc. and can be scaled from small to large venues depending on the need. The system is developed using RFID based on the mobile communication and IT technologies. The system collects records and processes data on participants of any conference or events. The system is designed to generate real-time consolidated reports on attendance, the number of attendees of the event and a record about the participants during the event. This can be done for a specific distance from the event, and during an extended period of time. MRF24WB0MA Module is used for the development. Van-Dung Hoang, et al., has proposed their work titled "A solution based on combination of RFID tags and facial recognition for monitoring systems" [9]. The authors have contributed to present a solution based on combination of facial recognition and RFID (radio frequency identification) tags for the office's surveillance monitoring system (SMS). The SMS is built based on two main techniques to building smart systems which consist of face recognition technology and RFID tag recognition which will enable the admin to monitor employee attendance when they are enter or leave the office. The authors have used the deep neural network for employing the face recognition module. The system is connected to the SQL Server database at the backend to store and retrieve employee's information that will help in monitoring and managing the employee's attendance. They have used MFRC522 as the RFID card Reader. The face recognition accuracy was calculated to be 95.22% Mahesh Sutar, et al., has proposed their work titled "Smart Attendance System Using RFID In IOT" [10]. The authors have thrown light to the issue of monitoring and recording attendance manually. An effort is made to solve regular lecture attendance monitoring problem by using the RFID technology. They have included SMS feature which will intimate the parents if the student has attended the classes for the day. An SMS alert is sent to the parent incase the student is absent for the day. This saves the time from recording the attendance manually and also prevents the students from bunking the classes. The system is implemented using RFID card readers. Norakmar Arbain, et al., have proposed their work titled "LAS: Web-based Laboratory Attendance System by integrating RFID-ARDUINO Technology" [11]. The authors have discussed about the issues faced while managing student's attendance in laboratories session especially when the sessions are conducted in parallel. As this process is time consuming the authors has proposed a web based RFIDARDUINO system which also helps them to manage student's experiment marks. The designed website caters to administrator, staff and student's needs. The system allows the staff to monitor attendance and to enter marks while the students have the facility to view these details.

3. PROPOSED SYSTEM

This project is to simplify attendance recording system by using Radio Frequency Identification (RFID) technology. In this project, we are using Arduino Uno, RC522 RFID scanner, and ESP8266 Wi-Fi module. Arduino and RFID scanner scans the RFID cards and then log the data to Adafruit IO cloud platform with the help of ESP8266 Wi-Fi and ESP32 Camera module. This information can be displayed in the Adafruit IO

dashboard and can be accessed by the required authorities to view and analyze the attendance over the internet from anywhere at any time.
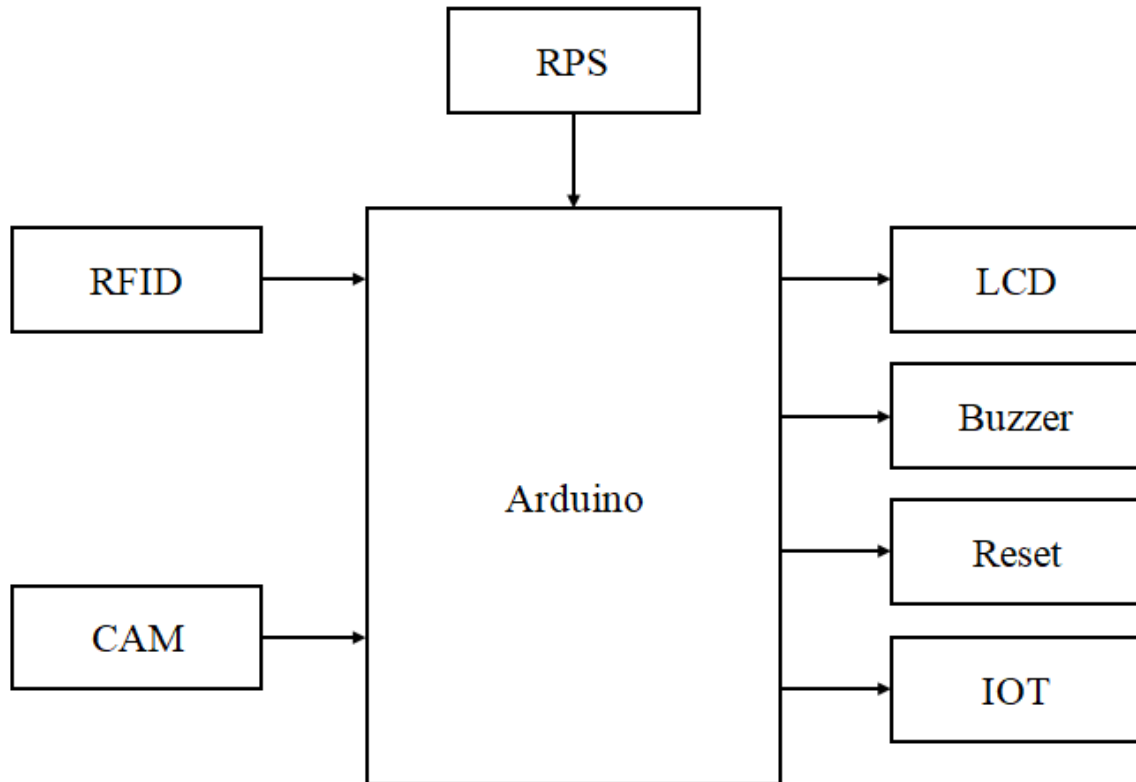

Fig.1.Block diagram

The primary purpose of the Radio Frequency Identification system is to register student attendance wirelessly by a mobile device called a tag, which is read by an RFID reader. Tags and cards of 13.56MHz frequency were used. Also, an RC522 Arduino RFID reader which is of same frequency was used. The circuit simulation for the interfacing of the Liquid Crystal Display (LCD) with the buzzer with the Arduino microcontroller. The application is a web based application. So when we deploy it will have a server where all the web pages reside. All the data is stored in the database. The Client accesses this data using internet. The database is accessed via Server and the application works in the browser. To access the application in the browser, the user must have a valid RFID card (which is analogous to the one shown in the diagram above) and he needs to swipe it in front of the RFID Scanner. The block diagram of system is shown in Figure . RFID Scanner being plug and play can be replaced very easily without affecting the current application and there would be no data losses as there is no hardware storage involved in terms of the RFID Scanner. Moreover the RFID Scanner and the cards are cost effective.

In the proposed system is integrated ESP32era module, RFID Reader, Tags, LCD, Buzzer, IOT and Arduino controller. When the student entry he scan the card to RFID module then immediately Camera capture the pic and information of the student send to department mail. If the student shows the invalid ID card the system automatically alerts the using buzzer. This is very secured Attendance monitoring system we can use in colleges, school and anywhere. The entire input module, output modules integrated to Arduino controller operated by 5v dc with the help of Arduino IDE software

4. RESULTS

5. CONCLUSION

The proposed system of attendance management using RFID technology will improve the process of manual attendance, especially in an organization or school environment. In the long run, with reducing unit tag and reader costs, several businesses will be able to leverage the benefits of RFID technology. A webcam can be

integrated into the system to monitor the person who swaps the card, thus avoiding the problem of a person scanning in for another person. In the proposed system is integrated ESP32era module, RFID Reader, Tags, LCD, Buzzer, IOT and Arduino controller. When the student entry he scan the card to RFID module then immediately Camera capture the pic and information of the student send to department mail. If the student shows the invalid ID card the system automatically alerts the using buzzer. The proposed system will be of great help in schools, colleges and any organizations to monitor their students or employees. Although there are different methods of managing the student's or employee's attendance, the proposed system is easy to handle and very convenient for any organization. The proposed system is time-saving, user-friendly and reliable to use.

REFERENCES

[1] P. Kovelan, T. Kartheeswaran, and N. Thisenthira, "Automated attendance system using IoT", International Conference on Advancements in Computing (ICAC), 2019. [2] Soumil Nitin Shah, AbdelshakourAbuzneid, "IoT based smart attendance system using RFID" , IEEE Journal of Selected areas in Communication, 2019. [3] Muhammad Ayat Hidayat, HolongMarisiSimalango, "Students Attendance System And Notification Of College Subject Schedule Based On Classroom Using Ibeacon", International Conference on Information Technology, Information Systems and Electrical Engineering(ICITISEE), 2018. [4] MohdIkhsanMoksin, NorizanMohd Yasin, "The Implementation of Wireless Student Attendance System in an Examination Procedure", International Association of Computer Science and Information Technology, 2010. [5] A.Kassem, H.Hamad, Z. Chalhoub, S. EI Dahdaah,"An RFID Attendance and Monitoring System for University Applications", International Journal of Science , Engineering and Technology Research(IJSETR), 2010. [6] G.T.Bharathy, S.Bhavanisankari, T.Tamilselvi, G.Bhargavi "Analysis and Design of RF Filters with Lumped and Distributed Elements" International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277 - 3878, Volume-8, Issue-2S5, July 2019, Pages 38 – 42, Retrieval Number: B10090682S519/2019©BEIESP DOI:10.35940/ijrte.B1009.0782S519 [7] D. Mane, "Importance and Analysis of RFID in Attendance System," International Journal of Emerging Science and Engineering (IJESE) no. 9, pp. 90–92, 2013. [8] H. K. Nguyen, M. T. Chew, "RFID-Based Attendance Management System", 2nd Workshop on Recent Trends in Telecommunications Research (RTTR)-2017 [9] Van-Dung Hoang ,Van-Dat Dang , Tien-Thanh Nguyen, DiemPhuc Tran, "A solution based on Combination of RFID tags and facial recognition for monitoring systems", 5th NAFOSTED Conference on Information and Computer Science (NICS) – 2018 [10] Mahesh Sutar, Mahesh Patil, Sachin Waghmare, "Smart Attendance System Using RFID In IOT", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 4-April 2016 [11] Norakmar Arbain, Noor Firdaus Nordin, Naimah Mat Isa, Shuria Saaidin, "LAS: Web-based Laboratory Attendance System by integrating RFID-ARDUINO Technology", 2nd International Conference on Electrical, Electronics and System Engineering (ICEESE), 2014 [12] Md. Sajid Akbar, Pronob Sarker, Ahmad Tamim Mansoor, Abu Musa Al Ashray, Jia Uddin, "Face Recognition and RFID Verified Attendance System", 2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE), 2018