

SMART ENTRY SYSTEM USING IOT AND AI

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Abstract: This work introduces a new paradigm of monitoring employee entry using ESP 8266, Radio Frequency Identification (RFID) based on the Internet of Things (IoT), and Monitoring the Temperature MLX (90614) for (the COVID 19) pandemic. Organizations are concerned about checking temperature and face mask clearance. The method of having a person check these processes is a quite lost cause. . The proposed work comprises two most popular trends in technology research; IoT and ESP 8266, RFID. An efficient employee entry check system needs to be enforced at such places. Radio Frequency Identification (RFID) based at entry system provides us with a solution that the employees are under covid guidelines. This project describes the design of an RFID-based entry monitoring system that uniquely identifies each employee based on their RFID tag which is attached to their ID card. This makes the mechanism of recording the attendance, Temperature, and mask status effortless in a quicker and more protected way as compared to the conventional method. This system is designed for educational institutions, corporate offices, government offices, etc. The proposed system consists of both hardware and software components based on IoT Technology. The employee just needs to place their RFID card or tag on the reader and their details will be recorded for the day.

Keywords: RFID, Temperature, IoT, Entry Monitoring.

1. INTRODUCTION

1.1 PREAMBLE

The way of maintaining the employee entry has several drawbacks such as it's difficult to maintain manually, it can be done automatically. The AI technology-based entry check system such as sensors; biometric-based entry systems reduced human involvement and errors. Whether it is an educational institution or any organization, every institution has to maintain a proper attendance of employees for the effective functioning of the organization. By designing a user-friendly IoT-based entry check system, the employees can record their entries with ease. This would improve the accuracy of employees' details and also saves valuable time for the employees.

Smart entry Management is a solution to one of the most challenging and long-standing problems in this covid situation for the organizations. For IoT-based Smart entry Management, there are several attempts made by many researchers in this direction. , has proposed their work titled "RFID Technology Based Attendance Management System". In the project, the author describes the distinctive components of RFID technology and highlights the core competencies such as scalability and security. A deep study of 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 a lower cost.

To build a Smart entry check System there is a need to integrate different hardware components such as RFID Card Reader, and temperature sensor with the ESP 32 which in turn needs to be connected with the computer through which data communication and data handling take place. The LED display is used to indicate the Humidity of the users of the Success or Failure Scenarios when their card is made to sense against the card reader. RFID Tags or RFID Cards are used to read the user's data. These tags may contain an RFID number that the system reads and records. The RFID tags or cards can contain user's information such as student-id or employee-id, user name, department, etc. Thus the Smart entry check System is built by basic blocks which comprise both the software and the hardware component.

The user must be registered in the system for the Smart Attendance Monitoring system to identify the user. The user's information may be stored in the RFID card or tag. Once the user swipes the card against the RFID card reader, The Card reader senses the RFID card/tag number stored on it. This card number is searched in the database if the user login time is noted to indicate the Temperature and the mask status is recorded by the system.

The entry check system checks the employee's mask and the temperature. The employee will

be entered only if the mask and temperature status are satisfied. After this status satisfies the door will be opened for the employee. If any one of the conditions fails the door will not open and the message will be shown and the process will continue.

1.2 Internet of Things

As the concept “Internet of Things” (IoT) has recently attracted growing attention from both academia and industry. IoT is a scenario where devices (even animals or people) are provided with unique identifiers and the ability to automatically transmit data over a network without requiring human-to-computer interaction. ESP 8266 and RFID form an essential block of IoT where RFID devices are wireless microchips used for tagging objects for automated identification. RFID systems consist of a reading device called a reader, and one or many tags. The frequency band in which each RFID system operates can be low, high, or ultra-high frequency. The low-frequency band (LF) covers frequencies from 30 kHz to 300 kHz. The high band (HF) ranges from 3 to 30 MHz. Most HF RFID systems work at 13.56 MHz with reading ranges between 10 cm and 1 m. The ultra-high frequency band (UHF), the recurrence band, covers the reach from 300 MHz to 3 GHz.

1.3 The Proposed Smart Entry Check System Using Rfid Technology

Our framework utilizes RFID tags which allow the organizations to monitor the employee’s attendance, mask status, and temperature status, and the data are uploaded to the firebase portal.

2. DEVICES FOR MEASURING THE ENTIRE SYSTEM

The reader is a powerful device with a lot of memory and computational resources which could be connected to ESP8266. The tags are usually of two major types; active or passive. In the active RFID systems, each tag has its transmitter and power source. In most cases, the source of power is a battery. Active RFID systems frequently operate in the ultra-high recurrence (UHF) band and offer a range of up to 100 m [5]. A passive RFID system doesn’t have a power source where it gets in power from the reader when the tag chip is brought close to it. Passive RFID systems can work in the low recurrence (LF), high recurrence (HF), or ultra-high recurrence (UHF) radio groups. RFID technology can help to identify and to monitor items (products, people, students, etc.) wirelessly within a specified distance (a few centimeters to hundreds of meters). This project describes the proposed Smart Attendance System using RFID technology. Our framework utilizes RFID tags which allow school/college to monitor the student attendance in and out of the class, upload the data on Google Spreadsheet, send alerts to parents using SMS/email, and generate a report quickly. When RFID tags pass through the read-range zone of the RFID reader, the system will record data from the RFID tags to the database system which could be a central server at the school. In Addition to schools, SAS is an automatic integrated system used to assist in taking attendance in any organization. provides organization, efficiency, and convenience utilizing the trending technologies of IoT.

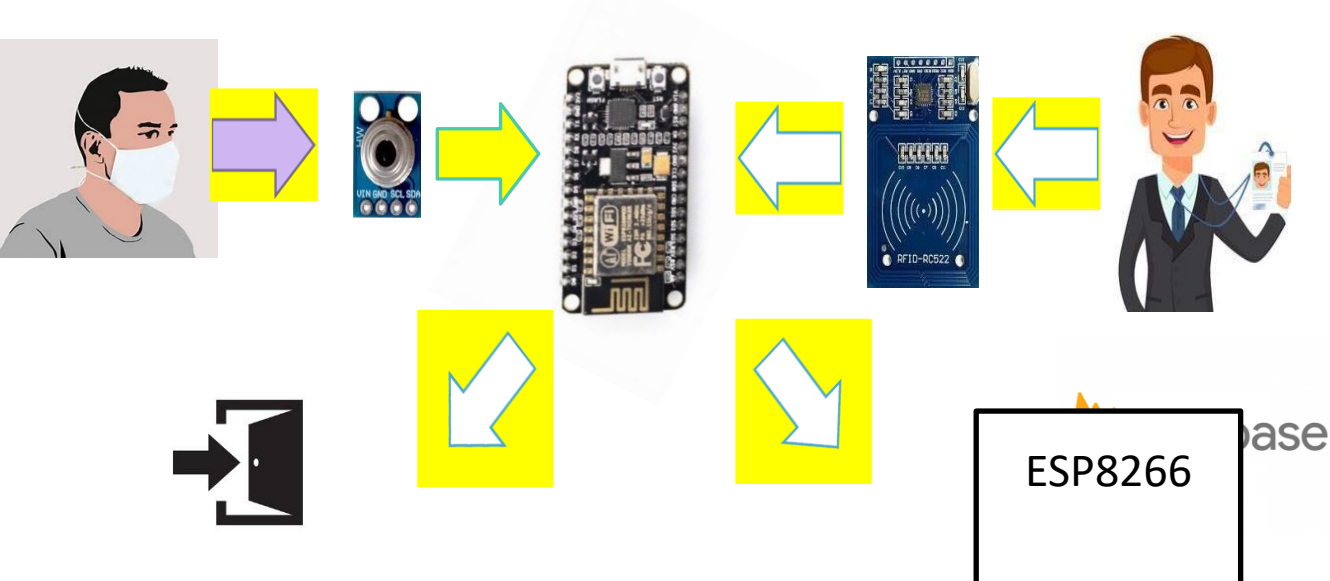


Fig.1. Smart Entry System With Temperature Monitoring

The ultimate benefit of this system to schools and organizations is to automate the attendance system and save time. It will prevent students from bunking classes through the SMS sending feature to parents if they subscribe to the service. The framework will generate reports of students' attendance in a click. It is a low-cost, and portable IoT-enabled RFID reader. The power supply system designed will automatically switch to battery power if the AC power was removed. The size of the device is small. These two features make the system portable and easily packed and carried to the classroom or other places. we present the design of the framework. In section, we provide the conclusion and future work.

2.1 Functional Diagram

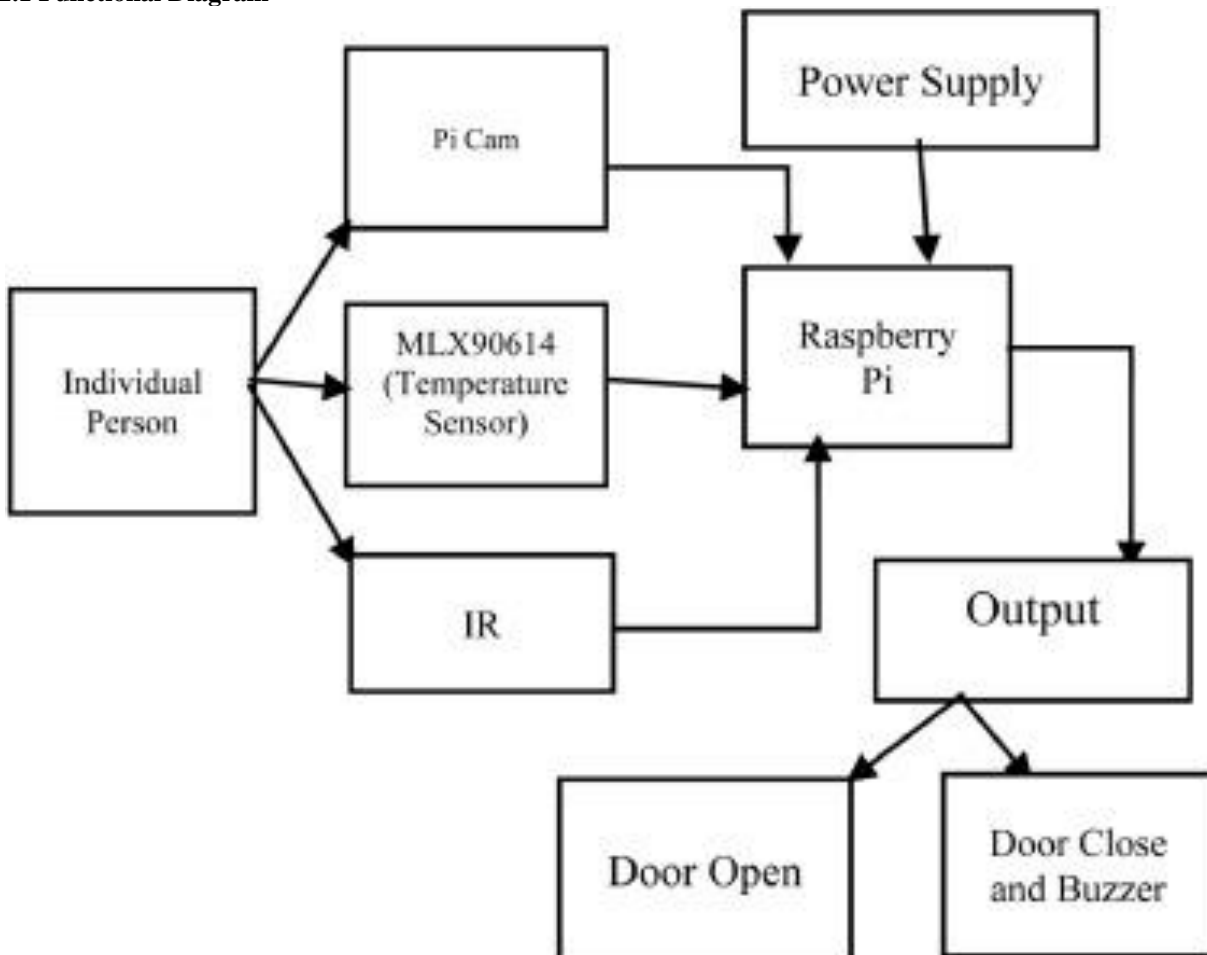


Figure. 2. Functional Block diagram

3. SOFTWARE DESCRIPTION

3.1. Introduction

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, and Linux) that is written in functions from C, C++, and Google Sheets. It is used to write and upload programs to Arduino compatible boards and, with the help of 3rd party cores, other vendor development boards.

3.2. Arduino IDE Arduino IDE is open-source software that is mainly used for writing and compiling the code into the Arduino Module.

It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role in debugging, editing, and compiling the code in the environment. A range of Arduino modules is available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino M, micro, and many more. Each of them contains a microcontroller on the board that is programmed and accepts the information in the form of code.

The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded to the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where the former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module. This environment supports both C and C++ languages.

The IDE environment is mainly distributed into three sections

1. Menu Bar
2. Text Editor
3. Output Pane

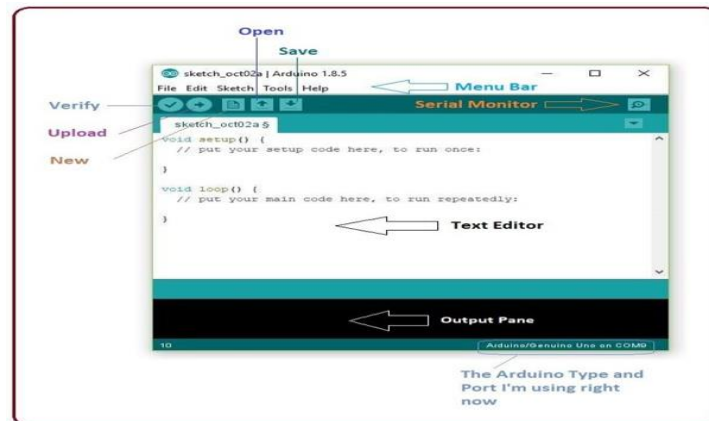


Figure. 3. Arduino IDE

3.3. FireBase Based Desktop Application For Monitoring Attendance System

Accessible: You can access data for all your classes from anywhere in the world on your laptop or Smartphone.

Compatible with everything: Every other piece of software in the world integrates with firebase. If you have data stored in other programs, you can easily download or directly import that data and centralize everything in the web portal.

Easy to use: Almost every professional works with firebase at some point during their life. FireBase is a very intuitive and user-friendly system, even for spreadsheet novices. This makes maintenance and training easier, and you can be sure that your system is future-proof.

4. PROBLEM FORMULATION

In an organization entry, check plays a vital role. Attendance in many organizations, college, and schools are project-based. When project-based details are considered, the chances of error are high. Using technology this issue can be solved and the projects can be avoided in this process. Many technologies support solving this issue. But best among them is RFID (Radio Frequency Identification) as the names suggest it uses the radio waves to identify and track an object or individual. The communication concerning RFID is wireless using an electromagnetic and electrostatic coupling, where a radio frequency of spectrum is used to communicate. The system is built using the RFID card reader module of the model RC522 RFID card reader and RFID cards/tags to demonstrate the results.

Consider the example that shows This makes the mechanism of recording the attendance effortless, quicker, and protected as compared to the conventional method. This system is designed to be used at different educational institutions, corporate offices, government offices, etc. The proposed system consists of both hardware and software components based on IoT Technology.

The hardware component consists of an RC522 RFID card reader and RFID tags/cards. The software component of the Web-based GUI for viewing the employee's or student's attendance is hosted on a web server and stores the data in a database server. The employees or students just need to place their RFID card or tag on the reader and their attendance will be recorded for the day. Also, the attendance recorded will be more accurate as the system is synced with a real-time clock.

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their attendance will be recorded for the day. Also, the attendance recorded will be more accurate as the system is synced with a real-time clock

4.1. Proposed Methodology

A smart entry check system is a solution to one of the most challenging and long-standing problems in the management of employee entry details. For the IoT-based Smart entry check system, The smart entry check system removes the traditional way of checking manually. It also provides a secure, error-free method of details management. The administrators can be at ease by employing such a smart entry system. The system is best suited for managing the attendance of employees. It can also be used to record details of employees and store them in a web portal(firebase).

4.2. Schematic of the System

The schematic of the system is shown below.ESP 8266 and RFID reader of the attendance recording system.

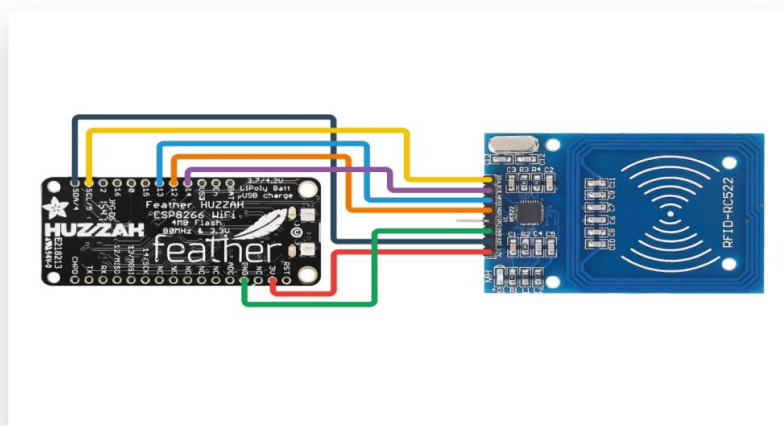


Figure.4. Schematic diagram

4.3. Circuit Connection

The below circuit shows the electrical connection among the microcontroller, sensor and RFID reader.

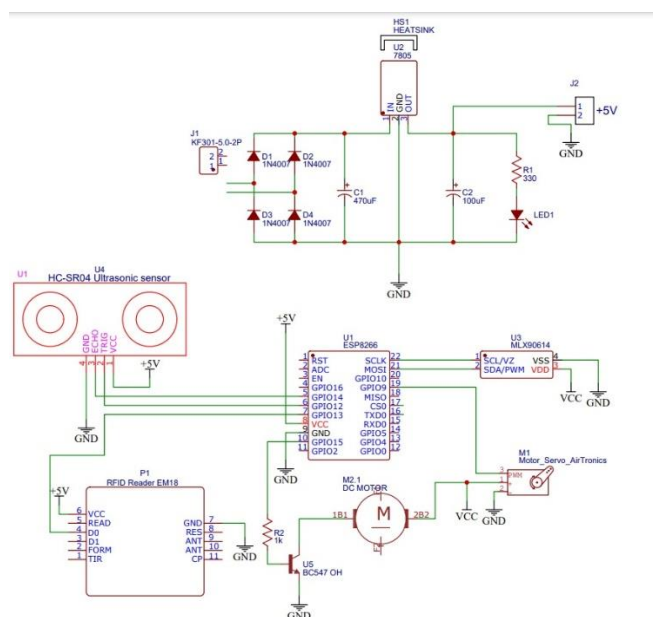


Figure. 5. Circuit Connection

4.4. Experimental Setup/Hardware Prototype

The below figure depicts the hardware prototype that has been developed to realize the proposed methodology. The tests were conducted using the below experimental setup.

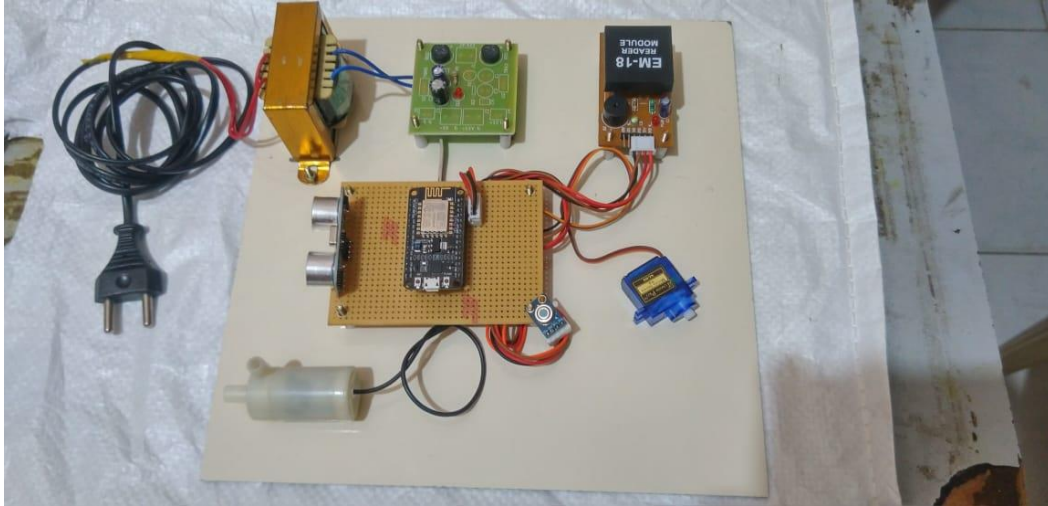


Figure. 6. Experimental Setup

4.5. Working

The first step would be entering a valid id card by showing it in RFID. After the user is validated, it will direct the user to the database. The user can view the esp32cam for mask detection after it was detected it will direct the user to the database of the employee. Once the employee is added to the database, next mlx90614 temperature read temperature from the employee body if it's high then 100 degrees the process will be stopped and it will be advised the employee to take care and meet the doctor and if it is less than 100 the next processes will be played in a row. The next will be an ultrasonic sensor for the working of sanitizing the hand of the employee after the process the servomotor will be open the door after all the processes done completely and it will direct the user to the database

5. CONCLUSION AND FUTURE SCOPE

Thus an AI-based non-contact temperature measurement and mask detection were successfully developed and validated. With the proposed system Our goal is to develop a secure, portable, and ready-to-deploy RFID-based attendance. The system provides a practical and efficient solution for monitoring employee entry on a large scale. The proposed entry check system uses the concept of IoT to log and fetch data on the server/cloud and make it available for the user anytime and anywhere.

REFERENCES

- [1] Vinitha, Valentina, "COVID-19 Facemask Detection with Deep learning and Computer Vision", IRJET, vo.7, issue 8, pp.3127-3132, 2020
- [2] Mental, "Facial Mask Detection using Semantic Segmentation", International Conference on Computing, Communications and Security, 2019.
- [3] Sammy V. Militante, Nanette V. Dionisio, "Real-Time Facemask Recognition with Alarm System using Deep Learning", 11th IEEE Control and System Graduate Research Colloquium (ICSGRC 2020), pp.106-110,2020
- [4] Bosheng Qin, Dongxiao Li, "Identifying Facemask-Wearing Condition Using Image Super-Resolution with Classification Network to Prevent COVID-19", Sensors, MDPI, pp.1-23, 2020
- [5] Mohammad Marufur Rahman, Md. Motaleb Hossen Manik, Md.Milon Islam, Saifuddin Mahmud, Jong-Hoon Kim, "An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network", IEEE International IoT, Electronics, and Mechatronics Conference (IEMTRONICS), 2020.
- [6] Mohanlal Meenpal, Ashutosh Balakrishnan, Amit Verma, "Facial Mask Detection using Semantic Segmentation", 4th International Conference on Computing, Communications and Security (ICCS), pp.1-5, 2019
- [7] Sneha Sen, Harish Patidar, "Face Mask Detection System for COVID_19 Pandemic Precautions using Deep Learning Method", Journal of Emerging Technologies and Innovative Research (JETIR), vol. 7, issue 10, pp.16-21
- [8]. Lu Tan and Neng Wang. (2010) 'Future internet: The Internet of Things, IEEE Xplore Proc., 3rd IEEE Int. Conf. Adv. Comp. Theory. Engg.(ICE), pp:1-9.