

Student Attendance Monitoring System using IoT and RFID

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Abstract- It is a difficult undertaking to keep kids' attendance up at a school. The manual handling of attendance is never easy. The goal of this project is to create a smart attendance system that effectively tracks and maintains student attendance in a setting on an automated basis. RFID readers and an Arduino Uno microcontroller were used to construct the entire system. Students' ID cards may be equipped with distinctive RFID tags. Additionally, Wi-Fi communication modules are employed to facilitate communication that is dependent on network availability. The creation of a student database is necessary. Messages on the pupils' attendance status are sent to parents' mobile devices via a GSM module. To determine the student's current location, a GPS module is employed. Teachers and administrators at any school won't have to do as much manual labor thanks to this method. IoT and RFID, two of the most well-liked technological trends, are included in the suggested work.

Keywords- Smart Attendance, IoT, RFID, GSM, Arduino, Esp Module, Node MCU, Ubidots.

I. INTRODUCTION

The importance of attendance cannot be overstated in any organization. Many businesses, colleges, and schools use paper to track attendance. Error rates are considerable when paper-based attendance is taken into account. This problem can be resolved through technology, and in the process, the use of paper can be avoided. Numerous technologies are available to help tackle this problem. However, RFID (Radio Frequency Identification) is the best of them all because it employs radio waves to identify and track people or objects. With regard to RFID, communication occurs wirelessly through electromagnetic and electrostatic coupling, using the radio frequency portion of the electromagnetic spectrum. The system is constructed using an RFID card reader module from the model RC522 RFID card reader to demonstrate the findings. The RFID system consists of RFID tag (or card) and RFID reader.

The user is first given access to the tag's (or card's) unique ID, which is first kept in the database. To record attendance, the user must position the tag a particular distance from the RFID reader. A microchip that aids in storing a special sequence number that is helpful in identifying objects makes up the tag. Microcircuitry and an integrated silicon chip are both included in the microchip. The tag has a persistent memory that may be programmed more than once and is rewritable. The most essential component of the RFID system is the RFID reader. The RFID reader used for detection runs at a frequency of 125 kHz and 12V power supply, with a maximum range of around 5 cm above the reader.

An RFID tag (or card) is used to communicate data with an RFID reader using radio waves. The tag is made up of an antenna for receiving radio waves and an integrated circuit for processing and storing data, among other functions. It retrieves the raw data from the tag and sends it for processing to the middleware. The reader queries tags that have different frequencies. The reader is then connected to the computer so that it can process the data. This can be done wirelessly or with a USB port. The work is considerably easier and the rate of error is improved with this kind of straightforward method where the tag is scanned toward the reader. Additionally, the protracted process of taking attendance is reduced to a single action. The sophisticated attendance management system does away with the conventional method of keeping track of attendance. Additionally, it offers a safe, error-free way to manage attendance. Using such a clever attendance system will put the administrators at ease. The approach works well for keeping track of staff attendance. It can also be used to track a student's presence in their residence halls.

II. LITERATURE SURVEY

[1] In this paper, a novel paradigm for employing Radio Frequency Identification (RFID) to track students' attendance is introduced. IoT, or the Internet of Things. The inconsistent attendance of students worries educational institutions. The entire academic achievement of a student might be impacted by truancy. The time-consuming and ineffective traditional way of taking attendance by calling names or signing on paper. One of the answers to the issue is an IoT system using an RFID-based attendance system. IoT and RFID, two of the most well-liked trends in technological study, are included in

the suggested effort. [2] If we look at the state of our educational system right now, we can see that although there are many technologies available, we are still using the conventional system.

When it comes to the university and school attendance systems, professors handled that work manually. The database was manually updated by lecturers using the attendance data. When it comes to technology, there are several solutions available that can be used to lighten the load of lectures. One illustration of such is the use of RFID. If we use RFID and IOT (Internet of Things) together, we can accomplish it automatically without having to give lectures. For improved speed, we intend to use the Cloud as storage in this case. We can access it at any time and from any location via IOT and the cloud, giving us greater proficiency and flexibility. [3] Participation is essential for students. Without the attendance process, the lecturer or teacher cannot assess the participation of a student.

However, the current procedure still involves physically taking attendance on paper. The use of excessive paper is the first issue, and it is challenging for the administration to summarize student attendance data that is the second issue. This is due to the administration having to review a large number of attendance records. Therefore, a system for tracking students' attendance that can gather data quickly, effectively, and precisely is required. The deployment of this student attendance system involves data collecting, system analysis, system design, and system implementation. The PHP and Java Android programming languages were used to construct this system. Ibeacon is also used by the system to identify classrooms. It is anticipated that this project will use IBEACON to create applications for student attendance systems and class scheduling alerts.

III. EXISTING SYSTEM

Fingerprint-based biometric system for keeping track of attendance in a facility. However, in light of the post-Covid pandemic, these systems are not reliable or secure. Barcodes are used in numerous projects and current models for recording attendance. Smartphones can also be used for this, however it appears that there is a risk of unauthorized system access. Numerous research studies suggested video and image-based automated monitoring, but these methods depend on where the camera is placed, the student's posture, and sometimes they don't work at all when there are multiple students with the same facial features.

IV. PROPOSED SYSTEM

A GSM module, MFRC522 Reader, Node MCU ESP8266 Wi-Fi module, and Arduino Uno (Atmega328p) are all

connected. The location of the RFID card that is scanned by the reader and whose location is sent to the database is determined by enabling GPS module communication with the controller. The RFID reader reads a passive RFID card, and the information is then delivered to a database and software program for additional data processing. The Node MCU ESP8266 Wi-Fi module is chosen as the main data transmission technique. The information is sent on to Google Server Cloud/UBIDOTS.

Students' information is organized by class, section, and department in a database created with MySQLite. The student database is set up such that the parallel attendance scanner system can be used to track attendance at many entrances to an institution without ever producing duplicate data that would need to be stored in the cloud. Python is used in the software implementation process. Tkinter and MySQLite are used to complete the backend and frontend, respectively. Faster data collection, aggregation, and processing are made possible by this. With just a press of a button, the system can notify the lecturer.

IV. HARDWARE AND SOFTWARE REQUIREMENTS

- Arduino Uno
- NodeMCU ESP 8266
- RFID Reader MFRC522
- RFID tags
- GSM Module
- Arduino IDE
- Embedded C
- PHP

V. BLOCK DIAGRAM

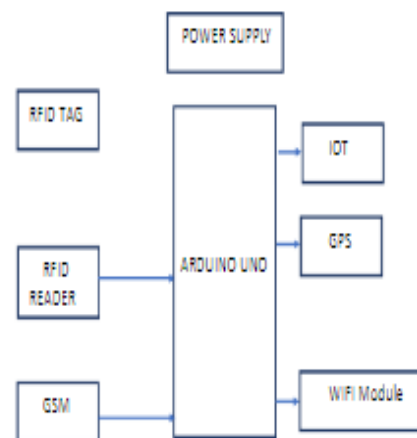


Fig 1. Block Diagram of the Proposed System

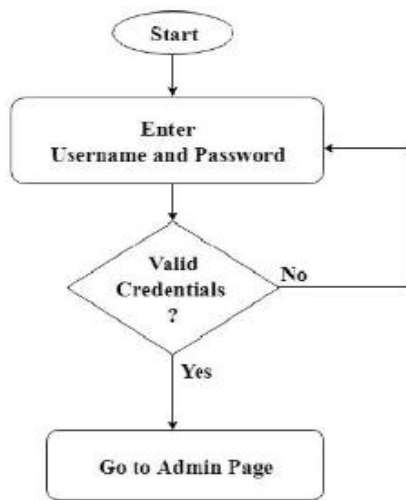
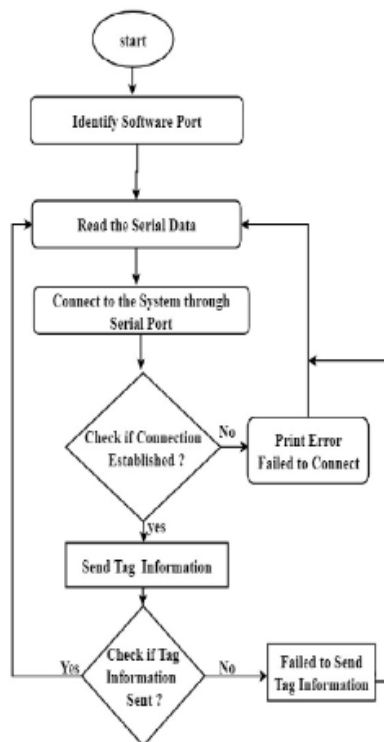


Fig 3. Flowchart of software implementation

Fig 2. Flowchart of Hardware



VI. SIMULATION RESULTS

When the RFID tag is inserted on the RFID Reader, the data is read by the reader and passed to the Arduino uno. The simulation work for this project is done with embedded C to ensure that the logical functions in a normal way and produces the results. The RFID tag contains particular characteristics and information. The

GPS module is used to determine the student's current location, which is posted on the website as shown in fig. 5.2. Using Node MCU, the read data is sent to the cloud. Additionally, a GSM module is used to send the SMS to the parent's mobile device. By entering into the server with a password and a username, the administrator can view the students' attendance records.

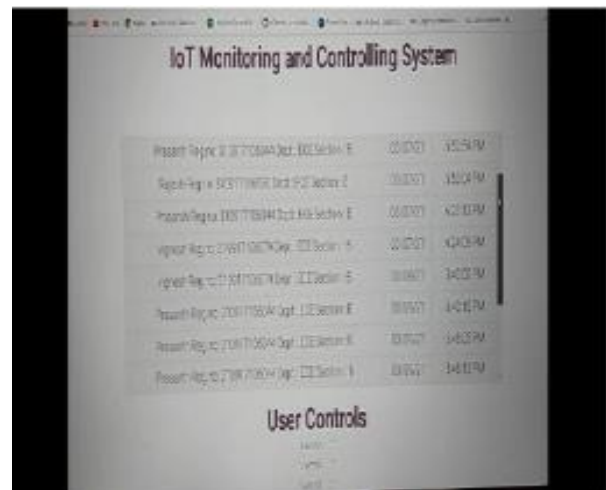
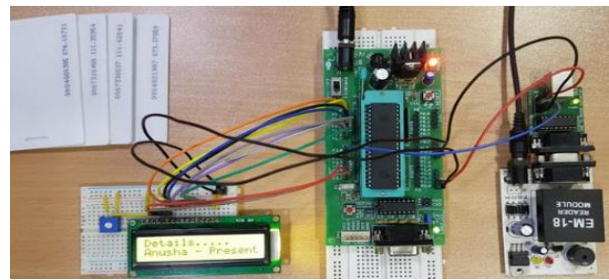


Fig 4. Value stored in the cloud (attendance report)

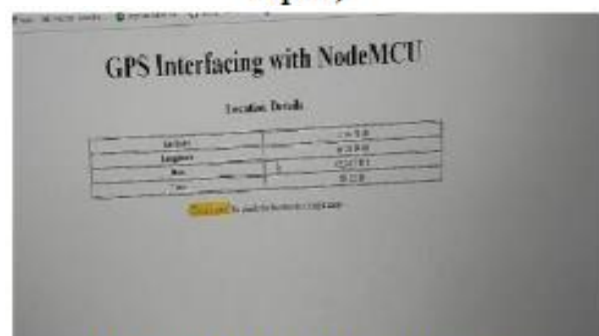


Fig.5 Students data in web server

VII. CONCLUSION

The current manual system of recording attendance can be changed into an effective and error-free attendance management system with the suggested IoT based smart attendance system using RFID. Information may be transmitted without a hitch using this approach. In order to keep track of their pupils or staff, schools, colleges, and other organizations will greatly benefit from the proposed

method. Although there are other ways to manage a student's or employee's attendance, the suggested approach is simple to use and ideal for any business. The suggested system can be used with confidence and saves time.

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