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RFID ATTENDANCE TRACKER: A SMART CLASSROOM SOLUTION

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ABSTRACT –

In educational institutions and workplaces, monitoring attendance is crucial for maintaining attendance records. Traditional manual method of attendance tracking prone to errors and time-consuming. To address these challenges, this paper aims to automate the process of recording attendance using RFID (Radio-Frequency Identification technology). We make use of RFID tags/cards which has unique ID. The microcontroller processes the ID and checks it against the database. If the ID is recognized, the attendance is recorded in the database and feedback is provided through the buzzer. Like wise efficient and accurate attendance is been recorded. The RFID smart attendance system provides an effective solution for automating attendance management in educational institutions and workplaces.

Key words- RFID, ID, Microcontroller, Attendance.

INTRODUCTION

RFID-based student attendance management systems utilize new technology that eliminates the problems of manual attendance records and are proven to be more reliable and accurate. Radio frequency identification is a technology that uses radio waves to transmit data from her RFID tag through a reader to uniquely identify an individual. RFID systems consist of tags and readers. An RFID reader consists of an antenna and a transceiver. RFID readers communicate with the tag's antenna by transmitting electromagnetic waves through an antenna. The tag's antenna receives data from the reader and activates the tag, which reflects the incoming electromagnetic waves along with the RFID tag information. The reader transceiver receives the data and passes it to the controller.

LITERATURE REVIEW

Ula, Mutammimul presented the new RFID-based student attendance monitoring system model. The advancement of information technology has improved convenience and efficiency, revolutionizing work operations. Nonetheless, a lot of institutions continue to use labor-intensive, imprecise manual paper-based attendance methods. In order to enhance attendance tracking, a new presence system utilizing RFID technology is proposed in this study. By immediately updating the database with information from student cards that RFID sensors have scanned, timely and correct attendance records are ensured. This method gives teachers and students access to real-time data and promotes timeliness[1].

Nivetha developed RFID-based student attendance system. In which for all types of companies, including educational institutions, efficient attendance management is essential. The inaccuracies and lengthy processing times of traditional manual methods make it difficult to monitor student attendance. A web-based attendance management system has been created utilizing the Model-View-Controller (MVC) architecture and the Laravel Framework in order to solve this problem. For precise attendance calculations, it electronically logs attendance, separates theoretical from practical classes, and stores information in a MySQL database. The system is a useful tool for effectively controlling student attendance in big departments or institutions since it provides an easy-to-use graphical user interface (GUI) for data administration and has undergone successful testing. This technology helps organizations make sure that attendance policies are followed by streamlining the attendance process[2].

RFID-based IoT-based smart attendance monitoring system, Unnati Koppikar, Shobha Hiremath, Akshata Rajoor, Akshata Shiralkar, and V. P. Baligar. This system describes the architecture of an RFID-based attendance tracking system that uses ID cards with RFID tags to identify each student or employee. When compared to conventional approaches, our novel methodology simplifies attendance monitoring and makes it faster, easier, and more secure[3].

Abdelshakour Abuzneid, Soumil Nitin Sha, and the use of an IoT-based smart attendance system (SAS). This study offers a novel method of monitoring student attendance using the Internet of Things (IoT) integration of Radio Frequency Identification (RFID). Educational institutions are concerned about student absence, and standard attendance procedures are time-consuming. This issue may be resolved by utilizing RFID and IoT technology, which combines two significant technical developments to improve attendance management[4].

METHODOLOGY

1. Node MCU ESP8266:

The Node MCU ESP8266 is a popular low-cost development board built around the ESP8266 Wi-Fi microchip from Espressif Systems. This microchip first gained attention for providing a surprisingly affordable way to enable Wi-Fi connectivity in projects involving microcontrollers. The ESP8266 itself is a self-contained Wi-Fi networking solution, offering all the functionality of a Wi-Fi adapter through its onboard processing and storage capabilities. Node MCU design is as shown in fig.1.
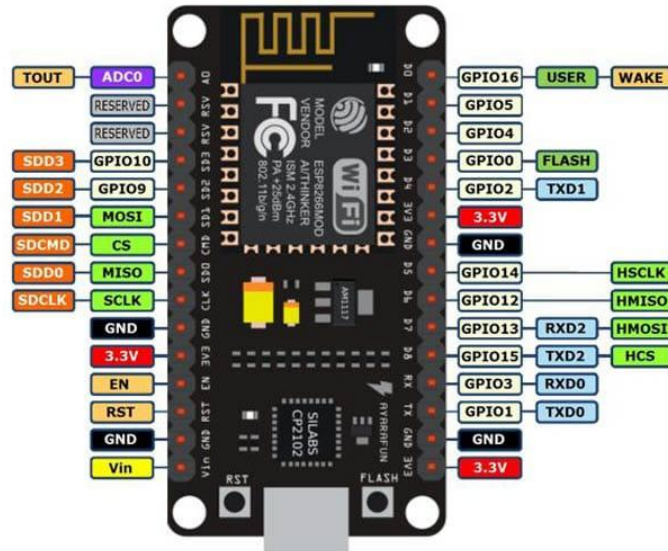

Fig.1 Node MCU ESP8266

2. RFID Reader:

An RFID (Radio Frequency Identification) reader, also known as an RFID scanner, is a device for collecting information from RFID tags that are used to track individual objects. RFID technology uses electromagnetic fields to automatically identify and track tags attached to objects. Tags contain electronically stored information and can be read from up to several meters away. Unlike barcodes, RFID tags do not need to be within the reader's field of view, which can streamline the process by which objects need to be scanned automatically. Figure 2 shows an RFID reader.
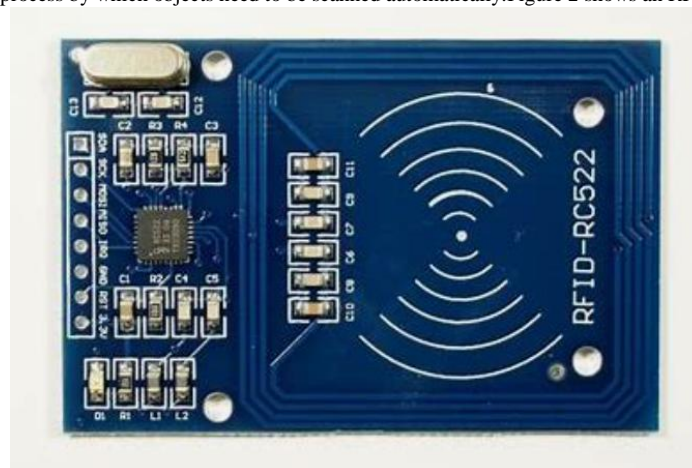

Fig.2 RFID Reader

3. RFID Tags:

RFID (Radio Frequency Identification) Tags/Cards are small electronic devices that consist of a small chip and an antenna. They are used to store and transmit data wirelessly via radio waves to RFID readers. It are commonly used for various applications such as tracking inventory in retail stores, managing access control in buildings, tracking livestock, and managing supply chains. They come in different forms, including passive, active, and semi-passive, each with its own characteristics and capabilities. RFID tags are as shown fig.3.

Fig.3 RFID Tags

4.Jumper wires:

These are used to make connections between different components of the system, such as connecting the RFID reader to the microcontroller or connecting sensors to the microcontroller. As shown in fig.4.

Fig.4 Jumper wires

5. Buzzer:

A buzzer can provide audible feedback to indicate successful attendance or any system errors. It can be programmed to emit different tones or patterns for various events, enhancing the user experience and providing accessibility to those with visual impairments. Shown in fig.5.

Fig.5 Buzzer

WORKING

An individual RFID tag is given to each user (like a card or key fob).The RFID reader recognizes and scans the tag's unique identification (UID) when a user places their RFID tag close to it. The Node MCU ESP8266 board and the RFID reader are linked by serial, SPI, or I2C communication interfaces. The Node MCU receives data from the RFID reader once it has read a tag's UID.As shown in block diagram below in fig.6, After receiving the UID, the Node MCU has the option to attach a date and other pertinent information (such as the reader ID if several readers are being utilized). The ESP8266 Node MCU is outfitted with Wi-Fi connectivity. It transfers the information to PLX-DAQ software across the network after processing the UID and other data. The acronym PLX-DAQ represents "Parallax Data Acquisition." This widely used tool uses microcontrollers to gather data from a variety of sensors and transfer it to a computer for Microsoft Excel analysis and display.
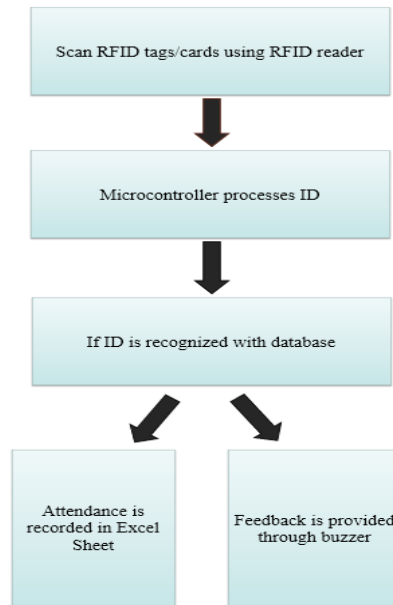
Fig.6 Block diagram

After receiving the information, the server enters the attendance into a database. Additionally, it may interpret the data to produce warnings, update attendance records, and give real-time feedback on access control. Alternatively, the Node MCU may receive a confirmation or rejection message from the server, at which point it may take appropriate action (such as sounding a buzzer to signal access being authorized). Using a special PLX DAQ, administrators or other authorized staff can obtain the attendance statistics. Users may also have access to their attendance records via a user portal. This system may generate comprehensive reports based on the data gathered, including attendance summaries and punctuality reports.

CONCLUSION

In summary, the RFID attendance system has shown to be a dependable and effective way to monitor attendance in a range of organizational contexts. Organizations have been able to automate the process of tracking attendance using RFID technology, doing away with the need for human entry or paper-based methods. The precision of the RFID attendance system is one of its main benefits. The system can reliably identify and record everyone's attendance without the possibility of fraud or error by using RFID tags or cards. Organizations may rely on this degree of precision to provide accurate attendance data for payroll, compliance, and other administrative needs.

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