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SMART ATTENDANCE SYSTEM USING RFID AND GOOGLE SHEETS

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***Abstract*— Attendance management is a critical function in educational institutions and organizations, impacting administrative efficiency, performance tracking, and access control. Traditional methods such as manual roll calls, signature sheets, and biometric systems are often time-consuming, error-prone, and difficult to scale for large groups. To address these challenges, this project proposes a smart attendance system leveraging RFID technology and cloud integration via Google Sheets. The system uses RFID tags and a NodeMCU ESP8266 microcontroller to automatically detect and log the presence of individuals in real-time. Attendance data is transmitted wirelessly over the internet and recorded directly into Google Sheets, enabling remote access, real-time updates, and elimination of manual data entry. A 16x2 LCD display and buzzer provide immediate feedback on successful scans, ensuring user-friendly interaction. The design is cost-effective, portable, and easily scalable, making it suitable for classrooms, workplaces, and other environments requiring automated attendance tracking. This approach demonstrates the potential of integrating IoT, RFID, and cloud platforms to enhance efficiency, reduce human errors, and streamline attendance management processes.**

Keywords— Smart Attendance, RFID, NodeMCU ESP8266, Google Sheets, IoT, Real-Time Data Logging, Automation, Cloud Integration, LCD Display, Buzzer Feedback.

I. INTRODUCTION

Attendance management is a fundamental aspect of any academic or organizational environment, serving not only as a record-keeping function but also playing a crucial role in performance evaluation, access control, and administrative decision-making. However, conventional attendance tracking methods—such as roll calls, signature sheets, or biometric systems—often prove to be inefficient, prone to human error, and susceptible to misuse. In large classrooms or workplaces, these manual processes become increasingly tedious and timeconsuming, diverting valuable time and resources from more productive tasks. With the advent of modern technologies such as the Internet of Things (IoT) and Radio Frequency Identification (RFID), more sophisticated and automated solutions have emerged. These technologies offer a practical pathway to streamline attendance systems by integrating hardware and cloud-based platforms for real-time data logging and analysis. The RFID-based attendance system, in particular, is a notable advancement that utilizes RFID tags and readers to detect and record the presence of individuals instantly and accurately. The system discussed in this document leverages a Node MCU ESP8266 microcontroller to read RFID tags and communicate data wirelessly to Google Sheets via the internet. This integration allows for seamless, remote access and real-time updating of attendance records, eliminating the need for physical storage or manual data entry. The entire setup is lightweight, portable, and economically viable, making it suitable for widespread use in educational institutions, small-to-medium enterprises, and other organizations seeking a smart alternative to traditional systems. Furthermore, the proposed system is equipped with a 16x2 LCD display to provide instant feedback to users and a buzzer to confirm successful scans. It supports scalability and customization, enabling administrators to extend functionality with minimal changes. This document presents a detailed exploration of the system's design, development, and performance, supported by circuit diagrams, code snippets, and implementation results

II. LITERATURE SURVEY

This paper introduces a new approach to utilizing RFID (Radio Frequency Identification) to track student attendance that is based on the Internet of Things (IoT). Educational institutions are concerned about student absences. The general academic achievement of a pupil may suffer from truancy. It takes a lot of time and is ineffective to take attendance the old-fashioned way, by calling names or having people sign their names on paper. One of the answers to the issue is an RFID-based attendance system that uses an IoT system. The two most well-liked technological research trends—IoT and RFID—are included in the suggested study. 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.

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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 RFID and IoT (Internet of Things) are used together, they can be done automatically without the need for 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

III. SYSTEM DESIGN

1) Input Unit

The input unit comprises RFID Tags and an RFID Reader. Each individual (student or employee) is assigned a unique RFID tag that stores a specific identification number. When the RFID tag is brought near the RFID reader, the reader detects the tag's unique ID and sends it to the microcontroller (NodeMCU) for verification and further processing.

This process eliminates manual attendance marking and ensures quick, contactless data capture. The RFID reader uses serial communication to transmit data to the NodeMCU. The system can also incorporate additional authentication mechanisms, such as PIN or password verification, to prevent proxy attendance.

2) Processing Unit (NodeMCU Controller)

The NodeMCU ESP8266 microcontroller serves as the central processing unit of the system. It receives the RFID tag data from the reader, verifies it against the stored database, and determines whether the individual is authorized. Upon successful identification, the NodeMCU records the attendance and sends the data wirelessly to Google Sheets via the internet using its built-in Wi-Fi capability.

The NodeMCU is programmed using the Arduino IDE, where it executes predefined logic for reading tag data, formatting attendance records, updating timestamps, and handling network communication. This wireless integration with Google Sheets enables real-time data logging and remote access to attendance records from any location.

3) Output Unit

The output unit consists of a 16x2 LCD Display and a buzzer.he LCD display provides real-time feedback such as "Tag Scanned," "Attendance Recorded," or "Access Denied.The buzzer emits an audible tone to confirm that the RFID tag has been read successfully, alerting the user that attendance has been marked.

Additionally, data is transmitted to the Google Sheet, where attendance information is organized in tabular form, including fields like student/employee name, ID, date, and time of entry. This cloud-based record-keeping enhances transparency and eliminates the need for manual data entry.

4) Power Supply Unit

The power supply unit provides the necessary electrical energy for the operation of all components. The NodeMCU and RFID Reader typically operate at 3.3V to 5V DC, supplied either via a USB connection or an external adapter. A regulated power module ensures stable voltage output to prevent fluctuations that might disrupt data transmission or tag detection. In cases where multiple modules (such as LCD, Wi-Fi, or buzzer) are connected, a separate 5V regulated power source is recommended for consistent performance.

IV. IMPLEMENTATION

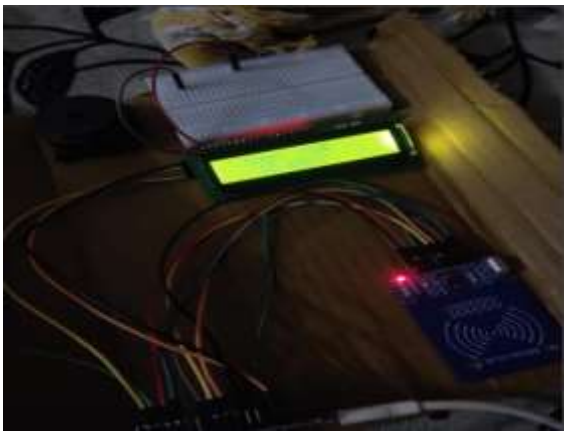

Fig. 1. Experimental Setup

This setup is an RFID (Radio-Frequency Identification) system prototype.It uses an RFID-RC522 module to read data from an ID card and displays the prompt "SHOW YOUR ID CARD" on a backlit LCD screen.A microcontroller (off-frame) links these components on a breadboard to manage access control logic.

V. FLOW CHAT

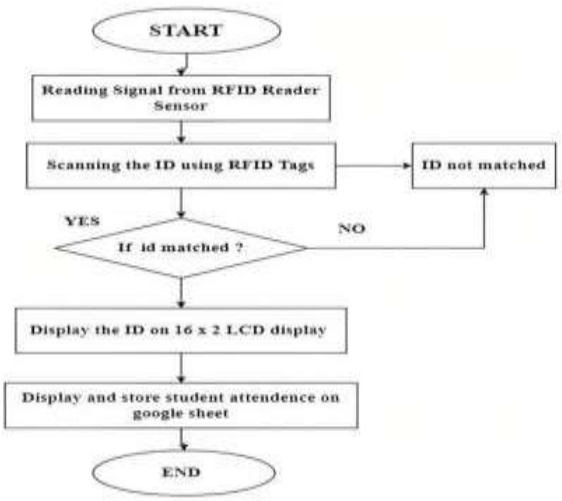

Fig.2.Flow Chart

The flowchart illustrates the working of the IoT-based RFID attendance system. The process begins with the RFID reader continuously scanning for nearby RFID tags. When a tag is detected, its unique ID is read and sent to the NodeMCU for verification. If the scanned ID does not match any record in the database, the system ignores it. However, if the ID matches a registered user, the system displays the corresponding ID or name on a 16×2 LCD display and simultaneously uploads the attendance details—such as ID, name, date, and time—to a Google Sheet through Wi-Fi.

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This ensures real-time attendance recording and easy remote access to data. Once the entry is stored, the system returns to its idle state, ready for the next scan.ansparency in result computation.

VI. Experimental result

“Fig3":The image displays an RFID-based logging system that prompts a user to scan a tag, transmits the tag's ID and time over Wi-Fi, and then instantly logs this data into a Google Sheets spreadsheet for real-time tracking.

Fig 3.Results

VII.CONCLUSION

It was aimed to get effective and efficient time-saving automated computerized attendance in real-time with a ready excel sheet to maintain attendance records we conclude that this userfriendly proposed system can be proved to be easy to use and implement, cost efficient, timesaving, less tedious, and portable. To overcome all the drawbacks, unreliable and inaccurate manual work, this proposed system gets improved with very minimal effort and yet generates the results with maximal accuracy and qualitative. Ultimately, the system improves academic performance which encourages time saves and accuracy in attendance. By integrating RFID technology with cloud-based Google Sheets, the system enables real-time, accurate recording of attendance data while minimizing manual effort and errors. This user-friendly system is costeffective, portable, and scalable, making it suitable for various educational and organizational
settings.

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