

RFID Based Attendance And Monitoring System

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ABSTRACT

Manual attendance systems are time-consuming, prone to errors, and allow proxy attendance. This paper proposes an RFID based attendance and monitoring system using NodeMCU ESP8266 with IoT connectivity. RFID cards are used for student identification, and an RC522 RFID reader is used for scanning. Attendance data is automatically uploaded to a cloud database (Google Sheets) along with real-time date and time. The proposed system reduces human effort, improves accuracy, and provides quick report generation for academic institutions and organizations.

Index Terms—RFID, IoT, NodeMCU ESP8266, Attendance Management, Location Monitoring, Google Sheets.

I. INTRODUCTION

Attendance management is a critical task in educational institutions and industries. Conventional attendance methods such as roll call or signature sheets consume lecture time and are susceptible to manipulation. Proxy attendance is also a major issue in manual systems. To overcome these limitations, automated identification systems such as RFID can be used. Radio Frequency Identification (RFID) is a wireless technology that enables contactless identification of objects and individuals using radio waves. This work implements an RFID based attendance system that automatically logs student attendance into cloud storage with the help of NodeMCU ESP8266.

II. RELATED WORK

Several studies have implemented automated attendance systems using biometric and RFID methods. Fingerprint-based systems provide high reliability but require physical contact and are comparatively costly. RFID based systems offer a low-cost, contactless solution with fast identification. Integration of RFID with IoT further improves scalability and enables remote monitoring.

III. PROPOSED SYSTEM ARCHITECTURE

The proposed system consists of an RFID reader (RC522), RFID tags/cards, NodeMCU ESP8266, LCD display, buzzer, and a cloud-based database. The RFID reader reads the unique ID stored in the RFID card. NodeMCU processes the ID and transmits it through Wi-Fi to Google Sheets using an HTTP request. The LCD displays the scanning status and user name, while the buzzer indicates successful scan.

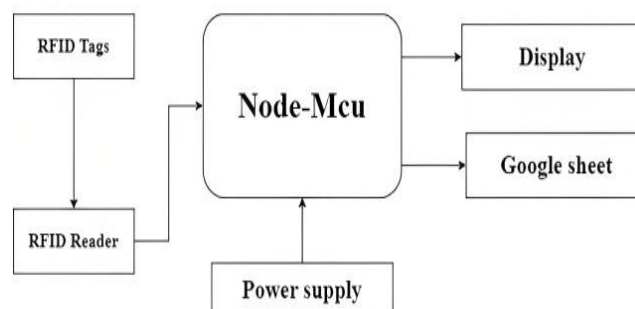


Fig. 1. Block diagram of RFID based attendance and monitoring system.

IV. HARDWARE IMPLEMENTATION

The hardware prototype includes NodeMCU ESP8266 as the main controller, RC522 RFID reader module, RFID passive tags, LCD display (16x2), buzzer, breadboard, and regulated power supply. NodeMCU provides Wi-Fi connectivity and communicates with the RFID reader using SPI protocol.



Fig. 2. Hardware prototype implementation of the proposed system.

V. SOFTWARE IMPLEMENTATION

Arduino IDE is used to develop and upload the program to NodeMCU ESP8266. The MFRC522 library is used to interface with the RFID reader. Once a valid RFID tag is scanned, the system sends the card holder name to a Google Apps Script URL using an HTTP GET request. Google Apps Script then stores the record in Google Sheets with date and time stamps. The stored data can later be downloaded as an Excel sheet for report generation.

VI. RESULTS AND DISCUSSION

The proposed system was tested using multiple RFID tags. The RFID reader successfully detected and read tags within a short distance range. Attendance records were uploaded to Google Sheets in real time. The LCD displayed confirmation messages and the buzzer provided audible indication of successful scanning.

The obtained results confirm that the proposed system is faster and more reliable than manual attendance methods. The system minimizes proxy attendance and eliminates paperwork.

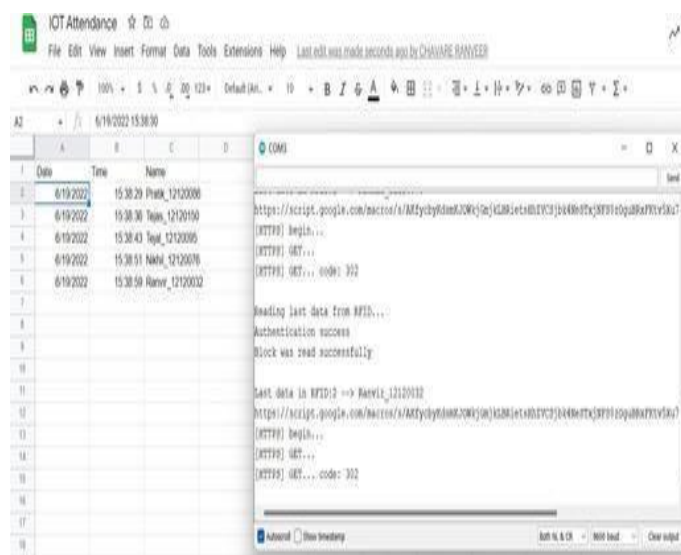
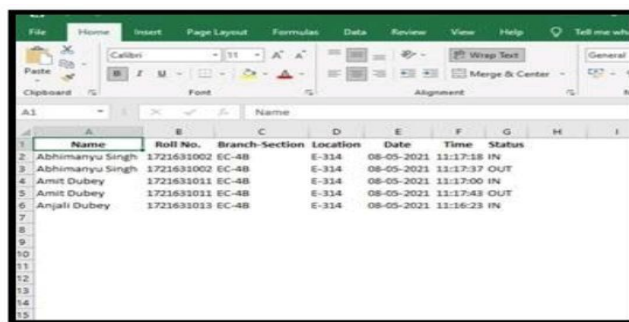


Fig. 3. Attendance recorded automatically in Google Sheets.



Name	Roll No.	Branch-Section	Location	Date	Time	Status
Abhimanyu Singh	1721631002	EC-48	E-314	08-05-2021	11:17:18	IN
Abhimanyu Singh	1721631002	EC-48	E-314	08-05-2021	11:17:37	OUT
Amit Dubey	1721631011	EC-48	E-314	08-05-2021	11:17:00	IN
Amit Dubey	1721631011	EC-48	E-314	08-05-2021	11:17:43	OUT
Anjali Dubey	1721631013	EC-48	E-314	08-05-2021	11:16:23	IN

Fig. 4. Location log records stored in database table.

Table I shows sample performance parameters observed during prototype testing.

Parameter	Observed Value
RFID Operating Frequency	13.56 MHz
Average Tag Read Time	≈ 1–2 seconds
Cloud Upload Time	≈ 2–5 seconds (Wi-Fi dependent)
RFID Read Range	≈ 2–5 cm
Power Supply	5V regulated
Data Storage	Google Sheets / SQL Database
System Accuracy	High (No manual entry errors)

TABLE I. PERFORMANCE PARAMETERS OF THE

PROPOSED SYSTEM

VII. CONCLUSION

This paper presented an RFID based smart attendance and monitoring system using NodeMCU ESP8266 and IoT. The system successfully records attendance automatically and stores the information in cloud storage with real-time timestamp. The design is low-cost, portable, and suitable for educational institutions and industries.

VIII. FUTURE WORK

Future enhancement includes integrating encryption for secure RFID communication, adding biometric verification, and developing a mobile/web dashboard for real-time monitoring. Multiple RFID readers can be installed at various campus locations for improved tracking.

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