



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

IOT Based Smart Attendance Monitoring System Using RFID and NODEMCU (Esp8266)

Aakanksha Khairnar, Mangesh Shidore, Bharat Golhar

U.G. Student, Department of Electronics and Telecommunication Engineering, BRAC's Vishwakarma Institute of Information Technology, Pune, India

Associate Professor, Department of Electronics and Telecommunication Engineering, BRAC's Vishwakarma Institute of Information Technology, Pune, India

ABSTRACT: Traditional methods of taking attendance, such as manual pen-and-paper systems, are not only time-consuming but also prone to errors, security breaches, and potential misconduct. Organizing and managing attendance data manually often result in wastage of valuable time and resources, with registers requiring extensive structuring and maintenance.

To address these challenges, we've integrated a relational database management system in real-time, fortified with robust security measures, to streamline attendance tracking using RFID (Radio-Frequency Identification) technology. RFID technology employs automatic wireless identification through active and passive cards, interacting seamlessly with RFID readers.

Our approach aims to revolutionize attendance management by leveraging RFID technology, which offers swift and effortless scanning of unique RFID tags. By automating the attendance process, our system empowers authorities to efficiently organize, manipulate, and represent attendance data with precision.

We've successfully implemented our methodology in a prototype system, validating its effectiveness in simplifying attendance tracking through RFID automation. The system's design is characterized by its simplicity, affordability, and portability, rendering it suitable for both commercial and academic environments.

KEYWORDS: Tags, Readers, RFID, Smart Attendance

I. INTRODUCTION

In contemporary educational and corporate settings, attendance management remains a crucial yet often laborious task. Conventional methods of manual attendance tracking are not only time-consuming but also prone to inaccuracies and manipulation. As technology continues to evolve, there is a growing need for innovative solutions to streamline this process and enhance efficiency. Leveraging the Internet of Things (IoT), this paper introduces a novel approach to attendance management through the integration of RFID (Radio Frequency Identification) technology and NodeMCU, a cost-effective IoT platform.

The traditional methods of attendance tracking, involving paper-based registers or electronic systems, often suffer from drawbacks such as delays in data entry, transcription errors, and susceptibility to fraudulent practices. These inefficiencies can result in administrative burden, discrepancies in attendance records, and ultimately, hinder the overall management of educational institutions or corporate entities.

Recognizing the limitations of conventional attendance systems, there has been a growing interest in harnessing IoT technologies to develop smarter and more automated solutions. IoT offers the potential to connect physical objects and devices to the internet, enabling seamless communication and data exchange. By integrating RFID technology with NodeMCU, which is a widely accessible and programmable IoT platform based on the ESP8266 microcontroller, we can create a robust and cost-effective smart attendance system.

RFID technology utilizes radio waves to identify and track objects or individuals equipped with RFID tags. These tags contain unique identification numbers that can be wirelessly read by RFID readers. By affixing RFID tags to students, employees, or any personnel requiring attendance tracking, we can automate the process of data capture as individuals pass through designated entry points.

NodeMCU serves as the backbone of our IoT-based attendance system, providing the necessary hardware and software capabilities to interface with RFID readers, capture data, and communicate with remote servers or cloud platforms. With built-in Wi-Fi connectivity, NodeMCU devices can transmit attendance data in real-time, facilitating instantaneous updates and enabling administrators to monitor attendance remotely.

In this paper, we propose a comprehensive Smart Attendance System utilizing RFID and NodeMCU, aiming to address the shortcomings of traditional attendance management methods. By harnessing the power of IoT, we aim to revolutionize attendance tracking processes, improve accuracy, reduce administrative overhead, and ultimately, enhance the overall efficiency of educational institutions and corporate organizations

II. RELATED WORK

IoT Layers used for experiment -

Transport Layer:

The transport layer is represented by two protocols: TCP and UDP.

The ultimate goal of the transport layer is to provide efficient, reliable, and cost-effective service to its users normally processes in the application layer. To achieve this goal, the transport layer makes use of the services provided by the network layer. The hardware and/or software within the transport layer that does the work is called the transport entity.

The transport entity can be located in the operating system kernel, in a separate user process, in a library package bound into network applications, or conceivably on the network interface card. The (logical) relationship of the network, transport, and application layers.

IoT wireless standards/Protocols used for experiment -

Hypertext Transfer Protocol Secure (HTTPS) is a protocol that secures communication and data transfer between a user's web browser and a website. HTTPS is the secure version of HTTP. The protocol protects users against eavesdroppers and man-in-the-middle (MitM) attacks.

One of the main benefits of HTTPS is that it adds security and trust. It protects users against man-in-the-middle (MitM) attacks that can be launched from compromised or insecure networks. Hackers can use such techniques to steal your customer's sensitive information.

HTTPS uses an encryption protocol to encrypt communications. The protocol is called Transport Layer Security (TLS), although formerly it was known as Secure Sockets Layer (SSL).

III. METHODOLOGY

This system consists of 3 codes.

First one is the spreadsheet code with is written on the back end of the spreadsheet.

Second one is the code in which we will register the card by loading his/her information. In it we will write the information which we want to save in the new fresh card. When the information is written in the code we simply have to upload the code. After that we have to take our new fresh card close to the RFID-RC522 module once the information is loaded in the card the serial monitor will show that " The Block is successfully Read" and "Data is stored in Block No 2". With this we have registered one card, same process is repeated to create the remaining cards , just change the information in code , upload the code take a new fresh card and scan.

The third code is the code through which we will scan our id card and then the attendance will be marked on the spreadsheet via NodeMCU. In it we have pasted a link of google spreadsheet which is deployed/ generated when we run the google spreadsheet code. So after registering the card we have to just simply upload the third code , when the code is successfully uploaded we have to take our "Registered Card" close to the RFID-RC522 module once the card is scanned the buzzer will immediately beep for few seconds and the serial monitor will give us the link and the HTTPS code.

If the HTTPS code is 302 that means our data is successfully read on the spreadsheet else we have to again look back the connection .

The initial phase involved conceptualizing the system architecture, outlining hardware requisites, and defining software specifications.

Careful consideration was given to the selection of RFID readers, RFID tags/cards, and microcontrollers (e.g., Node

MCU/ESP8266) to align with project objectives. The physical setup was meticulously planned, ensuring optimal positioning of RFID readers and antennas for efficient attendance recording.

Unique RFID tags/cards were assigned to each individual, facilitating seamless identification within the system. Tags were securely embedded or attached to identification cards or badges, ensuring durability and ease of scanning.

Extensive testing was conducted to verify the accuracy of information encoding onto RFID tags/cards for reliable identification during scanning operations.

Firmware development for microcontrollers (Node MCU/ESP8266) was undertaken to establish seamless communication with RFID readers and the central database.

An intuitive user interface was designed to empower administrators with efficient attendance record management, user administration, and report generation functionalities.

Robust database management systems were implemented, adhering to stringent security protocols to safeguard attendance data.

The attendance recording workflow was streamlined to ensure simplicity and efficiency.

RFID readers were configured meticulously to detect and read RFID tags/cards within designated proximity ranges. Microcontrollers were programmed to capture RFID tag/card data in real-time and transmit it securely to the central database.

Stringent data validation mechanisms were implemented to maintain the integrity and accuracy of attendance records.

Attendance data was stored systematically within the central database, complemented with timestamped entries for comprehensive tracking.

Advanced algorithms were developed to analyze attendance data, facilitating pattern recognition, report generation, and anomaly detection.

Rigorous testing protocols were employed to validate system functionality, reliability, and accuracy.

Simulated attendance scenarios were executed to evaluate system performance under varying conditions, ensuring adaptability and robustness.

Valuable feedback from users and stakeholders was solicited and incorporated to enhance system usability and address any identified deficiencies.

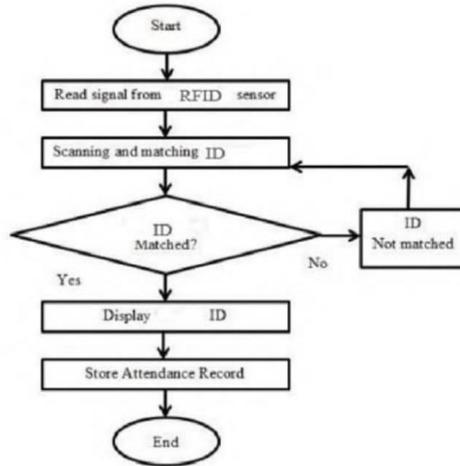
Following thorough testing and refinement, the RFID attendance system was deployed across educational institutions and organizational settings. Comprehensive training sessions were conducted for administrators, educators, and staff members, ensuring proficient system utilization and effective issue resolution.

Established procedures for ongoing monitoring of system performance, promptly addressing any technical issues or malfunctions. Regular maintenance checks were conducted to sustain the seamless operation of RFID readers, microcontrollers, and database servers.

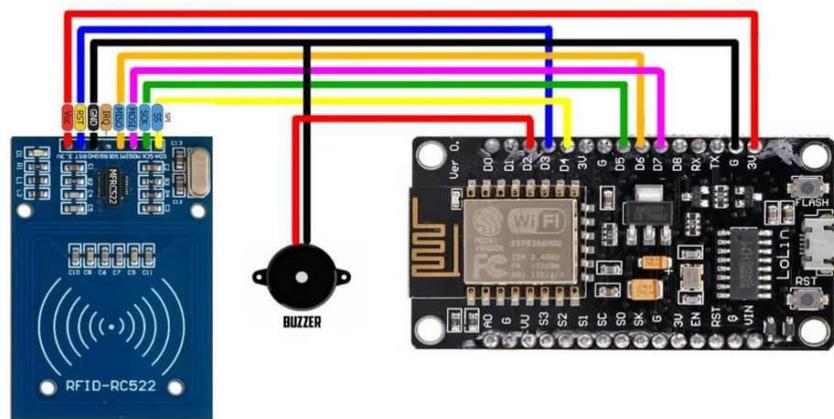
Leveraging user feedback and system usage data, continual improvement efforts were prioritized, driving enhancements and updates to optimize system functionality and user experience.

Method and analysis which is performed in your research work should be written in this section. A simple strategy to follow is to use keywords from your title in first few sentences.

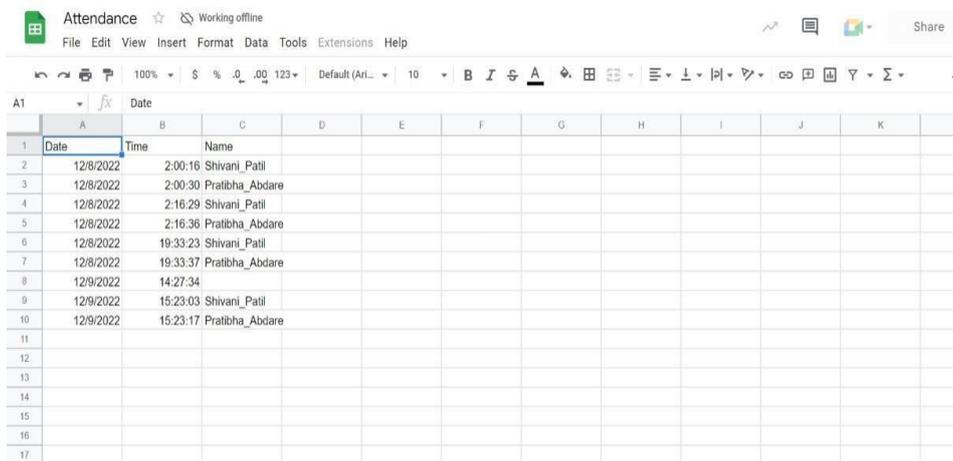
IV. EXPERIMENTAL RESULTS



a) Flowchart



b) circuit diagram



Date	Time	Name
12/8/2022	2:00:16	Shivani_Patil
12/8/2022	2:00:30	Pratibha_Abdare
12/8/2022	2:16:29	Shivani_Patil
12/8/2022	2:16:36	Pratibha_Abdare
12/8/2022	19:33:23	Shivani_Patil
12/8/2022	19:33:37	Pratibha_Abdare
12/9/2022	14:27:34	
12/9/2022	15:23:03	Shivani_Patil
12/9/2022	15:23:17	Pratibha_Abdare

c) Updated Attendance in Google Sheet

V. CONCLUSION

Our aim was to get effective and efficient time-saving automated computerized attendance in real time with ready excel sheet to maintain attendance records we conclude that this user-friendly proposed system would prove to be easy to use and implement, cost efficient, time saving, less tedious, portable. To overcome unreliable and inaccurate manual work, this proposed system gets improved with less effort and yet generates the results with high accuracy and qualitative one. Ultimately, improves academic performance with encourage as time saves

REFERENCES

- [1] A.Arunraja, Dr.G.M.Rajathi and S.Mathumitha."Smart Attendance System Using Esp8266", vol.8, IEEE, 2019.
- [2] Ms. G.T. Bharathy, Ms. S. Bhavanisankari and T.Tamilselvi."Smart Attendance Monitoring System using IoT and RFID", vol.3, IEEE, 2021, pp.1307-1313.
- [3] Qianwen Miao, Fu Xiao, Haiping Huang, Lijuan Sun and Ruchuan Wang. "Smart Attendance System Based on Frequency Distribution Algorithm with Passive RFID Tags", vol.8, IEEE, 2020, pp.217-206.
- [4] Inturi Meghana, J.D.N.V.L. Meghana and Ramesh Jayaraman."Smart Attendance Management System using Radio Frequency Identification", IEEE, 2020.
- [5] T.S. Lim, S.C. Sim and M.M. Mansor. "RFID Based Attendance System", IEEE, 2009.
- [6] Hasan U. Zaman, Jannatul Siffat Hossain, Tasnim Tamanna Anika and Deboshree Choudhury."RFID Based Attendance System", IEEE, 2017.
- [7] Keerthana Sanath, Meenakshi K, Muktha Rajan, Varshini Balamurugan, M.E.Harikumar."RFID and Face Recognition based Smart Attendance System", IEEE, 2021.
- [8] Soumil Nitin Shah and Abdelshakour Abuzneid."IoT Based Smart Attendance System (SAS) Using RFID"
- [9] Unnati Koppikar, Shobha Hiremath, Akshata Shiralkar, Akshata Rajoor and V. P. Baligar."IoT based Smart Attendance Monitoring System using RFID", IEEE, 2019.
- [10] K. Aravindhana, S.K.B. Sangeetha, K. Periyakaruppan, K.P. Keerthana, V. Sanjay Giridhar and V.Shamaladevi."Design of Attendance Monitoring System Using RFID", IEEE, 2021.
- [11] Rohan Bhagat. "An MQTT based IoT-RFID Attendance System using NodeMCU Firmware: A Review", vol.7, IEEE, 2020, pp.2395-0072.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details