

IoT-Based on Smart Attendance Monitoring System

R.Pandiyan 

Assistant Professor, Department of Electrical and Electronics Engineering
Sengunthar Engineering College (Autonomous), Tiruchengode, India

pandiyanr.eee@scteng.co.in

<https://orcid.org/0009-0005-3469-7357>

M.RaviKumar, B.Dhanush, S.Yasotharan, N.Kannan

UG Students, Department of Electrical and Electronics Engineering
Sengunthar Engineering College (Autonomous), Tiruchengode, India

ravikumarmeee2026@scteng.co.in, dhanushbeee2026@scteng.co.in,

yasotharanseee2026@scteng.co.in, kannanneee2026@scteng.co.in



Publication History

Manuscript Reference No: IJIRAE/RS/Vol.13/Issue03/AEMR26.MRAE10109

Research Article | Open Access | Double-Blind Peer-Reviewed | Article ID:IJIRAE/RS/Vol.13/Issue03/AEMR26.MRAE10109

Received:22,February 2026, Revised: 01, March 2026, Accepted: 16,March 2026,Published Online: 25, March 2026.

<https://www.ijirae.com/volumes/Vol13/iss-03/30.AEMR26.MRAE10109.pdf>

Article Citation:Pandiyan,RaviKumar,Dhanush,Yasotharan,Kannan(2026), IoT-Based on Smart Attendance Monitoring System, IJIRAE: International Journal of Innovative Research in Advanced Engineering, Volume 13, Issue 03 of 2026 pages 244-247 **Doi:** <https://doi.org/10.26562/ijirae.2026.v1303.30>

BibTeX Key: Pandiyan@2026IoT-Based

IJIRAE papers should be cited as IJIRAE (International Journal of Innovative Research in Advanced Engineering, AM Publications, India 2025, ISSN 2349-2163, <https://doi.org/10.26562/ijirae.2026.v1303.30> The journal's official abbreviation is IJIRAE. **Orcid:** <https://orcid.org/0009-0004-9398-7488>

About the License: Copyright©2026 copyright by the authors. This article is an open access and license under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: The IoT-Based Smart Attendance Monitoring System is designed to automate and enhance the process of attendance tracking using modern Internet of Things (IoT) technology. Traditional attendance systems are often manual, time-consuming, and prone to errors such as proxy attendance and data manipulation. To overcome these challenges, this project integrates hardware components like Node MCU (ESP8266), RFID reader, and fingerprint sensor with cloud-based storage for real-time data management. To address these issues, the project includes comprehensive charging and discharging circuits, plus advanced mechanisms for overcharge, over-discharge, undercharge, and under voltage protection. The simulation framework enables real-time monitoring of battery parameters and assessments of state-of-charge (SoC) and state health (SoH). This approach enhances reliability and safety, contributing to safer, more efficient energy storage and promoting sustainable transportation.

Keywords: Battery Management Systems, Lithium-ion Batteries, Thermal Management, State of charge, State of Health

INTRODUCTION

The traditional methods of attendance monitoring, such as manual roll calls or signing registers, are often time-consuming, prone to errors, and susceptible to proxy attendance. In educational institutions, workplaces, and various organizations, accurate and efficient attendance tracking is crucial for administrative purposes, performance evaluation, and safety compliance. This project aims to address these challenges by developing an IoT-based smart attendance monitoring system. Leveraging the power of the Internet of Things, this system will automate the process of recording and managing attendance, providing a more reliable, real-time, and less labor-intensive solution. The system will integrate hardware components like RFID readers, biometric sensors, or cameras with a cloud-based platform for data storage, processing, and visualization. The overarching theme of this project is "Intelligent Automation and Data-Driven Management through the Internet of Things." It focuses on how IoT can transform conventional manual processes into smart, automated, and data-rich systems, leading to improved efficiency, accuracy, and informed decision-making. This project proposes an IoT-based smart attendance monitoring system designed to replace conventional, often inefficient, attendance tracking methods. By integrating sensors and network connectivity, the system will automate the process of recording who is present and when. This data will be securely stored in the cloud, allowing for real-time monitoring and comprehensive report generation through a dedicated user interface. The aim is to deliver a reliable, accurate, and user-friendly solution that significantly reduces administrative burden and enhances overall operational efficiency in various organizational settings.

EXISTING SYSTEM

The existing attendance monitoring systems predominantly fall into two categories: manual methods and partially automated systems. Manual methods, such as roll calls or paper-based registers, are the most rudimentary, relying entirely on human intervention. These methods are simple to implement but are inherently inefficient, time-consuming, and highly susceptible to human errors and dishonest practices like proxy attendance. The IoT-Based Smart Attendance Monitoring System, which integrates both hardware and software components to create a complete and automated solution. The system begins with the hardware section, which includes components such as the Node MCU (ESP8266), RFID or fingerprint sensor, power supply, and display unit. The software section is divided into two core modules: the Database and the User Interface. The database plays a crucial role in securely storing attendance information and

maintaining real-time updates using cloud platforms like Firebase or Thing Speak. Meanwhile, the user interface enables teachers, administrators.

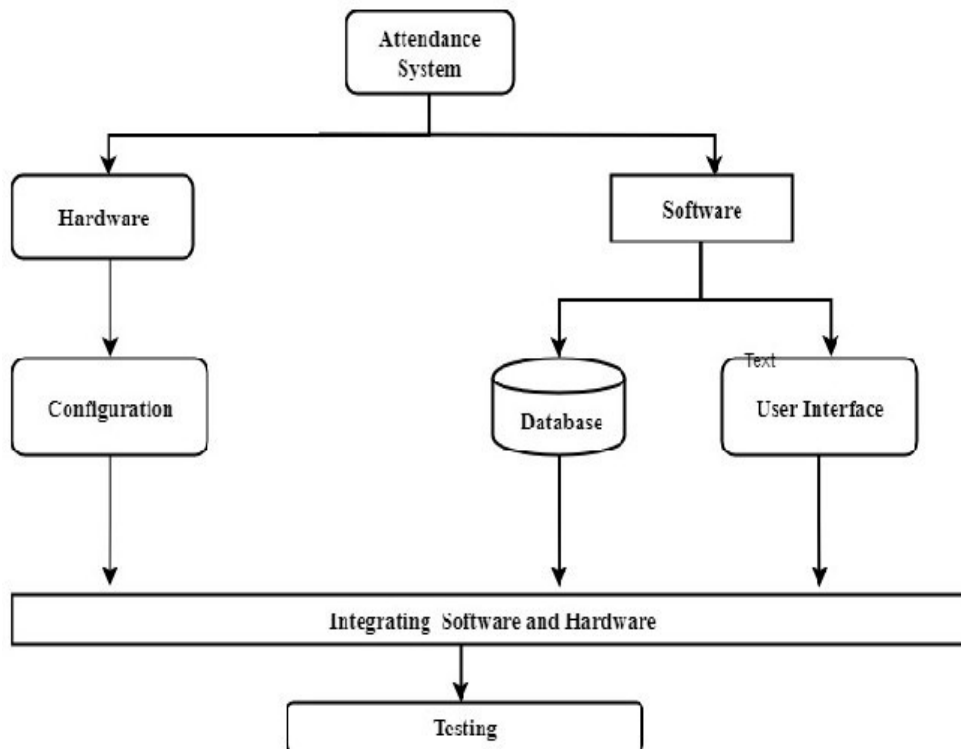


Figure1 - Block diagram for Existing system

PROBLEM IDENTIFICATION

In traditional attendance systems, the process of recording attendance is often manual and time-consuming, leading to several challenges such as human error, proxy attendance, and data manipulation. Teachers or administrators usually maintain registers or spreadsheets, which can be easily tampered with or lost. These systems also lack real-time monitoring and centralized data storage, making it difficult to track or analyze attendance records efficiently. Furthermore, manual methods do not support automation or remote access, which limits their usefulness in modern educational and corporate environments. In some RFID-based or biometric systems, the data is stored locally, increasing the risk of data loss or limited accessibility. To overcome these problems, there is a need for an IoT-based smart attendance monitoring system that provides real-time data synchronization, cloud storage, and secure access through the internet. This project aims to solve these existing issues by integrating smart sensors, Wi-Fi modules, and cloud-based data management to ensure accuracy, reliability, and efficiency in attendance tracking. High Initial Cost for Robust Biometrics: While advanced biometric systems exist, they can be expensive to deploy across multiple entry points, making them less accessible for smaller organizations.

PROPOSED SYSTEM

The proposed IoT-based smart attendance monitoring system is designed to overcome the limitations of existing systems by leveraging the full potential of the Internet of Things and cloud computing. This system will provide a fully automated, real-time, highly secure, and remotely accessible solution for attendance management. The working principle of the IoT-Based Smart Attendance Monitoring System is based on the use of RFID or biometric sensors connected to a NodeMCU (ESP8266) microcontroller, which communicates with a cloud database via Wi-Fi. When a registered user places their RFID card near the reader or scans their fingerprint, the system immediately identifies the unique ID assigned to that user. The NodeMCU then processes this data and sends it to the cloud server for verification and storage. If the identification is valid, the attendance is automatically recorded in the database with the user's ID, name, and timestamp. For RFID/Fingerprint, it extracts the unique ID. The IoT-Based Smart Attendance Monitoring System works by automatically recording the attendance of individuals using RFID or biometric technology connected to an IoT-enabled microcontroller such as NodeMCU (ESP8266). When a user places their RFID card or fingerprint on the sensor, the device reads the unique identification data. This data is then processed by the NodeMCU, which verifies the input and transmits it wirelessly to a cloud database through a Wi-Fi connection. The system stores all attendance information securely in the cloud, making it easily accessible for teachers, administrators, or managers. The data is displayed on an OLED or LCD screen, confirming that the attendance has been successfully recorded. The stored data can later be retrieved and analyzed through a web or mobile application, allowing for real-time tracking and report generation. The integration of hardware and software

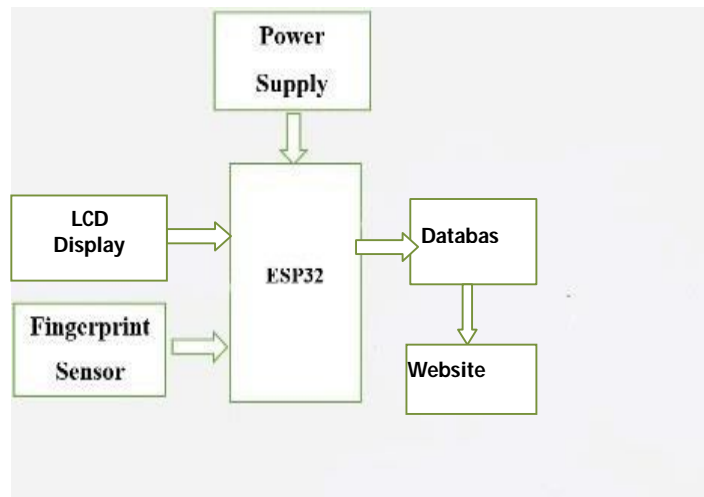


Figure 2- Block diagram for proposed system

SIMULATION AND RESULT

The main objective of simulation is to verify the circuit design, program logic, and data flow. It helps to identify and correct possible errors or inefficiencies at an early stage, saving both time and resources. The simulation environment replicates the working of sensors, input signals, and microcontroller responses. By using tools like Proteus, Tinker CAD, or Fritzing, the designer can visualize the hardware connections and analyze signal transmission between modules such as the RFID reader, LCD display, and Wi-Fi interface MATLAB

MATLAB SIMULATION

MATLAB, short for "Matrix Laboratory" is a high-level programming language and interactive environment developed by MathWorks, primarily for numerical computing and data analysis. It is widely used in engineering, scientific research, and mathematics due to its powerful computational capabilities. MATLAB provides extensive mathematical functions, advanced data visualization tools, and a variety of built-in libraries, making it suitable for tasks ranging from basic calculations to complex algorithm development. The MATLAB simulation of the IoT-Based Smart Attendance Monitoring System was carried out using the Simulink and Simscape environment to validate the system design and functionality before hardware implementation. MATLAB provides a powerful platform for modeling, simulating, and analyzing dynamic systems, which makes it suitable for IoT and embedded system applications. In this project, the simulation focuses on verifying the interaction between different components such as the RFID reader, NodeMCU (ESP8266), cloud database, and display unit. The system model was designed using block diagrams representing sensors, data processing units, communication modules, and output displays. Simscape was particularly useful in visualizing electrical characteristics such as voltage levels, current flow, and signal transmission between components. It allowed for testing of circuit behavior under different conditions, ensuring stable and reliable operation. The simulation results confirmed that the system can accurately detect user input, process the data, and send it to the cloud database in real time. Any delays or errors in communication were identified and corrected during this phase, improving the overall system performance.

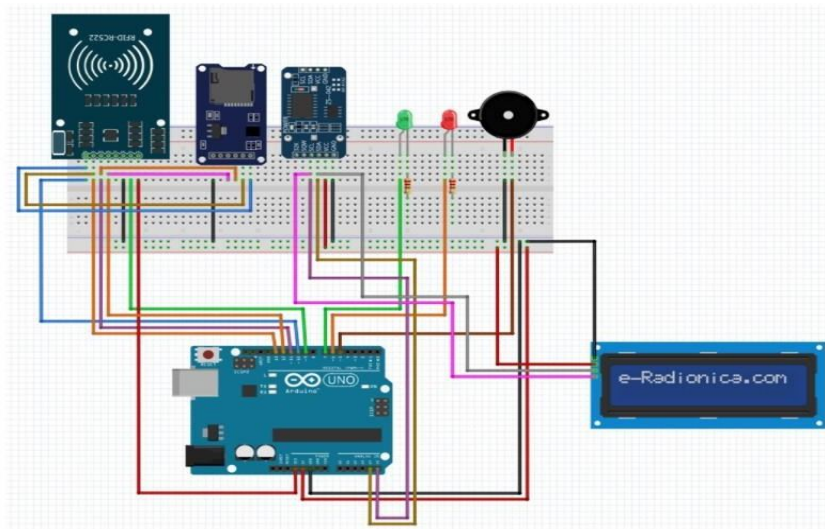


Figure 3 - RFID Based Attendance Monitoring System

RESULT

The IoT-Based Smart Attendance Monitoring System was successfully designed, simulated, and analyzed, demonstrating efficient and accurate performance in real-time attendance tracking. The system effectively integrates hardware components such as the Node MCU (ESP8266), RFID reader, fingerprint sensor, and LCD display with cloud-based storage to automate the attendance process. During simulation, the system was able to identify users through RFID or biometric input, process the data using the microcontroller, and transmit it to the cloud database via Wi-Fi without delay. The output was clearly displayed on the LCD screen, confirming successful attendance marking, while the cloud platform stored the data securely for future access. The results show that the system eliminates manual errors, reduces time consumption, and prevents proxy attendance through unique identification methods. The real-time data synchronization ensures that attendance records can be accessed instantly by administrators from remote locations. Simulation tools such as MATLAB Sims cape validated the circuit behavior, signal flow, and system reliability before hardware implementation. Overall, the system achieved high accuracy, reliability, and efficiency, proving that IoT-based automation is a practical and scalable solution for modern attendance management in educational institutions and workplaces.

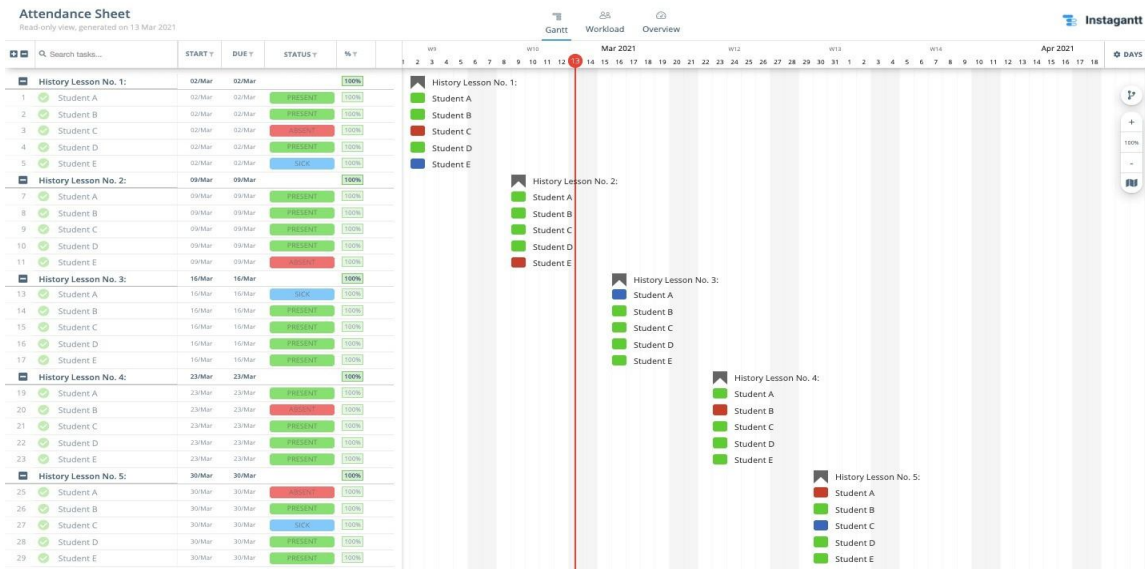


Figure4 - Iot-Based Smart Attendance Monitoring System WaveForm

CONCLUSION

The IoT-Based Smart Attendance Monitoring System provides an efficient, reliable, and automated method of managing attendance using modern Internet of Things technology. By integrating the NodeMCU (ESP8266), RFID module, and cloud connectivity, the system successfully eliminates manual record-keeping and reduces human errors in attendance tracking. The project demonstrates how IoT can simplify daily administrative tasks through automation and real-time data transfer. When a student or employee scans their RFID card, their attendance is immediately recorded and uploaded to the cloud, allowing authorized personnel to monitor records anytime and anywhere. The LCD display and buzzer enhance user interaction by giving instant feedback after each scan.

REFERENCES

1. B.Terzic and M.Jadric.(2001). "Design and Implementation of the Extended Kalman Filter for the Speed and Rotor Position Estimation of Brushless DC Motor."
2. R.Krishnan. (2004). "Control of Brushless DC Motors Using Microcontrollers."
3. N.Singh and R.Patel. (2017). "Integration of RFID Technology in Smart Systems." Journal of Computer Engineering and Intelligent Systems.
4. M.R.Patel and D.Verma. (2018). "Wi-Fi Based Smart Attendance System Using Node MCU." International Conference on Smart Technologies for Smart Nation.
5. S.Banerjee and L.Thomas. (2019). "Automation of Attendance Management Using IoT and Wireless Technologies." International Journal of Advanced Computer Science and Applications.
6. P.Kumar and K.Raj. (2020). "IoT-Based Biometric Attendance System Using Fingerprint Sensor and Cloud Storage." International Journal of Emerging Trends in Engineering Research.
7. A.Das and R.Kumar. (2020). "RFID and IoT Based Smart Attendance System Using ESP8266." International Journal of Innovative Technology and Exploring Engineering.
8. R.Sharma and S. Rao. (2020). "Design of Low-Cost Attendance Device Using NodeMCU and Firebase." International Conference on Embedded Systems and IoT.
9. A.Das and R.Kumar. (2020). "RFID and IoT Based Smart Attendance System Using ESP8266." International Journal of Innovative Technology and Exploring Engineering.
10. R.Sharma and S. Rao. (2020). "Design of Low-Cost Attendance Device Using NodeMCU and Firebase." International Conference on Embedded Systems and IoT.