

# Smart Campus Management System

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**Abstract:** *Managing a college campus efficiently requires continuous monitoring of attendance, security, and environmental conditions. This project proposes a Smart Campus Management System that uses IoT-based devices such as RFID modules, PIR sensors, DHT11 sensors, and Raspberry Pi to automate various campus operations. The system enables real-time attendance tracking, occupancy detection, and monitoring of temperature and humidity levels. By collecting and managing data automatically, it reduces manual work, improves resource utilization, and enhances campus security. The proposed solution provides a simple, reliable, and cost-effective way to create a smarter and more organized campus environment for students, faculty, and administrators.*

**Keywords:** Smart Campus Management, Raspberry Pi, RFID-Based Attendance System, PIR Motion Sensor, DHT11 Sensor

## INTRODUCTION

Managing daily activities in educational institutions can be challenging when tasks such as attendance recording, environmental monitoring, and facility management are performed manually. These traditional methods often require significant time and effort and may lead to errors or inefficiencies.

The Smart Campus Management System is designed to simplify campus operations by automating essential tasks. The system uses RFID technology for attendance management, PIR sensors for occupancy detection, and DHT11 sensors for monitoring temperature and humidity. A Raspberry Pi acts as the central controller, collecting and processing data from different sensors.

The proposed system helps improve campus management by providing accurate attendance records, monitoring classroom conditions, and supporting efficient use of resources. It reduces manual work, enhances security, and creates a more organized environment for students, faculty, and administrators. The system is affordable, easy to implement, and can be expanded in the future to support additional smart campus features.

## II. RELATED WORK

Several researchers have proposed smart campus solutions to improve attendance management, security, and resource utilization. RFID-based systems have been widely used for automated attendance tracking, reducing manual effort and improving accuracy. Environmental monitoring systems using temperature, humidity, and motion sensors have also been developed to enhance classroom comfort and energy efficiency. Recent studies focus on integrating multiple sensors with centralized monitoring platforms to provide real-time information and better campus management. Inspired by these developments, the proposed Smart Campus Management System combines attendance monitoring, occupancy detection, and environmental monitoring into a single cost-effective solution using Raspberry Pi and sensor-based technologies.



### III. PROPOSED METHODOLOGY

#### A. System Architecture

The proposed Smart Campus Management System is designed to automate campus operations such as attendance management, occupancy monitoring, and environmental monitoring. The system consists of four major layers that work together to collect, process, and display information in real time.

##### 1. Sensor Layer

The sensor layer is responsible for collecting data from different locations within the campus. It includes:

**RFID Module (RC522):** Used for automatic attendance recording. Each student is provided with an RFID card containing a unique identification number. When the card is scanned, the attendance data is captured automatically.

**PIR Motion Sensor:** Detects human movement and occupancy in classrooms, laboratories, and other campus areas. This helps monitor room utilization and supports automation.

**DHT11 Sensor:** Measures temperature and humidity levels to monitor classroom environmental conditions and maintain a comfortable learning environment.

##### 2. Controller Layer

The Raspberry Pi serves as the central processing unit of the system. It receives data from all connected sensors, processes the information, and performs the required operations. The Raspberry Pi also stores attendance records and environmental data and acts as the interface between hardware devices and the monitoring system.

##### 3. Communication Layer

This layer enables data transfer between the Raspberry Pi and the monitoring platform. Sensor data is transmitted through network connectivity and stored in a database. The communication layer ensures that information is available for real-time monitoring and future analysis.

##### 4. Application Layer

The application layer provides a user-friendly interface for administrators and faculty members. Through this interface, users can:

View attendance records.

Monitor classroom occupancy.

Check temperature and humidity levels.

Access system status and reports.

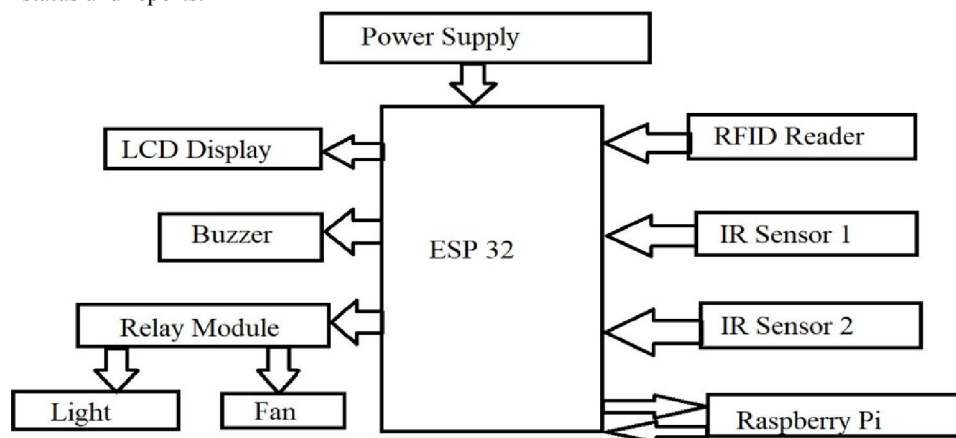


Fig 1. System Architecture

This layer helps simplify campus management by providing all information in a centralized platform.

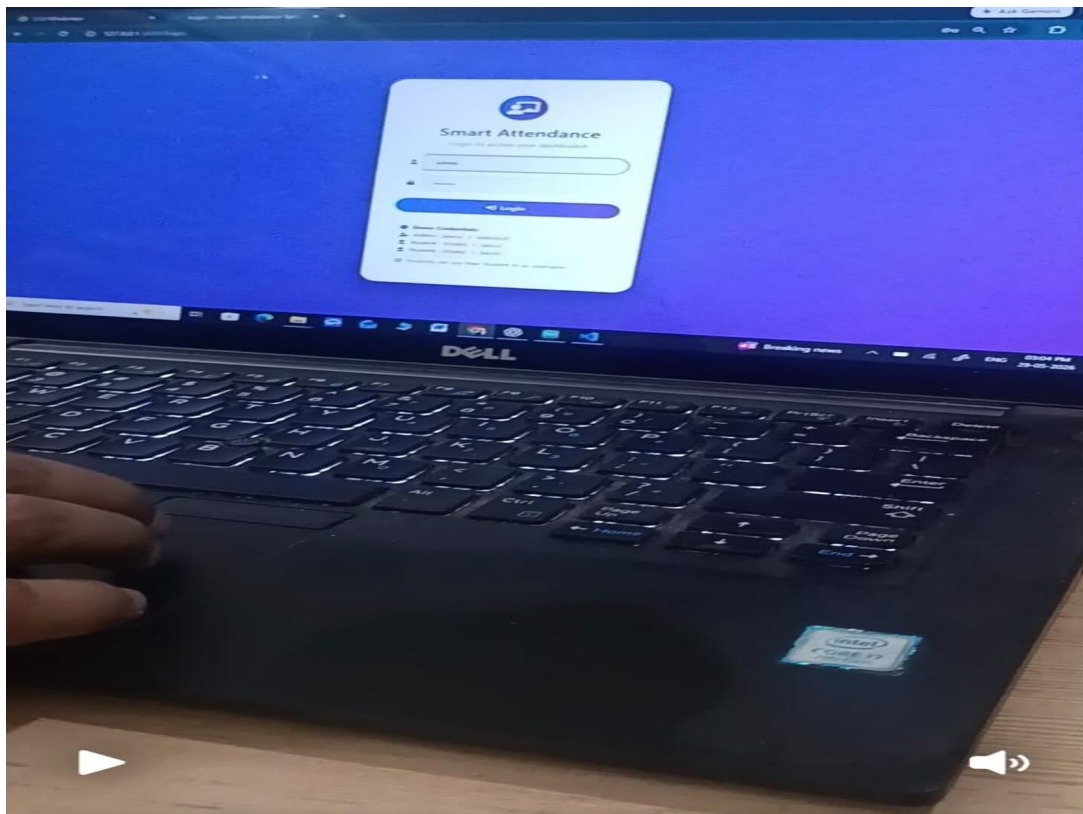


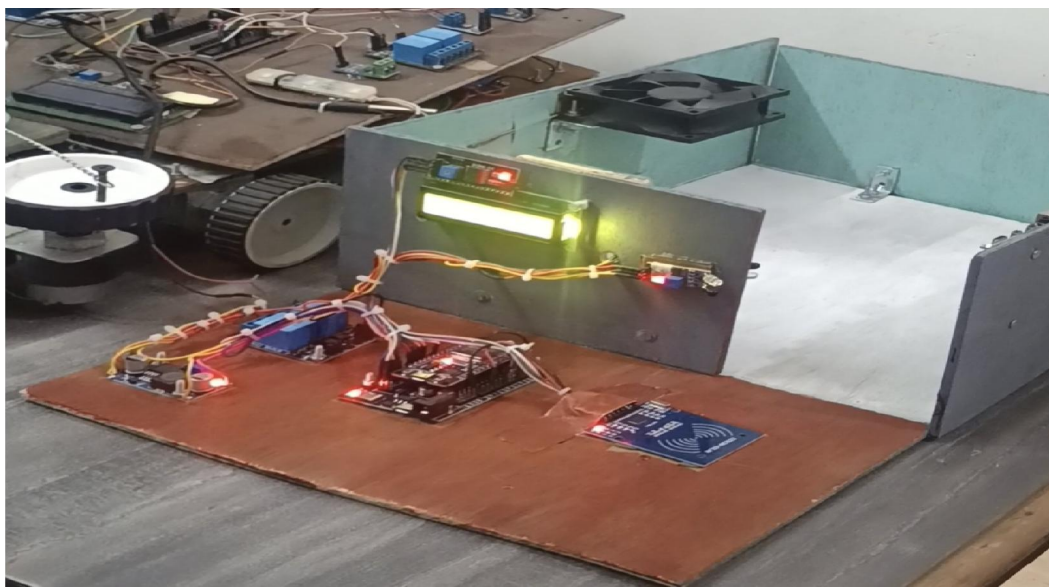
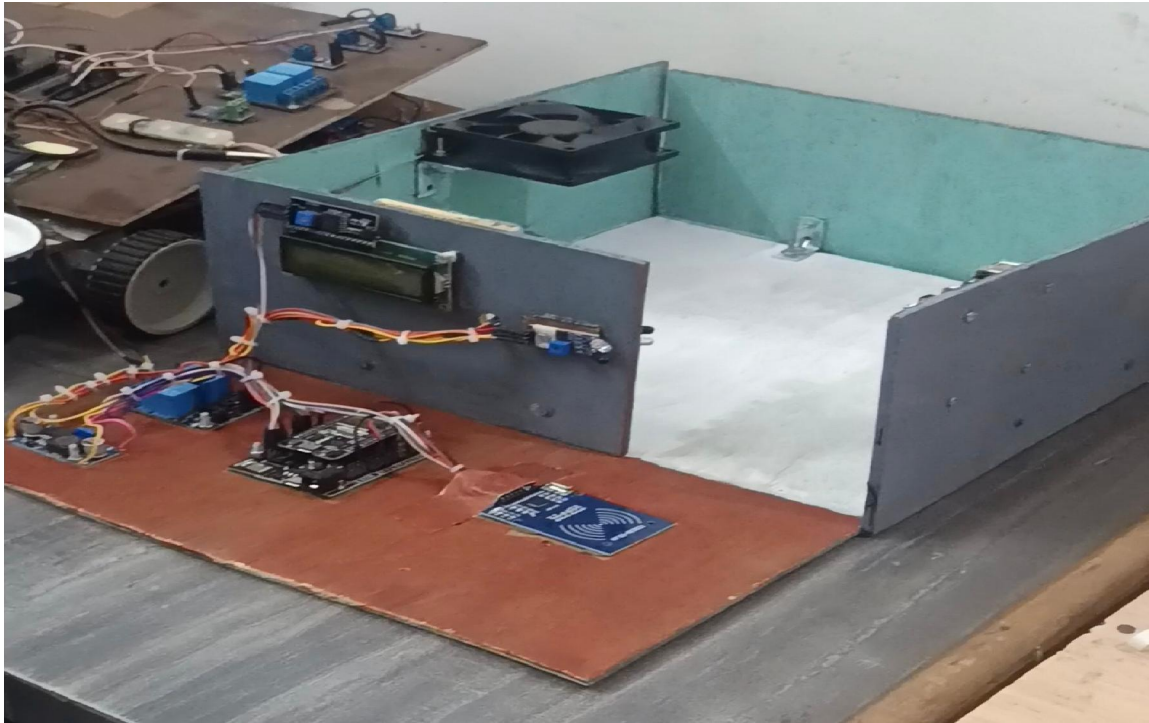
#### **IV. OBJECTIVES**

The main objectives of the proposed Smart Campus Management System are:

- To automate student attendance management using RFID technology and reduce manual record-keeping.
- To monitor classroom occupancy using PIR sensors for efficient utilization of campus resources.
- To measure and track environmental conditions such as temperature and humidity using DHT11 sensors.
- To provide real-time monitoring and data access through a centralized system.
- To improve campus security, operational efficiency, and resource management.
- To reduce human effort and increase the accuracy of campus-related activities through automation.
- To develop a cost-effective and scalable solution that can be implemented in educational institutions.

#### **V. SIMULATION RESULT**





## VI. CONCLUSION AND FUTURE WORK

The Smart Campus Management System provides an effective solution for automating various campus activities such as attendance management, occupancy monitoring, and environmental monitoring. By integrating RFID technology, PIR sensors, DHT11 sensors, and Raspberry Pi, the system reduces manual effort, improves accuracy, and enhances operational efficiency. The proposed system enables real-time monitoring of campus resources and creates a more



organized, secure, and comfortable environment for students, faculty, and administrators. Overall, it offers a cost-effective and reliable approach to modern campus management.

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