



*Sarvajanik Education Society*  
***Sarvajanik College of Engineering & Technology***  
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# Embedded System

## MINI PROJECT

**TOPIC : ATTENDANCE SYSTEM**

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# Overview of Attendance System

An attendance system using the ESP8266, RFID, and a buzzer can be designed to automate the process of tracking attendance in various scenarios such as schools, offices, or events. The system utilizes the ESP8266 microcontroller to connect to a local network, read RFID tags, and trigger a buzzer for audio feedback. Here's an overview of the components and their functionalities:

1. **ESP8266 Microcontroller:** The ESP8266 is a low-cost Wi-Fi-enabled microcontroller widely used for IoT applications. It provides the processing power and Wi-Fi connectivity required for the attendance system.
2. **RFID Reader:** An RFID reader module is connected to the ESP8266 to read the unique identification numbers stored on RFID cards or tags. When an RFID card is brought near the reader, it captures the card's ID and sends it to the microcontroller.
3. **RFID Cards/Tags:** Each individual is assigned a unique RFID card or tag that contains a specific identification number. These cards are distributed to the users and serve as their attendance markers.
4. **Buzzer:** A buzzer is connected to the ESP8266 to provide audio feedback. It can be programmed to emit different tones or melodies to indicate successful or unsuccessful attendance registration.
5. **Power Supply:** The system requires a stable power supply to operate. This can be provided by a USB cable connected to a power source or a battery if a wireless setup is desired.

# Importance of Attendance Systems in various Fields

- ▶ Attendance systems play a crucial role in various fields, providing several benefits and addressing specific needs within each domain. Here are some examples of the importance of attendance systems in different fields:
  1. Education Sector:
    1. Student Monitoring: Attendance systems help schools and universities track student attendance, ensuring that students are present in classes and maintaining regularity.
    2. Performance Assessment: Attendance records contribute to evaluating students' academic progress, as consistent attendance is often correlated with better performance.
    3. Safety and Security: Monitoring attendance allows educational institutions to maintain the safety and security of their students by keeping track of who is present on campus.
  2. Workplaces and Offices:
    1. Payroll and HR Management: Attendance systems aid in accurate calculation of work hours, enabling efficient payroll processing and reducing manual errors.
    2. Workforce Planning: Attendance data assists in analyzing employee attendance patterns, identifying trends, and making informed decisions regarding workforce planning and resource allocation.
    3. Compliance and Legal Requirements: Attendance records are often required to meet legal obligations, such as adhering to labor laws, ensuring proper documentation, and demonstrating adherence to employment regulations.

### 3. Events and Conferences:

- ▶ Access Control: Attendance systems with RFID or ticket-based scanning enable efficient access control at events, ensuring that only authorized individuals can enter specific areas or sessions.
- ▶ Participant Tracking: Attendance systems help event organizers track participant numbers, manage registrations, and plan logistics accordingly.
- ▶ Data Collection: Attendance data can be used for post-event analysis, gathering insights about attendee engagement, preferences, and overall event success.

### 4. Healthcare Facilities:

- ▶ Patient Management: Attendance systems assist in managing patient appointments, tracking patient arrivals, and ensuring efficient patient flow within healthcare facilities.
- ▶ Regulatory Compliance: Healthcare organizations often require accurate records of employee attendance to meet compliance regulations, maintain shift schedules, and provide reliable patient care.

### 5. Construction and Manufacturing Sites:

- ▶ Safety and Compliance: Attendance systems help ensure the presence of authorized personnel on construction or manufacturing sites, enhancing safety measures and regulatory compliance.
- ▶ Project Management: Tracking attendance assists in monitoring workforce productivity, identifying bottlenecks, and improving project management efficiency.
- ▶ Accountability and Documentation: Attendance records serve as evidence of personnel presence, facilitating accountability in case of incidents or disputes.

# System Overview

- ▶ The attendance system using ESP8266, RFID, and a buzzer is a project that utilizes these components to create an automated attendance tracking system. Here's a brief description of how it works:
  1. ESP8266: The ESP8266 is a popular and affordable Wi-Fi module that provides wireless connectivity. It acts as the main controller for the attendance system, responsible for processing data and communicating with other components.
  2. RFID Reader: An RFID (Radio Frequency Identification) reader is used to read the unique identification code stored in RFID cards or tags. Each student or employee is assigned an RFID card/tag, which they can use to mark their attendance.
  3. Buzzer: A buzzer is a simple sound-generating component that produces a sound when activated. It is used in the attendance system to provide feedback or indication to the user, such as a confirmation tone or an error alert.

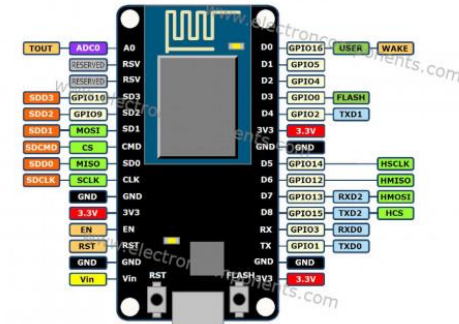


# ESP8266 Wi-Fi Module



- ▶ The ESP8266 Wi-Fi module plays a crucial role in the attendance system. Here are the key roles and functions it performs:
  1. **Wireless Connectivity:** The ESP8266 module provides built-in Wi-Fi capabilities, allowing the attendance system to connect to a local network or the internet. This enables communication with other devices or services, such as a remote server or a web-based interface.
  2. **Data Processing and Storage:** The ESP8266 acts as the main controller of the attendance system. It receives data from the RFID reader, processes it, and makes decisions based on the received information.
  3. **Interfacing with Components:** The ESP8266 module interfaces with other hardware components, such as the RFID reader and the buzzer. It receives data from the RFID reader, analyzes it, and triggers appropriate actions based on the result. For example, if the RFID card is authenticated successfully, the ESP8266 can activate the buzzer to provide a confirmation tone.

4. **Communication with External Services:** With its Wi-Fi capabilities, the ESP8266 module can communicate with external services or APIs. This enables the attendance system to integrate with other systems or platforms. For instance, it can send attendance data to a remote server for real-time monitoring or connect to a cloud-based database for centralized attendance management.
  5. **Configuration and Control:** The ESP8266 module can be programmed to handle various configuration settings and control operations of the attendance system. It allows setting up Wi-Fi credentials, managing database connections, defining attendance rules, and implementing customization options. This flexibility enables the system to be adaptable to different environments and requirements.
- Overall, the ESP8266 Wi-Fi module serves as the central processing and communication unit in the attendance system. It enables wireless connectivity, data processing, interfacing with components, and communication with external services, making it a fundamental component for creating an efficient and connected attendance tracking solution.




# RFID Reader

- ▶ The RFID reader plays a critical role in the attendance system, specifically in the process of identifying and authenticating individuals. Here are the key roles and functions of the RFID reader:
  1. **Reading RFID Cards/Tags:** The RFID reader is designed to read the unique identification codes stored in RFID cards or tags. Each student or employee is assigned a specific RFID card or tag, which they use to mark their attendance. The reader emits radio waves or electromagnetic fields, and when an RFID card/tag comes within its range, it detects and reads the unique ID embedded in the card/tag.
  2. **Data Transmission:** Once the RFID reader successfully reads the RFID card's ID, it transmits that data to the main controller, which in this case is the ESP8266 module. The reader may use various communication protocols, such as UART, SPI, or I2C, to send the data to the controller for further processing.
  3. **Authentication:** The RFID reader's primary role is to authenticate the identity of the individual presenting the RFID card/tag. It compares the read RFID card's ID with the authorized user database or list stored in the attendance system's memory. By matching the ID with the pre-registered IDs, the reader determines whether the person is authorized and eligible to mark their attendance.






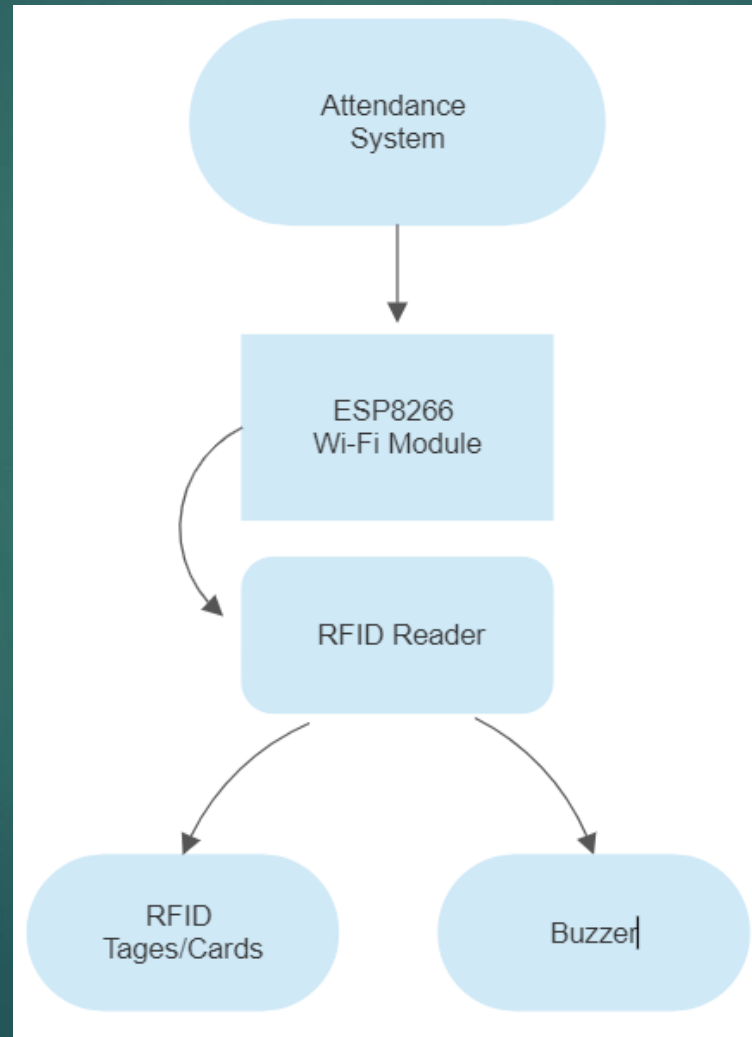
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1. Range and Sensing: RFID readers have a limited range within which they can detect RFID cards/tags. The range depends on the reader's specifications and the frequency it operates on. It is important to position the reader appropriately to ensure the cards/tags are within range for reliable detection. Additionally, the reader's sensitivity may be adjustable to optimize the detection process based on environmental factors.
  2. Integration with the System: The RFID reader is integrated with the attendance system's main controller, such as the ESP8266 module. It is connected to the controller through communication interfaces (e.g., UART, SPI, or I2C) to exchange data. The reader's output, the read RFID card's ID, is used by the controller to perform further processing, such as authentication, attendance marking, and triggering appropriate actions like activating a buzzer.
- In summary, the RFID reader plays a vital role in the attendance system by reading the unique IDs stored in RFID cards/tags and transmitting that data to the main controller. It enables authentication of individuals, allowing the attendance system to accurately record and track attendance based on the RFID card/tag presented by the users.


# Buzzer

- ▶ The buzzer serves an important role in the attendance system by providing audio feedback or alerts to the users. Here are the key roles and functions of the buzzer in the attendance system:
  1. Confirmation Tone: After a successful authentication of the RFID card/tag, the buzzer can be triggered to produce a confirmation tone. This audible feedback informs the user that their attendance has been recorded successfully. It provides a positive acknowledgment, giving assurance that the attendance process was completed.
  2. Error Alert: In the case of an authentication failure or an issue with the RFID card/tag, the buzzer can be activated to produce an error alert sound. This notifies the user that their attendance was not recorded due to an error or an unauthorized card. The error alert helps users identify and rectify any issues with their RFID card/tag or seek assistance from the system administrator.
  3. Indication of System Status: The buzzer can also be used to indicate the system's status or certain events. For example, during system startup or initialization, a brief sound from the buzzer can indicate that the system is ready for operation. Similarly, if the attendance system encounters any technical issues or errors, the buzzer can produce specific patterns of sound to alert the user or administrator.

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4. Customizable Audio Feedback: The buzzer's sound patterns and tones can be customized based on the specific requirements of the attendance system. This allows for flexibility in providing different audio feedback for different events or situations. The sound duration, frequency, and pattern can be adjusted to match the system's needs and user preferences.
  5. User Engagement: The buzzer's audio feedback enhances user engagement with the attendance system. By providing audible responses, it creates a more interactive and user-friendly experience. Users can receive immediate feedback about their attendance status, making the process more transparent and efficient.
- It's important to note that the buzzer's role in the attendance system may vary depending on the specific implementation and requirements. Its functionality can be extended or modified based on the desired user experience and system design.

# System Architecture



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- ▶ In this block diagram, we have three main components:
    1. ESP8266 Wi-Fi Module: The ESP8266 acts as the main controller of the attendance system. It provides wireless connectivity, data processing, and communication capabilities. It interfaces with the RFID reader and the buzzer.
    2. RFID Reader: The RFID reader is responsible for reading the unique identification codes stored in RFID cards or tags. It communicates with the ESP8266 module to transmit the read RFID card's ID.
    3. Buzzer: The buzzer provides audio feedback or alerts to the users. It can be triggered by the ESP8266 module to produce confirmation tones, error alerts, or other audio indications.
  - ▶ The ESP8266 module serves as the central hub, receiving data from the RFID reader, processing it, and making decisions based on the information received. It interfaces with the RFID reader to receive the RFID card's ID and authenticates it. It also controls the buzzer, triggering appropriate sounds based on the attendance system's logic.
  - ▶ Overall, this block diagram provides a high-level overview of the components and their interactions in the attendance system using ESP8266, RFID, and a buzzer.



# Overview of Interconnections Between Components

- ▶ In the attendance system using ESP8266, RFID, and a buzzer, the components are interconnected to facilitate communication and data flow. Here's an overview of the interconnections between the components:

## 1. ESP8266 Wi-Fi Module:

- Connected to the RFID Reader: The ESP8266 module interfaces with the RFID reader using communication interfaces such as UART, SPI, or I2C. It receives data from the RFID reader, including the RFID card's ID, for further processing.
- Connected to the Buzzer: The ESP8266 module controls the buzzer by providing appropriate signals to activate or deactivate it. It triggers the buzzer based on the attendance system's logic, such as producing a confirmation tone or an error alert.

## 2. RFID Reader:

- Connected to the ESP8266 Module: The RFID reader communicates with the ESP8266 module to send the read RFID card's ID. It utilizes communication interfaces like UART, SPI, or I2C to transmit the data. The ESP8266 module receives the data from the RFID reader for authentication and further processing.

## 1. Buzzer:

- Controlled by the ESP8266 Module: The ESP8266 module provides control signals to the buzzer to activate or deactivate it as needed. It triggers the buzzer based on specific events, such as successful authentication or an error condition.

## 2. Power Supply:

- All components, including the ESP8266 module, RFID reader, and buzzer, are connected to a power supply to provide the necessary electrical power for their operation.
- It's important to note that the specific interconnections between the components may vary depending on the implementation and the communication interfaces supported by the components. The communication protocols and wiring configurations may differ based on the chosen modules, libraries, and programming approaches used in the attendance system.

# Screenshots

Users Log

HERE ARE THE USERS DAILY LOGS

Log Filter/ Export to Excel

ID	NAME	SERIAL NUMBER	CARD UID	DEVICE DEP	DATE	TIME IN	TIME OUT
24	Mohi Jain	2	147141200166	EC	2023-05-21	20:06:21	20:06:09
23	dhamaraj	3	51238102169	EC	2023-05-21	20:06:14	20:06:04
22	gautam	1	12619958169	EC	2023-05-21	20:05:08	20:05:56
21	dhamaraj	3	51238102169	EC	2023-05-21	20:03:09	20:04:06
20	gautam	1	12619958169	EC	2023-05-21	20:03:03	20:03:57
19	Mohi Jain	2	147141200166	EC	2023-05-21	20:02:51	20:04:15
18	dhamaraj	3	51238102169	EC	2023-05-21	19:57:44	20:02:29
17	Mohi Jain	2	147141200166	EC	2023-05-21	19:57:26	19:57:36
16	gautam	1	12619958169	EC	2023-05-21	19:55:59	20:00:57
15	Mohi Jain	2	147141200166	EC	2023-05-21	19:55:53	19:56:36
14	dhamaraj	3	51238102169	EC	2023-05-21	19:55:35	19:56:46

RFID Attendance

ADD A NEW USER OR UPDATE HIS INFORMATION OR REMOVE HIM

1 User Info

User Name...

Serial Number...

User Email...

2 Additional Info

User Department:

All Departments

Female Male

CARD UID	NAME	GENDER	S.NO	DATE	DEPARTMENT
✓ 51238102169	dhamaraj	Male	3	2023-05-20	EC
147141200166	Mohi Jain	Male	2	2023-05-20	EC
12619958169	gautam	Male	1	2023-05-20	EC

RFID Attendance

ADD A NEW DEVICE/UPDATE/REMOVE/ENABLE/DISABLE

Your Devices:

New Device

De.Name	De.Department	De.UID	De.Date	De.Mode	De.Config
attendance	EC	8ddc986b6e59d3a8	2023-05-20	Enrollment Attendance	

RFID Attendance

Filter Your User Log:

Filter By Date:

Select from this Date: dd-mm-yyyy

To End of this Date: dd-mm-yyyy

Filter By:

Time-in Time-out

Select from this Time: --:--

To End of this Time: --:--

Filter By User:

All Users

Filter By Device department:

All Departments

Export to Excel:

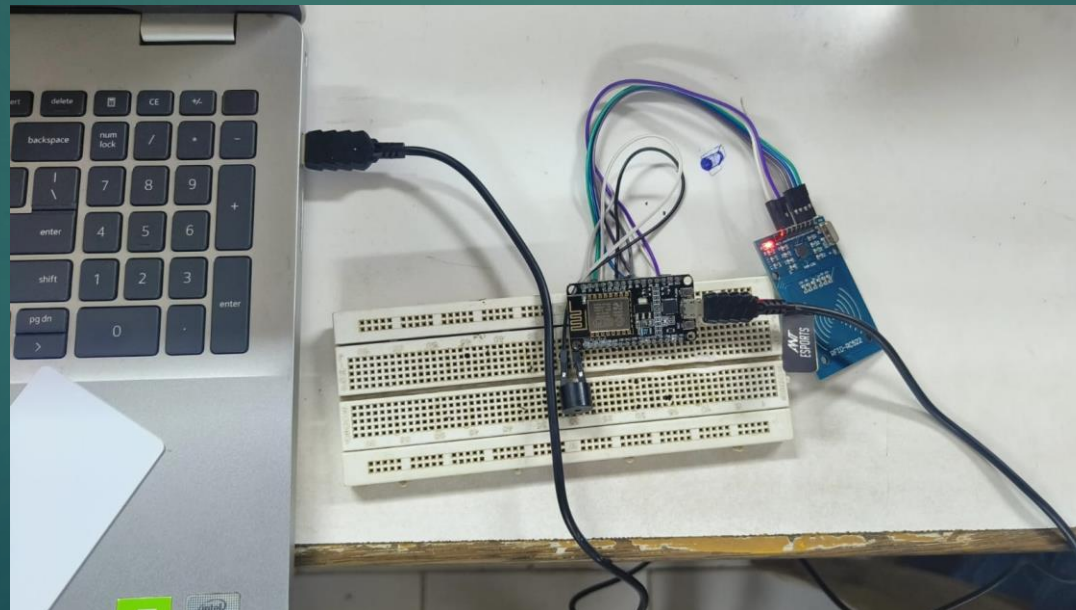
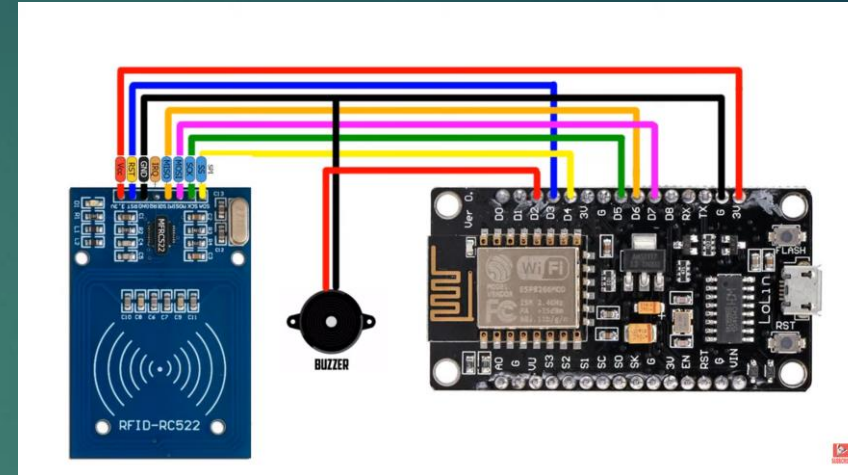
Export

Filter Cancel

ID	NAME	SERIAL NUMBER	CARD UID	DEVICE DEP	DATE	TIME IN	TIME OUT
24	Mohi Jain	2	147141200166	EC	2023-05-21	20:06:21	20:06:09
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# Circuit Diagram

```
# NodeMCU ESP8266/  RFID MFR522 / RC522#  
#   D2  <----->  SDA/SS           #  
#   D5  <----->  SCK               #  
#   D7  <----->  MOSI              #  
#   D6  <----->  MISO              #  
#   GND  <----->  GND              #  
#   D1  <----->  RST               #  
#   3V/3V3 <----->  3.3V          #
```



THANK YOU