# **Door Lock System Using RFID**

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Abstract- This project presents the design and implementation of a secure door lock access control system using RFID (Radio Frequency Identification) technology. RFID enables wireless, automatic identification of users through tags containing unique identifiers. The system comprises three core components: an RFID tag, an RFID reader, and a back-end application with a database. Passive RFID tags are used due to their compact size, low cost, and battery-free operation, making them ideal for access control systems. When a user presents their RFID tag near the reader, the system verifies the credentials against stored data and grants access if authorized. It also maintains a log of user check-in and checkout times to ensure accountability and traceability. This RFID-based system offers a fast, secure, and convenient method for access management, suitable for applications in offices, institutions, and restricted areas requiring controlled entry. The project highlights the practical benefits of integrating RFID with digital security systems.

#### I. INTRODUCTION

Identification) is a RFID (Radio Frequency wireless fundamental technology enabling automatic identification using radio waves. It consists of RFID tags, readers, and a database system for managing user information. This technology offers secure, fast, and contactless communication and has become more efficient with advancements in antenna design. In this project, a digital doorlocking system is developed using passive RFID technology, which is cost-effective, small in size, and battery-free. The RFID tag stores a unique user ID, which is read by the RFID reader and verified against a database. Upon successful authentication, the system unlocks the door and logs the user's check-in and check-out times. RFID provides a reliable solution for secure access to restricted spaces, combining automation, user tracking, and improved convenience. Its wide adoption in access control and inventory management highlights its practical value.

## Objective

To develop a secure and cost-effective RFID-based door lock system that enables automatic user authentication, allows fast and contactless access, and maintains records of user check-in and check-out times using passive RFID technology.

#### Working of the Project

- The RFID system consists of two components: an RFID tag and a Reader. The RFID tag consist of integrated circuit and an antenna, integrated circuit is for the storage of the data, and an antenna is for transmitting the data to the RFID Reader module. Whenever the RFID tag comes in the range of an RFID reader, an RF signal power the tag, and then the tag starts transmitting data serially. Data is further received by the RFID reader and the reader sends it to the Arduino board. And, after that as per the code in the micro-controller different tasks are performed.
- In our circuit, we have already saved the value of the RFID tag in the code. So, whenever that tag comes in range, the relay gets activated. Here we have connected a LED with the Relay to demonstrate, but this LED can be replaced by an Electric Door Lock so that whenever the Relay gets activated the lock will be opened.
- If we scan any other RFID card, the buzzer will start beeping as it's the wrong RFID tag. Hence, for the door lock system, we have used the concept that the door will only get opened by using the right RFID tag. The relay will itself get deactivated after 5 seconds, the door will be closed after 5 seconds, and you canthis delay in the code.

## Benefits

- Enhanced Security: Only authorized users can access restricted areas.
- Contactless Access: No physical key required, reducing wear and hygiene concerns.
- Automated Logging: Keeps records of check-in and check-out times for each user.
- Fast and Efficient: Quick authentication process improves user experience.
- Cost-Effective: Uses passive RFID tags, which are inexpensive and maintenance-free.
- Compact Design: Small-sized tags and readers are easy to install and use.
- Scalability: Can be integrated with larger access control or attendance systems.

• Power Efficient: Passive tags require no internal power source, reducing energy consumption.

#### CONCLUSION

- The RFID-based door lock system was successfully designed and implemented using Arduino Uno, RFID Module, LCD Display, and Servo Motor. The system effectively enhances security by allowing access only to authorized individuals with pre-registered RFID tags. The real-time status of the door is displayed on the LCD screen, providing clear and immediate feedback to users.
- Through testing, the system demonstrated accurate authentication, reliable locking and unlocking mechanisms, and efficient operation. When an authorized RFID card is scanned, the servo motor activates, unlocking the door, and the LCD screen and LED indicators provide visual feedback. If an unauthorized tag is presented, the system denies access, ensuring enhanced security.
- This project proves the effectiveness of RFID-based access control in real-world applications, such as residential security, office access management, and restricted area protection. Future enhancements could include Wi-Fi or Bluetooth connectivity for remote access control, biometric authentication for additional security, and data logging features for tracking entry records.
- Overall, the RFID door lock system is a costeffective, reliable, and scalable solution that significantly improves access control and security management.

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