International Journal of Scientific Research & Engineering Trends
Volume 12, Issue 3, May-Jun-2026, ISSN (Online): 2395-566X

Rfid Based Door Lock System

Sushma P S Assistant Professor
Srujan H S, Vybhav Gowda S, Sumukh Kashyap S, Ajay R Shetty
Dept of ECE, PESCE, Mandya

Abstract- Security and access control are important requirements in modern homes, offices, and institutions. This project presents an RFID and Fingerprint-Based Door Lock System using Arduino Uno. The design employs RFID technology and biometric fingerprint authentication to provide dual-layer security against unauthorized access. The system verifies both the RFID tag and fingerprint before activating a servo motor to unlock the door. An LCD display and buzzer provide real-time status messages and alerts during operation. The proposed system provides a secure, reliable, and user-friendly solution for access control applications in residential, commercial, and institutional environments.

Keywords- RFID Technology, Fingerprint Authentication, Arduino Uno, Access Control System, Door Lock System, MFRC522 RFID Reader, R307S Fingerprint Sensor, Servo Motor, LCD Display, Buzzer Alert, Dual Authentication, Security System, Biometric Verification, Unauthorized Access Prevention, Smart Door Lock.

I. INTRODUCTION

Security is an important requirement in modern homes, offices, and institutions. Traditional lock systems have limitations such as key duplication, loss, and unauthorized access.

This project presents an RFID-Based Door Lock System using Arduino. The system employs RFID technology to authenticate users through uniquely coded RFID tags and controls a servo motor-based locking mechanism.

An LCD display and buzzer provide user feedback during operation. The proposed system offers a secure, reliable, and convenient access control solution for residential, commercial, and educational applications.

II. LITERATURE SURVEY

R. Deshmukh and V. Sharma (2023):
The authors proposed an IoT-based RFID door lock system for secure access control and remote monitoring. Their results demonstrated reliable RFID authentication, stable internet-based door management, and low response delay, making the system suitable for smart home and office security applications.

L.M. Putra and R.A. Wijaya (2024):
The authors analyzed the service quality of an RFID-based smart door lock system in a hotel environment. Their results showed improved guest convenience, faster room access, reliable lock performance, and reduced key management workload, making the system suitable for hotels, commercial buildings, and shared office spaces.

S. H. Malik and P. George (2024):
The authors proposed an IoT-based smart door security system using RFID and a mobile application for dual authentication. Their results demonstrated enhanced security, reliable remote monitoring through the Blynk platform, and effective access management, making the system suitable for smart homes, industries, banks, server rooms, and other high-security environments.

S. T. Kumar and R. Prakash (2025):
The authors proposed an IoT-based smart RFID door lock system for secure and efficient access control. Their results demonstrated reliable RFID authentication, stable remote monitoring, low response delay, and improved system flexibility through cloud connectivity, making the system suitable for smart homes, offices, apartments, and IoT-based automation applications.

III. PROBLEM STATEMENT AND OBJECTIVES

Traditional door lock systems rely on physical keys, which can be lost, duplicated, or misused by unauthorized individuals. This project addresses the problem by designing an RFID-

Based Door Lock System using Arduino, RFID technology, and a servo motor to provide secure, reliable, and keyless access control.

1. To design and implement an RFID-Based Door Lock System using Arduino.
2. To authenticate users through RFID tags and allow access only to authorized individuals.
3. To control a servo motor-based locking mechanism for automatic door operation.
4. To provide system status indications using an LCD display and buzzer for enhanced security and user convenience.

IV. DESIGN METHODOLOGY

The RFID and Fingerprint-Based Door Lock System is developed using Arduino as the main controller. The design consists of an RFID reader, fingerprint sensor, LCD display, buzzer, servo motor, and power supply unit.

The RFID reader is used to identify authorized RFID tags, while the fingerprint sensor verifies the user's identity through stored fingerprint templates. The Arduino processes both authentication inputs and controls the servo motor for door locking and unlocking. The LCD display provides status messages, and the buzzer indicates successful or unsuccessful authentication.

This methodology ensures secure dual-factor authentication while providing reliable access control, improved security, and user-friendly operation.

Block Diagram

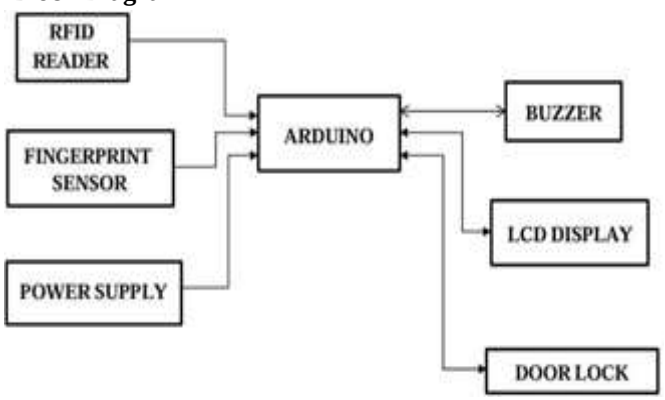

Figure 1: Block Diagram of RFIDbasedDoorlock System

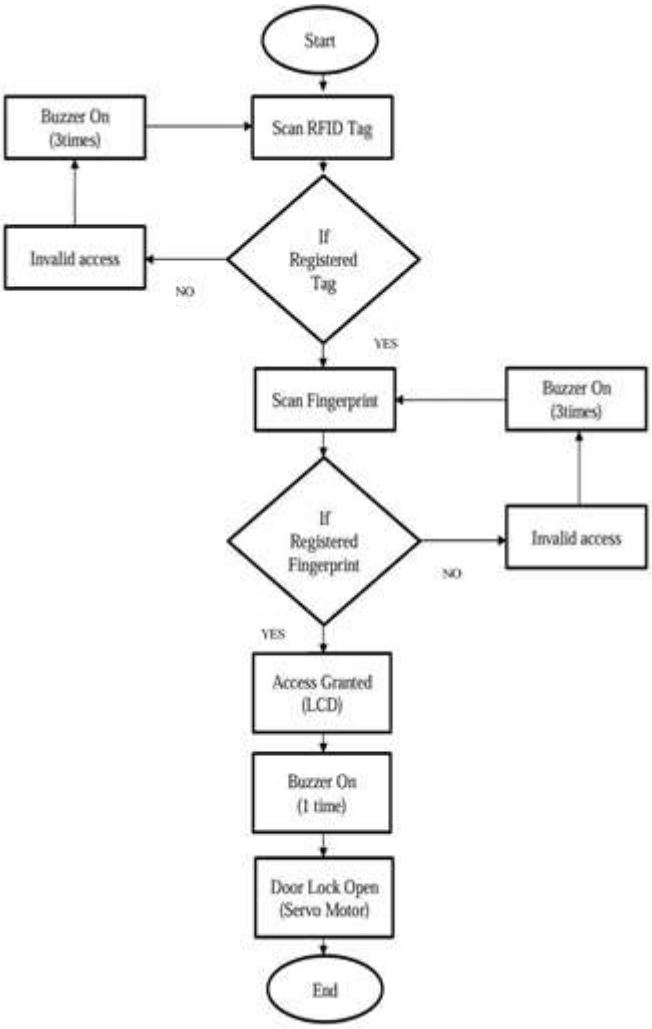

Figure 2: Flowchart of RFID based Doorlock System wirh Fingerprint Sensor

V. RESULTS AND ANALYSIS

The proposed RFID and Fingerprint Based Door Lock System was successfully designed, assembled, and tested using an Arduino Uno, MFRC522 RFID reader, R307S fingerprint sensor, 16x2 LCD display, buzzer, and servo motor. All hardware components were integrated on a breadboard according to the designed circuit and block diagram, and the firmware was developed using the Arduino IDE.

Figure 3 shows the RFID tag scanning stage, where the reader successfully detects and verifies the presented card while the LCD prompts the user to scan the card. After successful RFID verification, the system proceeds to fingerprint scanning, as

shown in Figure 4, where the LCD welcomes the registered user and requests a finger placement.

Upon successful verification of both credentials, the servo motor unlocks the door, as illustrated in Figure 5, with the LCD confirming that the door has been unlocked. In the case of an invalid RFID card or an unregistered fingerprint, access is denied, the LCD displays "Invalid Access" as shown in Figure 6, and the buzzer generates a warning alert.

Testing confirmed reliable dual-authentication performance, quick response time between scanning and door operation, and stable behaviour across repeated trials. The results validate that combining RFID with fingerprint verification provides a meaningfully stronger access-control solution than either factor used alone, while remaining low-cost and easy to deploy in homes, offices, and laboratories.

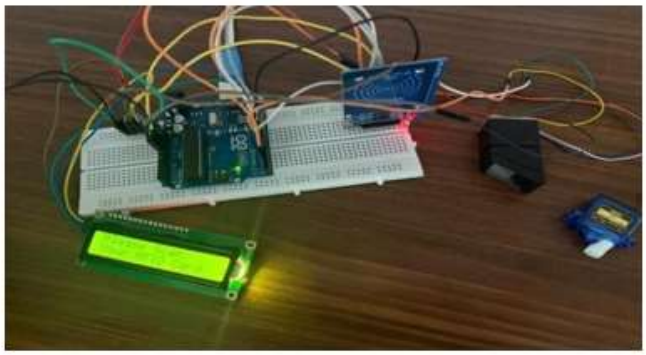

Figure1: Scanning of RFID Tag

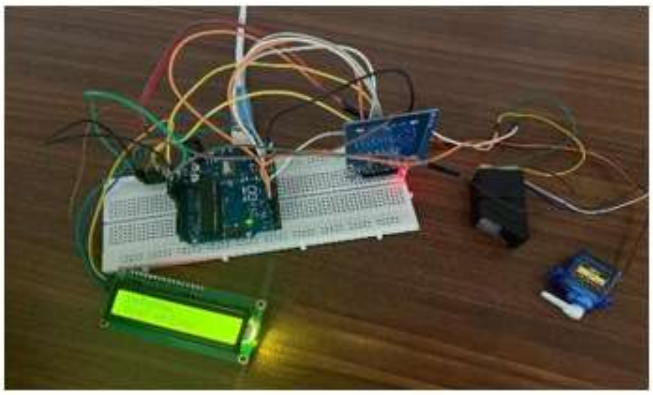

Figure2: Scanning of finger print

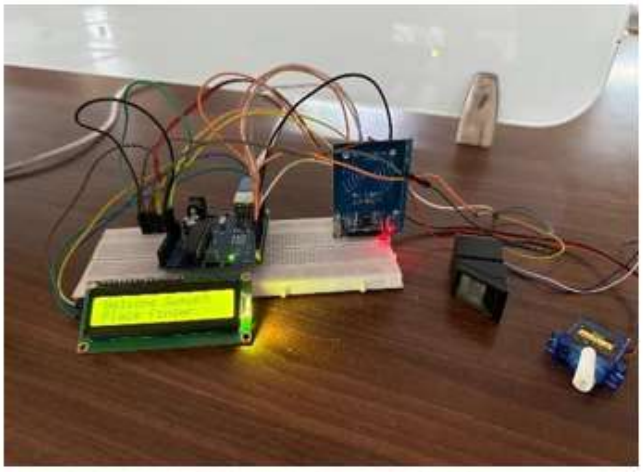

Figure3: door unlock

Acknowledgment

We thank the Department of Electronics and Communication Engineering, PES College of Engineering, Mandya, for providing the resources and support required for the successful completion of this project. We express our sincere gratitude to our guide, faculty members, and laboratory staff for their valuable guidance and encouragement throughout the project.

REFERENCES

1. S. T. Kumar and R. Prakash, "IoT-based smart RFID door lock system," International Journal of Creative Research and Technology (IJCRT), vol. 13, no. 3, pp. 1–7, 2025.
2. R. Deshmukh and V. Sharma, "Implement of an automatic door lock system using RFID technology," International Journal of Scientific Research in Engineering and Technology (IJSRET), vol. 9, no. 3, pp. 246–250, 2023.
3. L. M. Putra and R. A. Wijaya, "Service quality analysis of RFID-based smart door lock in hotel environment," Brilliance: Research of Artificial Intelligence, vol. 3, no. 2, pp. 55–63, 2024.
4. S. H. Malik and P. George, "IoT-based smart door selector for double security using RFID and mobile application," International Conference on Intelligent Systems and Computing, pp. 1–7, 2024.