IF-102

Project Report

Group 56 (RFID door lock with fingerprint)

FEE

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Abstract:

This project aims to create an RFID door lock system with advanced security features by integrating RFID technology, a fingerprint scanner, servo motor, and LCD display. Using Arduino and master-slave architecture, it provides a versatile solution for access control in various environments. The system offers convenient access through RFID cards or key fobs, enhanced security with fingerprint scanning, real-time feedback via the LCD display, and smooth operation through the servo motor. This project demonstrates the practical applications of RFID and Arduino technologies in addressing modern security challenges.

Introduction:

In an era where security and convenience are paramount concerns, the integration of advanced technologies into everyday systems has become increasingly prevalent. This project endeavors to combine various cutting-edge components to create an RFID door lock system with enhanced functionality and security features.

The primary objective of this project is to design and implement a sophisticated door locking mechanism utilizing Radio-Frequency Identification (RFID) technology alongside complementary elements such as an LCD display, servo motor, and fingerprint scanner. By harnessing the capabilities of the Arduino platform and employing the concept of master-slave architecture, the system aims to provide a robust and versatile solution for access control.

The significance of this project lies in its potential to address the evolving needs of security-conscious environments, ranging from residential settings to commercial establishments. By leveraging RFID technology, users can conveniently access secured areas using RFID cards or key fobs, while additional authentication layers such as fingerprint scanning further enhance the system's security.

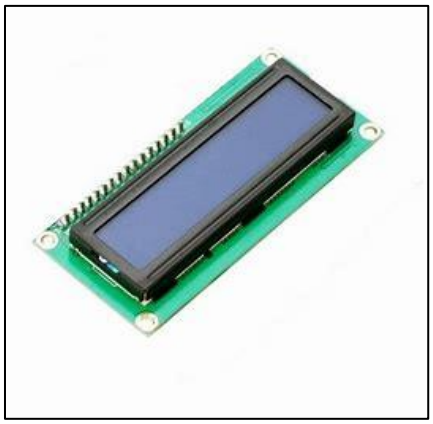
Moreover, the integration of an LCD display provides real-time feedback to users, displaying pertinent information such as access status and system notifications. The servo motor, acting as the physical mechanism for locking and unlocking the door, adds a tangible element to the system's functionality, ensuring smooth operation.

In essence, this project aims to showcase the seamless integration of multiple advanced technologies to create an intelligent door locking system that not only enhances security but also simplifies access control in various environments. Through this endeavor, we seek to demonstrate the practical applications of RFID technology and Arduino-based solutions in addressing contemporary challenges related to access management and security.

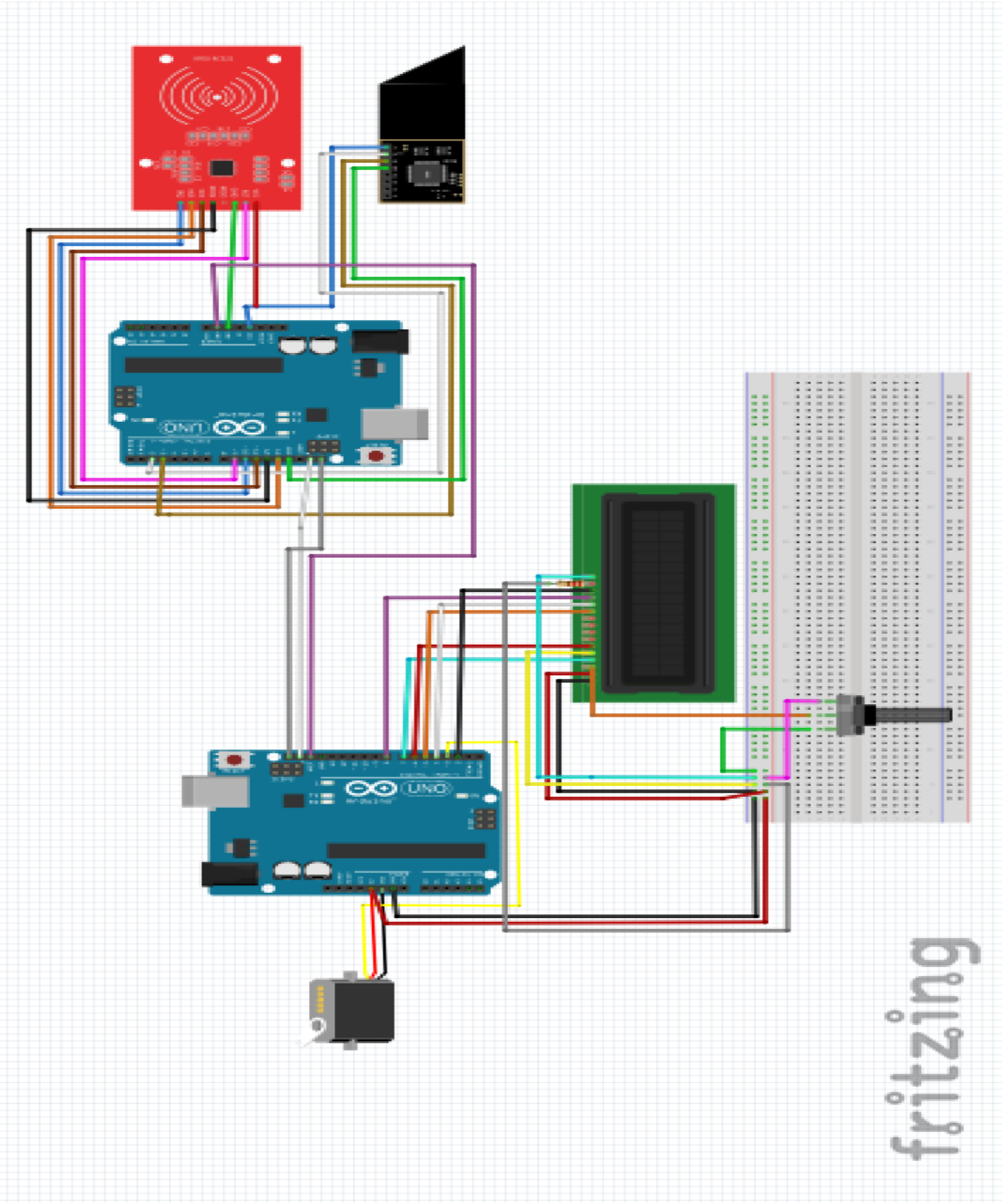
Components:

Following are the components being used:

- RFID module (RC522)
- RFID tags
- Fingerprint sensor (AS608)
- 2 x Arduino Uno
- Servo (SG90)
- LCD 16 x 2
- 10k potentiometer
- Jumper wires
- Veroboard



Circuit Diagram:



Working:

Here's an overview of the working of the RFID door lock system with advanced features:

1. **Initialization:** Both the master and slave Arduinos boot up, initializing their respective components, including the RFID module, fingerprint sensor, servo motor, and LCD display.
2. **User Authentication:** A user approaches the door and selects their preferred authentication method: either RFID tag or fingerprint.
3. **RFID Authentication:** If the RFID option is chosen, the user presents their RFID tag to the RFID module. The module reads the unique identifier (UID) of the tag.
4. **Fingerprint Authentication:** Alternatively, if fingerprint authentication is chosen, the user places their finger on the fingerprint sensor, which captures and matches the fingerprint against stored templates.
5. **Data Transmission:** Master Arduino processes the authentication data and communicates it to the slave Arduino via the I2C protocol, ensuring secure and reliable data transfer.
6. **Decision Making:** The slave Arduino receives the authentication data and verifies it against a database of authorized users. If the authentication is successful, access is granted; otherwise, access is denied.
7. **Servo Control:** Upon successful authentication, the slave Arduino activates the servo motor, which moves to unlock the door, allowing the user to enter.
8. **LCD Display:** Simultaneously, the LCD display connected to the slave Arduino updates to inform the user whether access has been granted or denied, providing real-time feedback.
9. **Door Locking:** After a predefined delay or when the user exits, the slave Arduino triggers the servo motor again to lock the door, ensuring security.
10. **Standby Mode:** The system returns to standby mode, ready to process authentication requests from the next user, thus maintaining security and efficiency.

By following these steps, the RFID door lock project provides a robust and user-friendly solution for controlling access to a door, combining RFID and fingerprint authentication methods for enhanced security and convenience.

Code:

Master Arduino:

The code for master Arduino is: Master_Arduino.ino

Slave Arduino:

The code for the slave Arduino is: Slave_Arduino.ino

Conclusion:

In conclusion, the RFID door lock system presented here offers a sophisticated solution for access control, combining RFID technology with a fingerprint scanner, servo motor, and LCD display. Its versatility, enabled by Arduino and master-slave architecture, ensures seamless integration into various environments. Whether through RFID cards or fingerprint scanning, users benefit from enhanced security and convenience. Real-time feedback via the LCD display enhances user experience, while the servo motor ensures reliable operation. This project demonstrates the practical application of advanced technologies in addressing contemporary security challenges, emphasizing the importance of integrating RFID and Arduino solutions for efficient access management.