RFID BASED ACCESS CONTROLSYSTEM
USING ARDUINO

Submitted by

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ABSTRACT

The RFID-Based Access Control System is an embedded system that utilizes Arduino UNO and an RFID Module to implement a secure access control mechanism. The system allows authorized individuals to gain entry to a restricted area by using RFID (Radio Frequency Identification) cards or tags. It enhances security and provides a convenient and efficient way to manage access in various environments such as offices, homes, or institutions.

 With the rising interest in security, frameworks with high reliance and fast-reaction systems area real need for industries and ventures. Radio-frequency identification is the most significant area of the future and is increasingly considered by the scientific world and enterprises. In this work, RFID-based door access control utilizing Arduino is developed. We used an RFID ID tag and RFID reader, which is used to match the data on the tag with the data in the database program, leading to the movement of the door by confirming whether the data is correct and/or incorrect. Opening of the door uses a Solenoid Lock that gets its feed from the Arduino board.

The opening and closing are based on the flag set by the Arduino response. When the flag is set to 1, the door opens, and if it is set to 0, the door remains closed. The LED based on the feed also comes from the Arduino boar
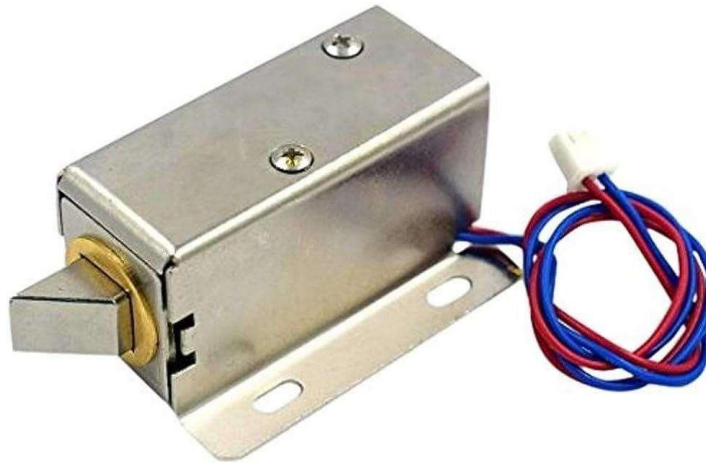
1.1 SOLENOID LOCK:

FIG 8 SOLENOID LOCK

A solenoid lock works on the electronic-mechanical locking mechanism. This type of lock has a slug with a slanted cut and a good mounting bracket. When the power is applied, DC creates a magnetic field that moves the slug inside and keeps the door in the unlocked position. The slug will retain its position until the power is removed. When the power is disconnected the slug moves outside and locks the door. It doesn't use any power in a locked state. To drive the solenoid lock you would need a power source that can give 12V @ 500mA.
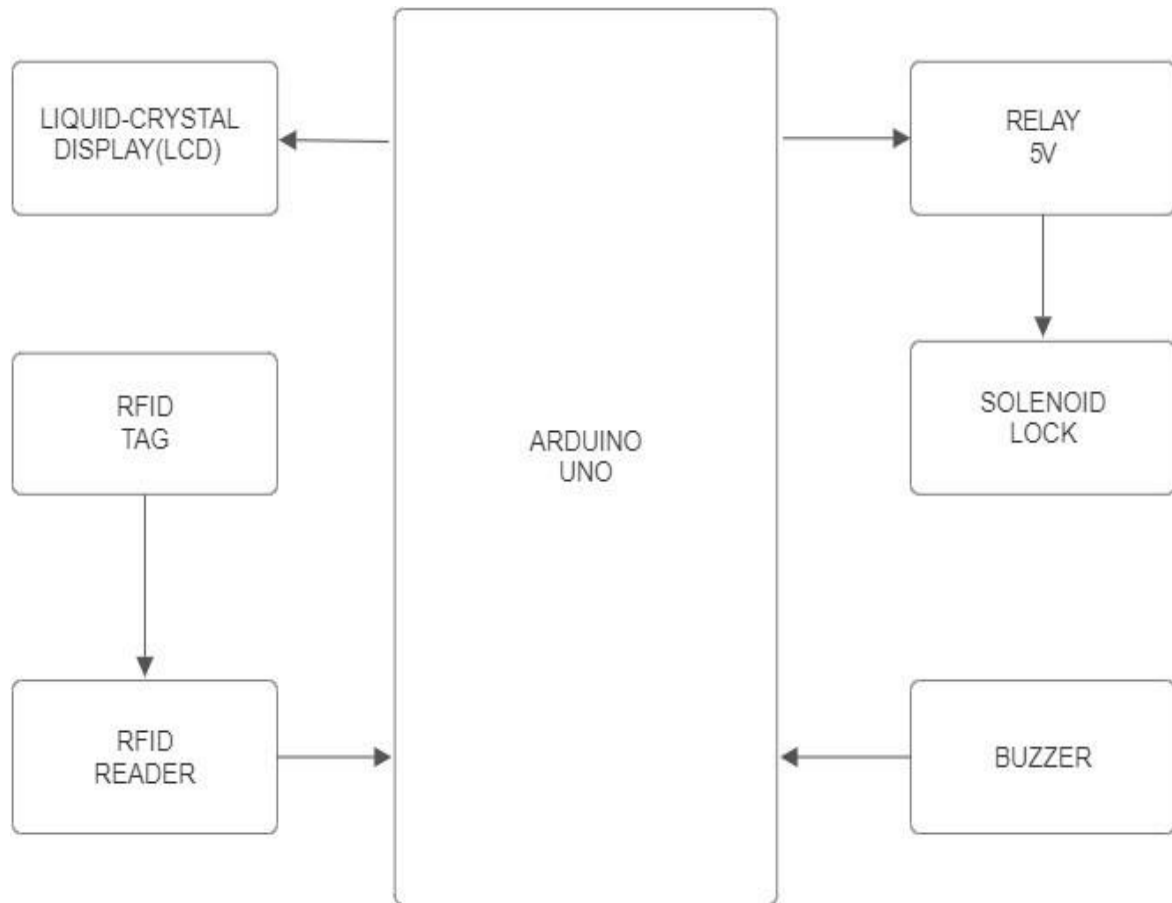
1. BLOCK DIAGRAM:

FIG 9 BLOCK DIAGRAM
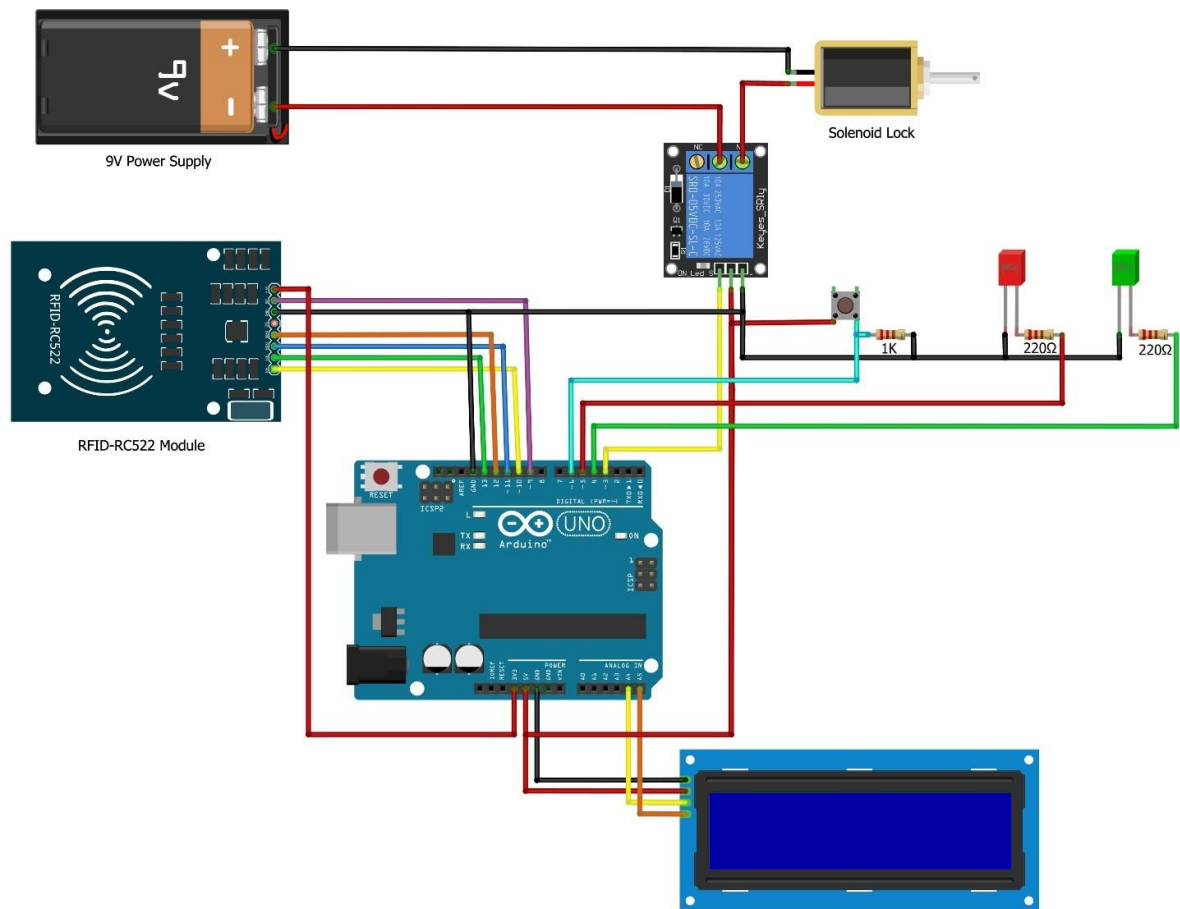
2. CIRCUIT DIAGRAM:

FIG 10 CIRCUIT DIAGRAM

3. OUTPUTS:

The project has the following workflow: on arriving at the door where the access control is installed, one is asked to approximate their RFID tag to the reader as show on the output window. The reader reads the tag and the microcontroller compare the tag's UID for match and grant access if there is a match and deny access if there is no match An RFID tag can be added or removed through the Arduino IDE or any other programming language that Arduino understands. For changes made on the sketch to be effective on our system, the sketch must be re-uploaded to the Arduino board to override previous sketch.
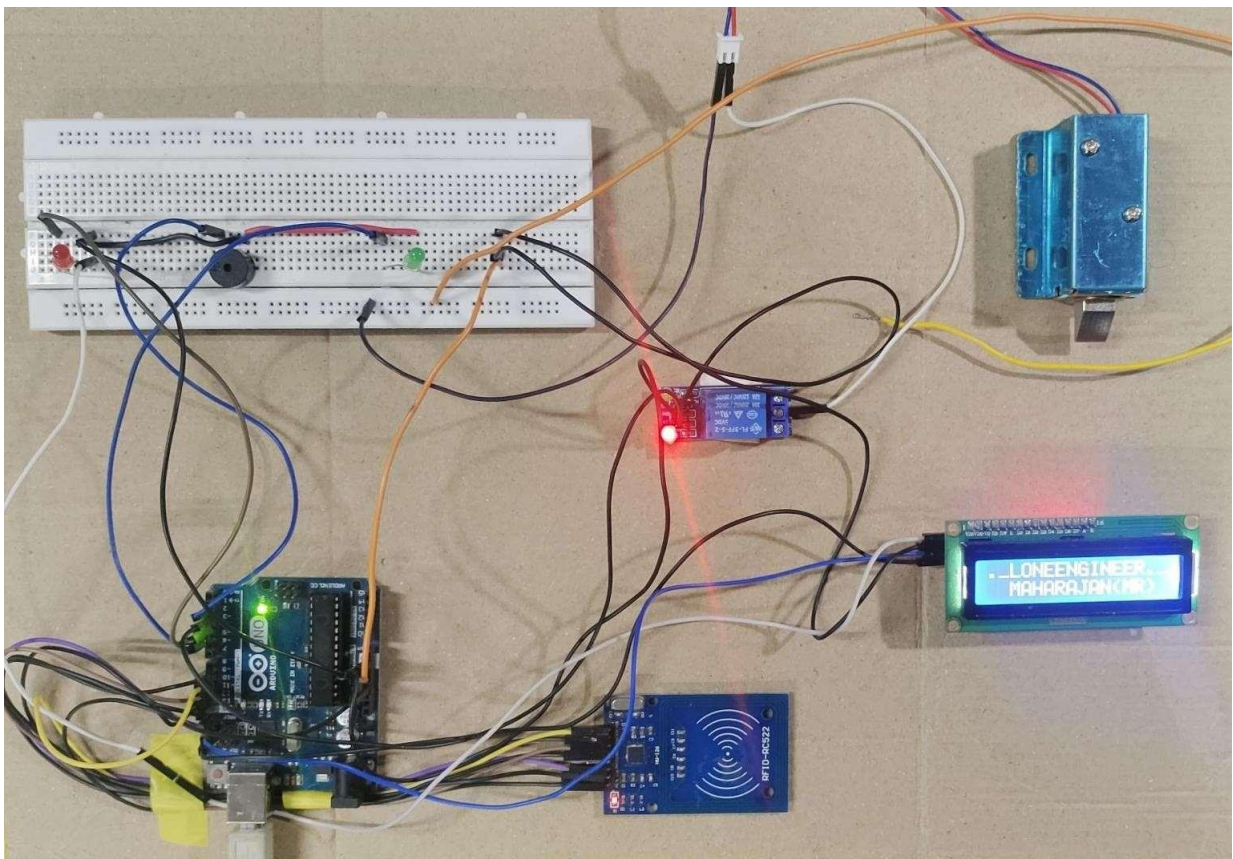

FIG 12 SAMPLE SCREENSHOT 1 OF THE PROJECT

4. PROS AND CONSCIRCUIT DIAGRAM:

Benefits of RFID access control systems

- **Ease of use for tenants:** Tapping a key card or badge credential against a reader is simple and intuitive.
- **Easy to replace:** Should a resident misplace a card, you'll be able to disable access for that card using the control panel and issue a new one.
- **Effective for elevators:** Elevator RFID access control allows you to regulate and control access to certain floors easily.
- **Practical for vehicles:** Vehicle RFID access control offers convenient, hands-free access to vehicles at your property.
- **Great for doors and gates:** An RFID door entry system automatically unlocks doors when a valid card or fob is scanned. Additionally, an RFID gate system empowers tenants to open gates easily for convenient property-wide access.

RFID access limitations

- **Key fobs have to be replaced often:** Even your most detail-minded tenants are prone to slip-ups. When you have to deal with replacing lost key fobs in addition to assigning new ones to new residents, those costs add up.
- **Potential safety pitfalls:** While RFID tags are more secure than traditional keys, they're capable of being cloned with the right skills and equipment. With that said, if a resident loses their key fob, someone with malicious intentions could try to use it to access the property.
- **No way to manage visitor entry:** Residents aren't the only ones who need to access your building. Visitors and delivery couriers need access, too. Unfortunately, an RFID system offers no way to grant access to visitors remotely.

5. APPLICATIONS:

An RFID-based access control system for a solenoid lock using Arduino can be a versatile and secure solution for various applications. Here are some potential applications and benefits of such a system:

1. **Home Security**: Implementing an RFID access control system at your home's entrance provides an extra layer of security. Only authorized individuals with the correct RFID cards or key fobs can gain access.

2. **Office Access Control**: Employers can use RFID-based access control to restrict access to certain areas of the office, enhancing security and protecting sensitive information.

3. **Educational Institutions**: Schools and universities can use this system to control access to classrooms, laboratories, and administrative offices. It can also help track attendance.

4. **Parking Lots**: RFID cards can be used to grant access to secure parking lots or garages. Only authorized vehicles can enter.

5. **Hotels and Motels**: Guest rooms and restricted areas can be accessed only by guests with valid RFID cards, enhancing guest security and privacy.

7. **Data Centers**: Data centers often store critical information. RFID access control ensures only authorized personnel can enter the facility.