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Arduino RFID Solenoid Lock System

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ABSTRACT: RFID, Radio Frequency Identification is an inexpensive technology, can be implemented for several applications such as security, asset tracking, people tracking, inventory detection, access control applications. The main objective of this paper is to design and implement a digital security system which can deploying secured zone where only authentic person can be entered. We implemented a security system containing door locking system using passive type of RFID which can activate, authenticate, and validate the user and unlock the door in real time for secure access. The advantage of using passive RFID is that it functions without a battery and passive tags are lighter and are less expensive than the active tags. A centralized system manages the controlling, transaction and operation task. The door locking system functions in real time as the door open quickly when user put their tag in contact of reader. The system also creates a log containing check-in and check-out of each user along with basic information of user.

KEYWORDS: Arduino UNO, RFID, Solenoid Lock, Reader, Bread Board, Jump Wires, Relay

I. INTRODUCTION

You have seen DoorLock Mechanism in some Hotels and other places, where you don't need a key to unlock the room. You are given a card and you just need to put it in front of a RFID Reader box, and the lock gets unlocked with a Beep and a Blink of LED. This RFID Door Lock can be made easily at your home and you can install it in any door. These Door lock is just electrically operating door lock which gets open when you apply some voltage (typically 12v) to it. Here in this project we are using Arduino and relay to trigger the Electric Door Lock and RFID to authenticate, so your RFID tag will act as a key. If you place wrong RFID card near RFID reader a buzzer will beep to alert about wrong card. If you are new to RFID first read its working an interfacing with Arduino.

II. LITERATURE REVIEW

Security is a main concern in our everyday life. Each and every individual needs to feel secure. An access control for doors forms an essential part in our security pattern. Doors locked using conventional locks are not as safe as they used to be, anyone can break in by breaking these locks. We need to make a framework that will give 24/7 benefit. Password based door lock system allows only approved persons to access restricted areas. This system is fully controlled by Arduino. The password can be entered via a keypad. If the password is matched with the stored password in Arduino the door gets open. This programmed password based bolt framework will give client more secure and minimal effort method for locking-opening framework. The security door lock automation system promises a bold step to the future where mechanical door locks will be substituted by electronic door locks.

III.SYSTEM DESIGN

Circuit diagram:

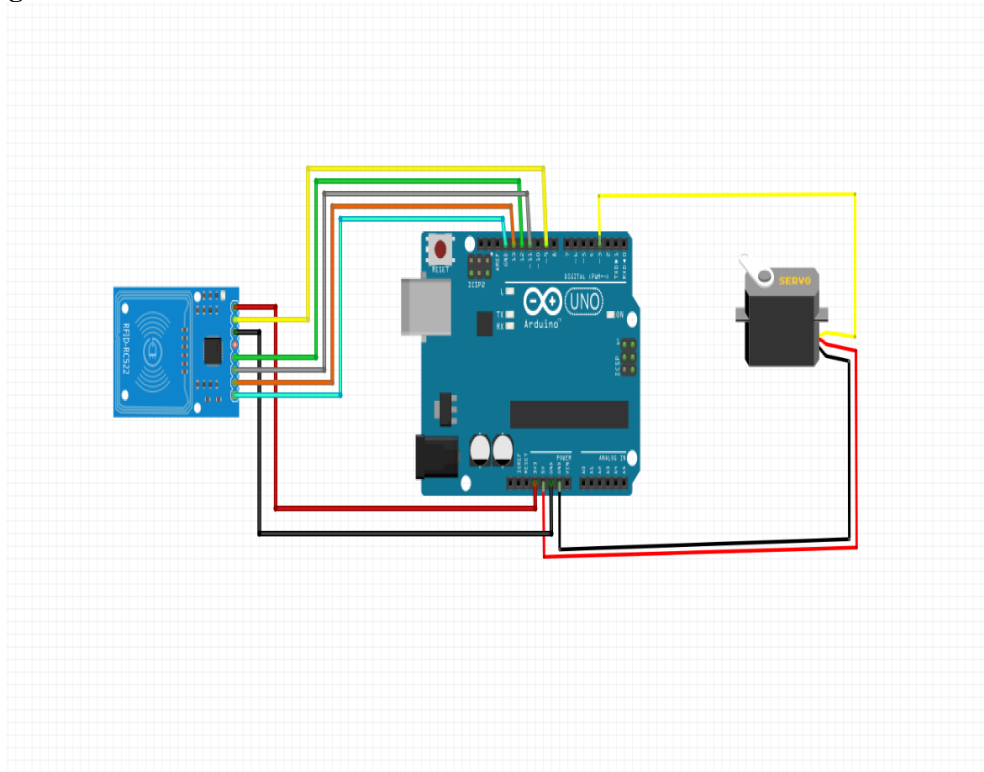


Fig. 1 – Circuit Diagram Of Arduino RFID Solenoid Lock System

IV. WORKING

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 RFID reader, RF signal power the tag and then 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 micro-controller different task performs.

In our circuit, we have already saved the value of RFID tag in the code. So, whenever that particular tag comes in range, the relay gets activated. Here we have connected a LED with 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 this 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 can change this delay in the code.

Code:

```
char tag[] ="180088F889E1";
char input[12];
int count = 0;
boolean flag = 0;
void setup()
```



```
{
pinMode(2,OUTPUT);
pinMode(3, OUTPUT);
pinMode(4, OUTPUT);
Serial.begin(9600);
}
void loop()
{
digitalWrite(3,1);
if(Serial.available())
{
count = 0;
while(Serial.available() && count < 12)
{
input[count] = Serial.read();
count++;
delay(5);
}
if(count == 12)
{
count =0;
flag = 1;
while(count<12 && flag !=0)
{
if(tag[count]==input[count])
flag = 1;
else
flag= 0;
}
if(flag == 1)
{
digitalWrite(2,HIGH);
```

```
digitalWrite(3,LOW);
delay(5000);
digitalWrite(2,LOW);
}
if(flag == 0)
{
for(int k =0; k<= 10; k++)
{
digitalWrite(4,HIGH);
}
}
}
```

Advantages of this project:

- a) Since there is no exposed card slot, RFID locks are generally waterproof. They also provide easier, better access control than key locks or traditional locks.
- b) Data on keycards is secure because it takes specialized equipment to read it. This maintains the lock system security.
- c) Many companies use RFID lock for business efficiency since they track the person carrying the card and record their movements with a smart-card system.
- d) RFID cards can be programmed and reprogrammed as the aspects of security requirements change.

Disadvantages of this project:

- a) Just like traditional keys, you can forget your keycard.
- b) It is possible the system can be hacked or bypassed by someone who is tech-savvy, so they aren't foolproof.

V. WORKING RESULTS AND CONCLUSION

When RFID tag placed on the RFID reader as it read the data and through reader its code send to the controller which access with the controller match and receives code with store code if the code is same then the security system is authorized to use and access the data. Change the tag ID in Access Control into sketch with the ID you have noted down earlier and then connect arduino board with PC, upload the sketch into the board. After access control system the information is display on LCD and if the information is not correct the alarm will start ringing. If uploading is doing well, you will see the glowing of LED. It means the system is prepared to read the tag. Now, bring the tag near to RFID reader. If tag ID matches with the ID in the code, lock will open for five seconds. It closes manually after five seconds. Glowing of LED indicate that the lock is open. Glowing of caution LED means that you are using the wrong tag.

RFID based security and access control system is more secure and fast responded as compared to the other system like biometric. The advantage of the RFID system is contact-less and works without-line-of-sight. By using arduino it is easy to access and works very quickly while burning the code it is like plug and play device. Users can change the function accordingly by using arduino. It is easier to use and accurate also. Hence this project can be useful for implementation of access control application for tracking system as well as providing the security benefits. This project can improve by raising the range of reader in which the tag read.



VI. FUTURE SCOPE

It depends upon how original one could be to enhance the use of this project. But for us this project is practical for future uses such as Smart cart can be interfaced with wireless technologies to make it completely portable in the near future. Payment of bills using mobile can be implemented. A low cost RFID scanner can be manufactured and used which can scan multiple tags (products) simultaneously for faster processing and lesser resources. Automatic scanning & availability of products

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