

Smart Door Locking System with RFID Technology

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Abstract— Day by day the technology is developing around us and technology has advanced. Smart door locking system becomes a great knowledge and fashion to us according to currently developing technology. There are so many methods for automatic door lock systems. Fingerprint based door locking system is more secure and safety method of door locking and unlocking system, because of underway covid19 situation, it is awfully dangerous to touch the Fingerprint sensors, which is regularly used by different people, because by touching the same sensor by different people leads to increase of transmission of virus. Hence in this project we use RFID technology, RFID technology in the sense it consists of RFID tag and RFID reader. They work based on radio frequency. RFID reader is used to collect data from RFID tag and it is used to recognize objects. These cards have particular unique code, and changes for each and every RFID card. When RFID cards bring closer to the RFID reader, RFID reader identifies the radio frequency of the RFID card and validates and give access. Buzzer is used to produce a sound while locking and unlocking of the door. LCD display is used to display the information regarding door opening and door closing. This type of system is planned for smart door locking and unlocking purpose. This system is very valuable because of simple interface, very ease of convenience of user, mainly it is very low cost of construction, it is simple confluence. This system can be used in every doors for smart locking and unlocking, can be used in home, main doors and use any other locations as extra security purpose for contactless door locking and unlocking to decrease the contagious of covid19.

Index Terms— RFID technology (RFID reader and tags), LCD Display, Buzzer, Arduino Uno, Servomotor.

I. INTRODUCTION

Now a days, security becomes top most priority in every aspect, especially security becomes topmost priority in safeguarding homes. Day by day thefts are increasing, according to present criteria of situation we need home security. Hence security is required for our homes [1]. The main purpose of this system is to increase the security to homes at low cost. This project is about to give the safe and secure door locking system using RFID technology. Internet of things (IOT) is nothing but exchange of the data over the internet. and it becomes most popular thing in all over the world, IOT is developed in each and every sector like manufacturing, healthcare, agriculture and etc. on the basis of internet of things the smart door locking system is proposed. By using RFID technology we can make safe entry and we can maintain record of user according to the particular unique id of RFID tag. We can

use this system in any door to accentuate the security. and this door lock is operated electrically, door lock opens when we give a threshold voltage of (9v) to it. We are applying 9v to the system with the help of battery.

II. PROPOSED SYSTEM

Smart door locking systems has become popular and technology has become advanced in terms of security for safeguarding homes. There are number of methods for accessing the systems automatically. For example, finger print based system, keypad systems, by pressing appropriate password on keypad we can access the system. But using keypad Password based systems is awfully dangerous according to ongoing covid19 situation because while unlocking the door we touch the keypad then same keypad will be touched by other Persons this leads to transmission of viruses [4]. And another method is for accessing the system is bluetooth compatible door lock system, but we can't use these kind of systems for long range. So frequently touching of same surface becomes threat to us during this ongoing covid situation [2]. In the same way finger print based systems are also threat to us in these ongoing covid situation [3]. Smart door locking system is proposed for safe and secure manner to operate the door without contact. RFID technology is involved in this project for security purpose. Generally, RFID technology consists of RFID reader and RFID tags. RFID reader is a device consists of group of antennas, which emits radio waves. Actually RFID technology work on basis of radio frequency. We can say that RFID technology is used for wireless communication, radiofrequency plays a vital role in communication. The RFID reader receives the radio waves from the RFID tags and we use buzzer for sound indicator for door opening and closing purpose, led are used for indication that whether the doors are open or closed, it is very useful in night times. We use green led and red led for knowing whether the door is opened for closed, green light glows and indicates that the door is opened and red light glows and indicates that the door is closed. The servo motor is used for pull and push the tower bolt of the door lock set. Hence it is best proposed system for operate the door.

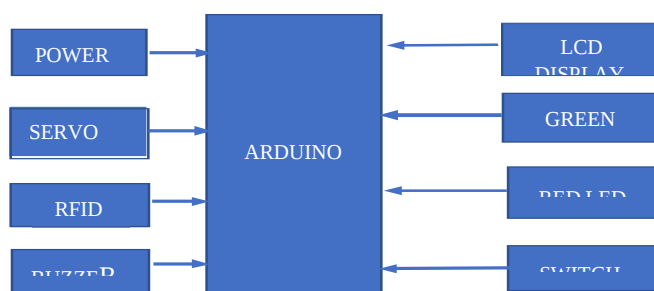


Figure 1. Block Diagram

A. RFID Reader

RFID reader is a device in RFID technology, it consists of group of antennas and it receives data from RFID card. RFID technology is similar to the barcode theory, but we cannot scan the RFID directly. It consists of antennas, which are used for wireless identification of objects or things.

Connector	DB9 connector
Supply Voltage	7v to 15v DC supply voltage
Operating Frequency	125KHZ frequency
Distance between reader and object	10 cm
Operating Voltage	DC 4.5v to 5v



Figure 2. RFID Reader and Specifications

B. RFID Card

RFID card is the device in RFID technology, which emits the signals or transfer the signals, that transmitted signals are received by RFID reader. And tags attached to items because of Electromagnetic waves [6]. Generally these

RFID tags have unique code, so the code of particular tag will not same with code of other tag. By leveraging RFID technology, the system offers a secure and convenient solution to traditional access methods. These small, wireless devices store unique identification data that can be quickly and wirelessly read by RFID readers. In a smart door system, an RFID tag, when presented to a reader, initiates an authentication process, allowing or denying access based on the stored information. The advantages of RFID tags include swift and contactless authentication, scalability, and adaptability. The integration of RFID tags enhances security and user experience, making them a key component in modern access control solutions for smart doors."

Compatible	With EM4001 64bit RFID tags
TTL and RS232 output at	9600bps
Reading range	8-10cm
Frequency range	125KHZ
Output for	Magnetic strip simulation



Figure 2. RFID Card and Specifications

C. Arduino Uno

Arduino Uno is developed by Arduino.cc, and initially it is released in 2010. It is an open source microcontroller board and it is based on Microchip ATmega328p. The board consists of Analog pins and digital pins.

Developer	Arduino
Type	Single Board microcontroller
CPU	Microchip AVR(8-bit)
Memory	SRAM
Storage	Flash, EEPROM



Figure 3. Arduino Uno and Specification

D. LCD Display

LCD (liquid Crystal Display) is an optical device; it mainly uses the light modulating properties of liquid crystals combined with polarizers [5]. We use only LCD because it consumes less power when compared to gas displays.

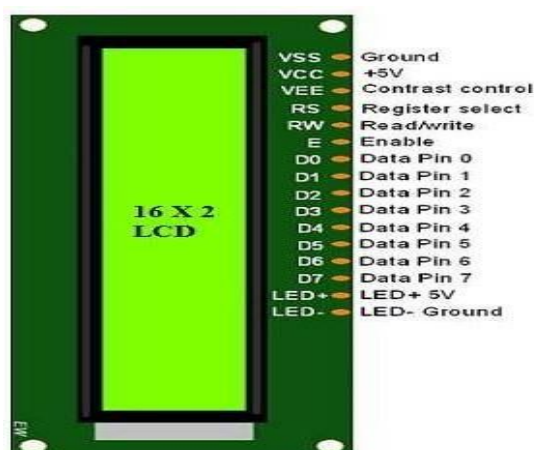


Figure 4. LCD pin Configuration

E. Servo Motor

Servo motors or servos are electronic devices and rotatory actuators. Here rotatory actuators rotate 0 degrees to 180 degrees. In this project, a servo motor is used to push and pull the tower bolt of a door lock set. Servo motors relied upon to operate exactly as commanded.



Figure 5. Servo Motor

III. RESULTS

The working model of Smart door locking system with RFID technology was designed and implemented. The user must have RFID tag because each tag have their own specific unique Id, when RFID tag placed near reader then the RFID reader receives signal from RFID tag and then RFID reader gives access to the system as well as the servo motor rotates around 0 degrees to 180 degrees, pulls and push the bolt of the door lock set. and with respective to push and pull of servo motor, the door opens and closes. Smart door locking system is proposed because to accentuate security at low cost of construction.

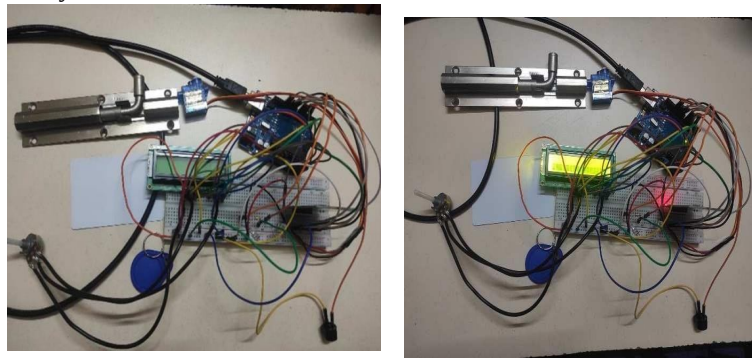


Figure 6. Hardware Setup and Output

IV. CONCLUSIONS

Here we use Arduino microcontroller to achieve the project in shorter times when compare to other technologies and it is having simple confluence. Data will be recorded of the user, we can record the data that is how many times the user opened the door and closes the door. And this system is very useful to the people to reduce the thefts and it is very useful to increase the security. Here this project saying that the security of door lock is increasing by using RFID technology. We can apply this system to any doors of homes, offices where we need security. We can build this much of secured and safety door lock systems with low cost and its appearance is simple.

V. FUTURE WORK

For this smart door locking system we want to add the additional feature that to receive a SMS to user. By using GSM architecture, we can add additional feature to this system. To accentuate the, security we want to process the image processing using raspberry pi, firstly we record the images of few persons and then we strengthen the security to the proposed model. Further, AI may be used to boost the security of proposed model. To determine that the how many times that the door is opened in a day.

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