FINGERPRINT BASED DOOR ACCESS SYSTEM

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Abstract: Security is a constant concern for our homes, offices, retail establishments, etc. Everyone has a fear of entering of unauthorized person to their home or office without their knowledge. In traditional system door can be fitted with locks which can be broken with the use of an alternate key. Alternatives to this system will be the password or pattern system in the locks which again has possibility of getting hacked. So, a solution to such problems can be combination of door lock and biometrics. Biometric verification is a means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures. In a proposed system, fingerprint used for biometric verification and Arduino to implement the system which will provide security with commonly available component and less power consumption.

Index Terms - **Arduino, Biometric, Fingerprint sensor**

I. INTRODUCTION

Today, whether at home or away from it, everyone must deal with the serious issue of office or corporate territorial security. In this busy, ruthless world where people can't find ways to manually secure their priceless goods, security systems are one of the biggest problems. Instead, they discover an alternative approach that offers better, trustworthy, and atomized security. In today's connected world, anyone can access information from anywhere in the world. Therefore, the possibility of having one's information compromised is a severe issue. Due to these risks, having some form of personal identification to enter one's own information is absolutely necessary. Personal identification is increasingly important in modern society. This paper is about solving the problem regarding security of unauthorized people trespassing in our home, shops or offices. Security issues can be fixed using traditional locks but there is always possibility of someone opening the lock even without breaking it with the use of duplicate key. Use of locks create problem like losing of keys or we have to carry keys along with us always. Use of patterns in the locks can increase security but again it can be opened if somehow the passwords or patterns are known. There are many innovative smart door locks system. These systems include fingerprint, RFID card, pin, password or IOT, unlocking of the system using mobile phone. Each one has some advantages and disadvantages. In the proposed project, a system is implemented using biometrics. In case of biometrics, the pattern which will be used as key will be unique. In this Arduino and different devices are used for the implementation of the security lock which will provide increased level of the security level. In simple words, we can say that we are implementing a door access system using arduino which make use of fingerprints to identify whom to allow and who not to allow inside our homes, offices, shops, etc. We are trying to implement it using a normal and simple door lock which is fitted in every home so as to minimize the cost of the device as a product.

II. LITERATURE REVIEW

The Existing system has few digital techniques for Door security locks. This modern smart locking system replace the role of traditional locking system which has lock and keys. The drawback of these locks is they can be easily welded without any alert to the user. People want their home, office, shops to be secured. This need for people is the main reason for developing smart lock**.**

2.1 Fingerprint Locking System

Fingerprint locking system is a locking system using the user fingerprint with the help of fingerprint sensor module. The fingerprint sensor module the works with the help of Arduino or raspberry pi. The Fingerprint module checks the given fingerprint authorized or unauthorized. The locking system uses the user fingerprint to unlock the system [2].

2.2 Pin / Password Authentication

In this smart door lock Pin or password authentication is used along with the fingerprint authentication. It is used to unlock the system directly or used in the case of fingerprint failure. Most of the smart lock system pin number using keypad. The Existing systems has pin authentication to make users easy when fingerprint sensor is not working. And the main advice to the user is not to share the pin number with the outsiders or typing pin number visible to unknown persons.

2.3 Internet of Things

IOT stands for internet of things which is worked in door lock through wireless connection. The user can access the door lock using his smart phone with the use of IOT supported apps. User can easily unlock or lock the system by single touch. But IOT is supported only by internet connection.

2.4 RFID Card

The user can unlock the system by using RFID card stands for radio frequency identification. The radio frequency in scanned by the scanner and check whether the identity is authorized or unauthorized. The main drawback of this system is these cards can be duplicated by hackers. So the user has the handle it safely.

2.5 OTP Using GSM

OTP stands for one-time password which is used for randomly changing the password for security purpose. OTP should be given in a particular time period otherwise the system will not recognize the password then the user has to refresh the OTP. The OTP is sent as a message using GSM modem which is used the send message to the registered mobile number.

2.6 Limitation of Existing System

The Existing system some time fails to provide security due to various attack by hacker or unknown persons. In pin or password authentication system, user has to keep password secured otherwise the hackers may get the password using various attacks or by using the scanner to check the finger impression on the keys. IOT system can't work without internet, so in the case of failure of power supply or server or error in server may became a problem. In RFID system there may be chances of card duplication. The drawback of the Existing system is, some system has more than one security in the same system but it requires any one authentication to unlock system. Some system has two level authentication, but it can be easily hacked by hacker and guest can't be entered until the authorized user has to come and open the door.

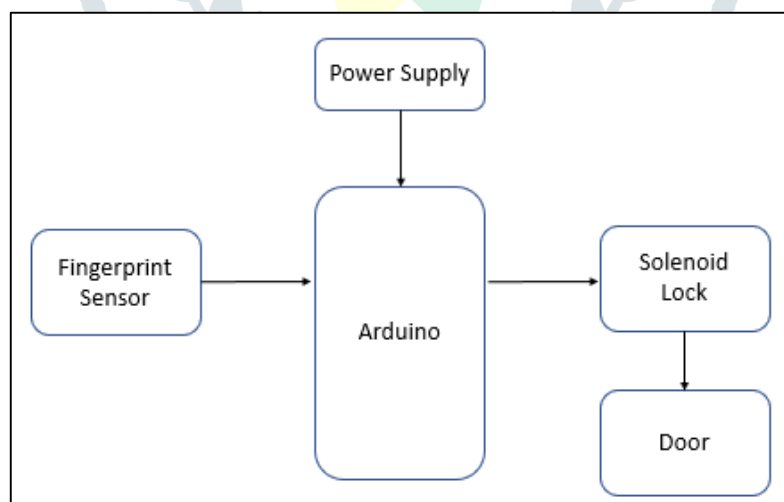## III. PROPOSED SYSTEM

3.1 Methodology

Figure 1. Block diagram of proposed system

The block diagram of proposed system is shown in above figure 1. The main block diagram of proposed system are as follows:
1. Arduino: Arduino NANO is a microcontroller board based on 8-bit at mega328P microcontroller. Along with at mega328P board, This Arduino NANO has 14 digital pins where (out of 6 used as PWM outputs) and 6 analog featured i/o input pins and USB-B type connection port.

Figure 2: At mega 328P microcontroller

2. Fingerprint Sensor: R307 fingerprint module is a finger print sensor with TTL UART interface. The user or owner can store the fingerprint data template in the module and can configure it in 1:1 or 1: N mode to identify the authorized or registered person.

Figure 3: Fingerprint Scanner

3. Solenoid Lock: This DC 12V strong and rigid door lock, Electric Lock Assembly for Solenoid which is used for locking the sell machine, storage shelves, file cabinets etc. The hidden way of unlocking it is used for an emergency purpose. The lock will work as when the circuits disconnect, and it unlocks as the instant power-on. It is steady, it's durable, and energy-saving relay and had a long lifespan in future.

Figure 4: Solenoid Lock

In the proposed system, the biometric system uses an ATmega 328P based Arduino uno connected to an optical fingerprint sensor R305 to scan the finger of the person. The fingerprint of the person is enrolled in system with id number. This id is used to access the door lock of home. When a person scan finger to open the door, fingerprint sensor sends the fingerprint data to the Arduino. The Arduino will check the input with the stored fingerprint id. If the fingerprint data matches with the stored data, the solenoid works and door lock opens.
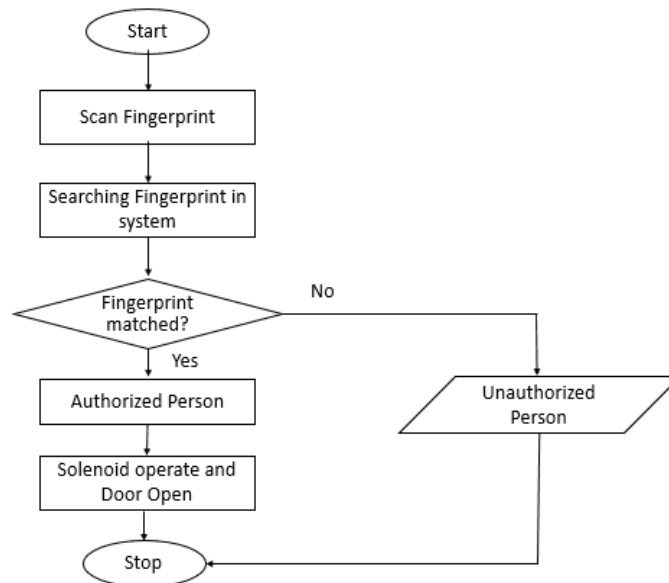
3.2 Flowchart

Figure 5: Flowchart of proposed system

The description of above figure 2 flowchart of proposed system is given below:
1. The fingerprint is scanned.
2. The fingerprint is put in a condition where it scans for the match of the fingerprint.
   If match is found, it moves to Next step.
3. The Solenoid Lock is Closed and door will open.
4. The solenoid lock Open for 5 sec.
5. A welcome message is displayed.
6. If fingerprint is not matched, then message will be displayed as "Unauthorized Person".

IV. RESULTS AND DISCUSSION

Figure 3 shows the prototype of proposed system. The test is carried out to determine the tool's reliability designed both from the software or hardware side. This system is based for improving the security which will register the owner's fingerprint into the Arduino using the fingerprint sensor. The power supply is connected to Arduino through the code uploading wire. The 5V supply is given to the designed system. When thumb is pressed on fingerprint sensor after registration, the lock will be unlocked

and person can repeat this process again then the solenoid lock will be got locked. The process of locking and unlocking requires less than 1 second so this is why the Solenoid lock is used inside this project.
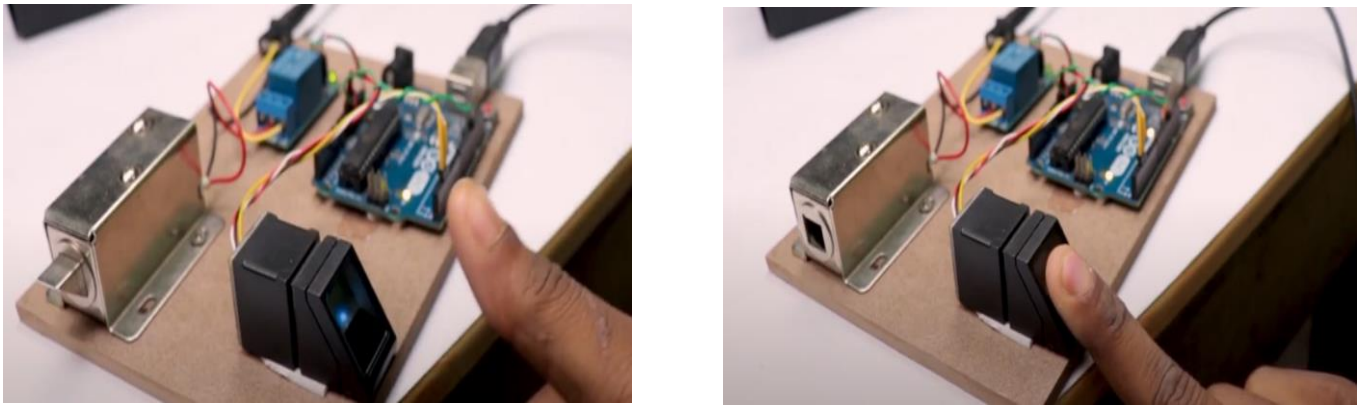

Figure 6: Prototype of proposed system

V. CONCLUSION

Based on the discussion regarding the design of the Smart door lock prototype using the Aurdino application, several conclusions can be obtained as follows; The fingerprint sensor used can identify fingerprints with different positions and can read fingerprints when they are dirty. This Smart door lock prototype can make it easier for users to control the room to minimize thefts. The Arduino UNO microcontroller can communicate and control the tool to run according to the program algorithm. The work system of the Relay flows electric current to the solenoid door lock to work by programming instructions. Suggestions for future research: The system can be modified to better it by adding a buzzer sensor. Using a buzzer is expected if a stranger enters the room. It will make a sound so that people around know if the room is being entered by force.

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