

# FINGERPRINT AND OTP BASED MULTI-DOOR LOCK SECURITY SYSTEM

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## Abstract:

In today's modern world, providing security to our confidential belongings has become a major issue. To overcome this issue, an advanced security system has proposed for those who need to have control of unauthorized user access. In this model, we design and execute multiple entryway locker high-security framework based on unique fingerprint, OTP and GSM innovation which can be implemented in ensured offices, banks, and homes. In this, the system gathers the biometric information and mobile number of each person for allocating the lockers only to authentic persons. This single system can access control to multiple doors.

**Index Terms:** Fingerprint sensor, GSM, OTP, Security System

## INTRODUCTION:

Security is the primary concern in this modern competitive world. Humans find various ways to give security but as technology is emerging on day to day basis chances of stealing others personal information has also increased. In view of this hazard, personal identification techniques which can recognize authorized and unauthorized user is now generating interest. In present days there are various personal identification techniques that we mostly see like password authentication, RFID authentication system. But those techniques are unreliable because the password hacking can be made easily and ID cards may get lost. Hence it is important to develop reliable, security and safety system.

The proposed system will be developed using fingerprint, OTP, and GSM. Biometric considers the automatic method of distinguishing a person or validating the identification of a person based on the behavioral or psychological characteristic. So now biometrics is used as authentication in various places [2]. The biometric that has been preferred for implementation of our paper is the fingerprint biometric because fingerprint biometric is effectively accessible and highly reliable

when related to other biometrics. The fingerprint of all the users are saved first and verified during door access. If the fingerprint is similar to the enrolled fingerprint then access accepted, generates OTP and through GSM sends the random OTP to the user mobile number. By using this model, users no need to remind passwords or don't need any kind of ID cards that may also get lost. As technology is emerging nowadays sometimes duplication of fingerprints is also possible. So to overcome this issue in our system we also use GSM to generate a random number and send to the registered user mobile number as a secondary level of security purpose. We can also add a various number of locks to our system instead of having separate door locks.

The remaining of the paper is discussed as mentioned below: Section II addresses about the related work, Section III addresses about the proposed system and block diagram, Section IV addresses about the system structure, Section V addresses about the system hardware, Section VI addresses about the implementation and results whereas Section VII addresses about the conclusion.

## 2. RELATED WORK:

Various methods like password authentication, voice recognition, RFID reader authentication, face recognition etc., have been used for the door lock. Some of those methods have discussed below:

### 1. Password authentication system

In this, the system stores the password and only authorized users know the password. But even unauthorized users can also access by hacking the password. And even it is difficult for all the authorized users to remind the password for a long time.

### 2. Voice Recognition

This method uses sound features of speech as it varies between individuals. As the speech features are sensitive to various factors like background noise, it is not reliable. There is a problem of identifying the user from a poor utterance [3].

### 3. RFID reader authentication:

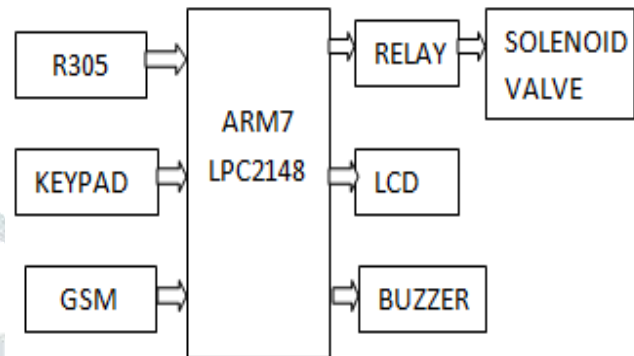
In this method, the individual user has a specific code that contains an RFID tag. The advantage of this system is the data on the chip is very secure as data on RFID card can be read only through specific equipment. But the disadvantages of this system are cards that are even unique can be duplicated or stolen easily.

## 3. PROPOSED SYSTEM

The Fingerprint or Password alone based methods have some cons now a day. To overcome this in our present proposed model we use both the fingerprint and OTP to provide more security. Initially, the authorized user's fingerprints are enrolled and stored in the fingerprint sensor memory. If the fingerprint of the user got matched then the user will get the random number as an OTP to his mobile from SIM in the GSM. In our proposed model, more locks are added to a single system and each lock is unlocked with specific address IDs. So by this instead of implementing separate door locks for every individual door, we can use only single lock system

for multiple doors. If an unauthorized user tries to access it then automatically the buzzer will alarm and the LCD displays saying unauthorized user access.

The block diagram representation for our proposed system is as below:



## 4. SYSTEM STRUCTURE:



## 5. SYSTEM HARDWARE:

Hardware components include ARM7 LPC2148, R305 Fingerprint Sensor, LCD, M95 GSM modem, Keypad, Relays, Solenoid valve.

### ARM7LPC2148

ARM is computer processor based RISC architecture. A RISC-based method implies that in the design ARM processors need few transistors than normal processors in ordinary computers. This approach reduces heat, costs and power utilization. The power utilization of arm is low which made them extremely famous. The ARM architecture (32-bit) is the most broadly used design in mobile

phones, and most 32-bit one in embedded frameworks.

The LPC2148 microcontroller has ARMv4T architecture and ARM7TDMI-S CPU. 512KB of the flash program and 32KB of static RAM are available. Due to their low power utilization and little size, LPC2148 is used in many embedded applications.

### **FINGERPRINT SENSOR R305:**

Fingerprint sensor R305 is used for identification of users by their fingerprints. The information from the fingerprint is used as the benchmark of Identification. Fingerprint processing has two steps: enrollment of fingerprint and matching of the fingerprint (the matching of fingerprints can be either 1:1 or 1: N). In 1:1, compare the fingerprint with particular template assigned in the fingerprint module memory and in 1: N, look through the entire fingerprint module library for the matching finger [5].

### **GSM:**

GSM is a worldwide device for cellular transmission which is a digital cellular network for broadcasting mobile data and voice services. GSM allows voice calls, transmission of SMS (quick Message company organization agency) and data transfer speeds of as an outstanding deal as 9.6 Kbit/s. M95 is the GSM module used in our system. The GSM module needs a SIM card to operate that functions over a range of network allowed by the network operator. GSM is used to send OTP as SMS to the user mobile.

### **LCD:**

It is made of a grid of pixels. 128X64 is the common resolution. It is used to display data received from ARM7. A 16x2 display LCD is a fundamental part and is mostly used in many gadgets. An LCD of 16x2 can display 2 lines with 16 characters on each line.

### **KEYPAD:**

A keypad consists of a buttons set which are organized in either a block manner or "pad" manner. The buttons usually contain symbols, digits and a total set of alphabetic. If the keypad contains mostly numbers, it is also called the numeric keypad. Keypads are used in numerous gadgets such as combination locks, calculators and digital door lock systems, which mainly require numeric input. The 4\*4 matrix keypad can be interfaced to any microcontroller easily. The 4\*4 matrix keypad is present in our paper to enter the OTP.

### **RELAYS:**

A relay is an electromagnetic device that acts as a switch. It is used to drive the load (solenoid valve) connected to the output of relay.

### **BUZZER:**

A beeper or buzzer is an audio signaling device. It may be piezoelectric, mechanical or electromechanical. Typical uses of beepers and buzzers include timers, alarm devices and user input confirmation such as a keystroke or mouse click.

## **6. IMPLEMENTATION AND RESULTS:**

All the authorized user's fingerprints are first enrolled using fingerprint enrollment software. Once if we give the fingerprint then it is stored with an address ID in the fingerprint sensor built-in memory. During fingerprint matching, the user fingerprint is compared with all the address IDs. By this, we can store numerous fingerprints in different address IDs.

This developed program is successfully burnt into the arm7 board using USB programmer.

**Step1:** After providing the power supply the GSM initialization happens and then it displays as place the finger on the scanner.





Person place the finger

**Step2:** Read the Fingerprint and compare with the address IDs stored in the inbuilt fingerprint memory. For every individual user id, their corresponding mobile no and their door no have assigned in the program.

**Step3:** If the fingerprint match found send OTP as an SMS to the matched user mobile.

**Step4:** After the user received the OTP, the user enters the OTP through Keypad



**Step5:** If match found opens the corresponding solenoid valve to unlock the matched door for some time duration and after that, it automatically locks the door.



**Step6:** If match not found alarm the buzzer and do not unlock the door.

## 7. CONCLUSION:

Our "Fingerprint and OTP based multi-door lock security system" is very secure and flexible. As through OTP, we have given additional security to the system, so there is no chance of accessing unauthorized user. In our design, as we have executed by assigning more locks to a single system, we can control access to several doorways. Hence no need to spend so much on individual doorways. This system provides more control over access to the restricted places.

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