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Three Layered Bank Locker Security System

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Abstract: The three layered bank locker security system consists of iris scanning, fingerprint scanning and one time password (OTP) generation. The iris and fingerprint for every person is unique.No two persons in this world have identical iris or fingerprint. There is need of proper authentication to access crucial data in some cases. With the help of this system, unauthorized entry of a person can be stopped. By using this process we can avoid unauthorized entry in authorized areas like bank locker, in military base stations security, criminal identification, security system in R&D labs etc. The process of checking each & every persons ID manually by security guard is very difficult and also a time consuming process so, to solve all these problems we use smart locker system. The three layered bank locker security system is user friendly system. With the help of this security system we can make bank lockers more secure.

Keywords: Iris recognition and detection, Fingerprint recognition and scanning and OTP support

I. INTRODUCTION

The three layered bank locker security system is mainly used to provide a high level security for many areas. We can see in today's world everyone is concerned about the safety of their own houses, colleges, banks, industries etc. and also concerned about the safety of their valuables like important documents, jewelry, money etc.

For the safety of these valuables mostly people choose an option which is bank lockers. But, due to increasing rate of crime it is difficult to make secure our valuables. The widely used target for the criminals is bank because it has storage of large amount of money & jewelry. That's why we hereby propose a smart bank locker security system which helps users to make secure their valuables in banks. This system is used to avoid intrusion in authorized areas. In this system we use three levels of security. These are iris scanning, fingerprint scanning and one time password (OTP) generation.

The first level is iris scanning: By using iris scanning we can scan the eye of the user. Iris scanning gives us a better result. When we use iris scanner then users have to register the image of their eye in that system. When another person has to use this system then he/she will go through the registration process repeatedly.

The second level is fingerprint scanning. The iris & fingerprint are most important in order to have high level security as the iris and fingerprint of everyone is unique. The work of fingerprint scanner in this system is to scan the finger of registered person who will use the bank locker.

The third level of security is one time password (OTP) generation. OTP is the additional level of security which makes system more secure. The one time password is sent by the GSM module to the user's registered mobile number. The generated OTP is in 5 to 6 digits.

II. OBJECTIVE

The primary objective of a three layered banklocker security system is to provide protection for sensitive assets, ensuring the confidentiality, integrity and availability of valuable items. Physical, biometric and digital barriers are used in the form of iris scan, fingerprint scan and OTP together which will increase the overall security of this system. It will prevent intruder and only authorized person will be able to access the bank lockers. The system enables continuous surveillance and alerts for suspicious activity which is real-time monitoring.

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III. METHODOLOGY

The research is mainly based on Arduino.Many researchers have implemented different systems to ensure the security of bank lockers. As the security of bank lockers becomes very important need, it motivated us to develop such system, so in order to ensure security of bank lockers we can use three layered bank locker security system. The whole system is designed to provide high level of security to user. This system is user friendly. In this security system we useiris recognition, fingerprint scanning and OTP generation. By using these three layers the security of bank lockers will be increased.



IV. BLOCK DIAGRAM

System working:

The working of this security system is divided into three layers. Out of these first is iris scanning, second is fingerprint scanning and third is one time password(OTP) generation. The iris and fingerprint scanning is the most important security level used in this system. The text messages about alert message or instructions are displayed on the LCD display. The GSM module is used to send the OTP to user's registered mobile number. The buzzer is used for alerting or access granted message. The purpose of using relay is to open and close the locker, if access is granted. In this system first we register the mobile number, iris image and fingerprint image of authenticated person.

Layer 1: Iris scanning

After turning 'ON' the system a message is displayed on LCD display saying, "Place user's eyes in front of the iris scanner". Then the user will place his/her eyes in front of the iris scanner which will capture the iris image of user and this captured iris image is compared with stored image. If image is matched 'Access granted' message is displayed & usergoes to second layer. If iris is not matched then buzzer will turn ON, error message will be displayed and process returns to start.

Layer 2: Fingerprint scanning

At first a message is displayed on LCD display "Place finger on fingerprint scanner". The fingerprint scanner captures fingerprint image & compares with stored image. If the image is matched then the 'Access granted' message is displayed and user goes to third layer. If fingerprint is not matched then the buzzer will turn **CN**, display error message and process returns to start.

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Layer 3: OTP generation

This is the additional security level used in this system for high level security of bank lockers. The one time password (OTP) is generated by the system or token will send to the user's registered mobile number which is in the form of text message. Then this OTP is entered by the user in the system through keypad. The entered OTP is compared with generated OTP. If the OTP is matched then 'Access granted' message is displayed and locker will open through servo motor otherwise the buzzer will turn ON, error message will be displayed and process returns to start.

Hardware components: Arduino UNO



Fig (b). Arduino UNO

The Arduino UNO is a type of processor or microcontroller which works in this project as a controller. The Arduino UNO is widely used for prototyping projects. By using Arduino UNO the interfacing with electronic component is easy. In this project we use ATmega328p microcontroller. By using this microcontroller we can burn the Program code without using external burner because it has inbuilt burner.

GSM module



Fig (c). GSM module

In this project we use SIM900A GSM GPRS with RS232 interface & SMA antenna. It's a popular choice for Arduino projects due to its ease of use and compatibility. The GPRS supports for data transmission. The main use of the GSM module isto send OTP to the user's registered mobile number.

IRIS scanner



Fig (d). Iris scanner

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The iris scanning is the most important security used in this project. In this system we use Mantra MIS100V2 iris scanner. Iris scanning gives us better performance and accuracy than other image processing system. The iris scanning is used to identify the eye of an individual person who will use the bank locker.

Fingerprint scanner



Fig (e). Fingerprint scanner

The fingerprint scanner is used to capture a user's unique fingerprint and verifies it against stored fingerprints. There are four types of fingerprint scanner. These are Optical scanner, Capacitive scanner, Ultrasonic scanner & Thermal scanner. Out of these four we use optical fingerprint scanner. In this project we use FPM10A optical fingerprint scanner. We use this scanner because of it's reliability. Optical scanners capture detailed image of fingerprints which helps accurate scanning of fingerprint of user.

4*4 Keypad



Fig (f).4*4 Keypad

A 4*4 keypad is a versatile input device commonly used in various projects. The 4*4 Keypad is used for entering the OTP code. The key layout of this keypad is 4 rows and 4 columns (Total 16 keys). It uses a matrix configuration to connect the keys when a key is pressed, it creates a connection between one of the rows & one of the columns, which can be detected by a Arduino. This allows the Arduino to determine which key is pressed.

V. ALGORITHM

- 1. Start
- 2. Initialize the components
- 3. Start system
- 4. IRIS scanning
- 5. Fingerprint scanning
- 6. OTP verification
- 7. If all conditions are satisfied go to next step else go to start.

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- 8. Unlock locker
- 9. Return to start
- 10. Stop

VI. FLOWCHART



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VII. ADVANTAGES & APPLICATIONS

Advantages:

- 1. Usability.
- 2. Provides accurate identification.
- 3. Time saving.
- 4. User convenient.
- 5. Innovation.
- 6. Non-intrusive.
- 7. Use of fingerprint to avoid any malpractice.

Applications:

- 1. Bank lockers security.
- 2. Border crossing control.
- 3. Security system in R&D labs.
- 4. Used in ATM machines.
- 5. Aviation security.
- 6. Criminal Identification.
- 7. Military base station security.

VIII. CONCLUSION

This system is able to implement the three layered bank locker security system. This system is used to provide high level security for users valuables. This system is also used in bank lockers, in military etc. The first level is to scan the iris of the user next we will scan the fingerprint of the user & after that we enter the OTP which is sent y the system through GSM module. During the above process if any of the condition is not satisfied then the buzzer will turn 'ON' and this process will start again from first step.

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