



Finger Print Based Bank Locker Security System

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ABSTRACT — The main aim of this paper is to design and implement a secure locker system that provides reliable and user-friendly access to stored valuables. The locker system is designed to be secure, with multiple layers of authentication to prevent unauthorized access. The system uses a combination of keypad, fingerprint scanner, and mobile phone verification to authenticate the user, with an LCD display and LED indicators providing clear feedback to the user.

To develop the system, we used an Arduino UNO board and a variety of components including a GSM SIM800L module, a solenoid lock, an LCD display, LED indicators, a buzzer, and a keypad. The fingerprint scanner used was the R307 fingerprint scanner. we used the Arduino Integrated Development Environment (IDE) to program the system, with the code written in C.

The system was tested extensively to ensure that it is reliable and secure. we tested the keypad, fingerprint scanner, and mobile phone verification separately to ensure that each component worked as expected. They also tested the system as a whole to ensure that it provided reliable and user-friendly access to the locker.

system is a reliable and user-friendly solution for storing valuables. The system provides multiple layers of authentication to prevent unauthorized access, and the components used are reliable and easy to use. we recommend that the system be further developed to include additional features such The results of the research project show that the secure locker as a camera for added security. Overall, the secure locker system is a great example of how technology can be used to provide secure and to everyday problems.

Keywords—Arduino UNO, GSM SIM800L Module, R307 Finger Print, Scanner

I.INTRODUCTION

In today's world, security is a top concern for individuals and organizations alike. With the increasing use of technology in day-to-day life, there

is a growing need for secure and user-friendly systems to protect valuable items. Bank lockers are a popular way for customers to store their valuable items, but traditional lock and key systems can be inconvenient and prone to security breaches. Biometric technology provides a more secure and user-friendly alternative, and finger print scanning is one of the most widely used biometric technologies

In this research paper, we present a finger print based bank locker security system that uses advanced biometric technology to authenticate the user. The system is designed to provide a secure and convenient way for bank customers to access their lockers. The system uses a combination of finger print scanning and mobile phone verification to authenticate the user, with an LCD display and LED indicators providing clear feedback to the user. The system also uses a solenoid lock to ensure that the locker is secure when locked.

II.LITERATURE SURVEY

These are some of the existing Smart Security designs that have been implemented-

- a) R.Ramani (2012) et al. described a bank locker security system based on RFID and GSM technology which can be organized in bank, secured offices and homes. In this system only authentic person can be recovered money from bank locker. We have implemented a bank locker security system based on RFID and GSM technology containing door locking system using RFID and GSM which can activate, authenticate, and validate the user and unlock the door in real time for bank locker secure access. The main advantage of using passive RFID and GSM is more secure than other systems. This system consists of microcontroller, RFID reader, GSM modem, keyboard, and LCD, in this system The RFID reader reads the id number from passive tag and send to the microcontroller, if the id number is valid then microcontroller send the SMS request to the authenticated person mobile number, for the original password to open the

bank locker, if the person send the password to the microcontroller, which will verify the passwords entered by the key board and received from authenticated mobile phone. if these two passwords are matched the locker will be opened otherwise it will be remain in locked position, This system is more secure than other systems because two passwords required for verification. This system also creates a log containing check-in and check-out of each user along with basic information of user.

- b) Sanal Malhotra (2014) proposed banking locker security system with Odor identification, Security Questions using RFID and GSM technology which can be used in banks, companies and at personal secured places. Only original account holder is able to use his locker. This system uses Odor identification, Security question technique, RFID technology and GSM technology which makes it more secured than any other system. The system is more secured as 4 steps are required for verification. RFID tag is verified using RFID technology, then valid person has to answer the security question using Security question software technique and it should be same as that of stored (initially during account opening), then the valid person gets message in his mobile using GSM technology and has to type password from his mobile and keypad of locker, both passwords should match to open the door of the locker, and then odor identification will be done, the odor pattern should match with the odor pattern stored in the microcontroller.



III. PROBLEM STATEMENT

Traditional bank locker security systems rely on physical keys or combinations, which can be prone to theft, loss, or unauthorized duplication. Hence to enhance the security of bank lockers and provide a more convenient and reliable access control

mechanism, our aim of this paper is to design and implement a fingerprint-based bank locker security system.

IV. PROPOSED METHODOLOGY

[1] System Requirements Analysis:

Identify and analyze the specific requirements of the fingerprint-based bank locker security system, including user authentication, security protocols, database integration, scalability, and user interface. Identify the hardware and software components needed to implement the system.

[2] Database Design and Encryption:

Design a secure and encrypted database to store fingerprint templates and associated user information. Implement strong encryption algorithms to protect the stored data from unauthorized access or tampering.

[3] Fingerprint Recognition Algorithm Development:

Research and select an appropriate fingerprint recognition algorithm, such as minutiae-based matching or pattern matching.

Implement the chosen algorithm to extract and compare fingerprint features for authentication.

[4] Fingerprint Feature Extraction:

Implement the hardware and software components of the system.

Develop a feature extraction module that extract some features which is used in our project that is fingerprint images, such as ridge orientation, ridge frequency, and minutiae points.

[5] Fingerprint Template Generation:

Use the extracted fingerprint features to generate a unique fingerprint template for each user.

Store the generated templates securely in the database.

[6] Fingerprint Matching and Authentication:

Define a matching threshold for determining acceptance or rejection of the fingerprint authentication.

[7] Real-time Authentication and Access Control:

Develop a real-time authentication module that provides instant feedback to users regarding the authentication result.

[8] System Testing and Evaluation:

Conduct rigorous testing of the entire system to ensure its functionality, accuracy, and reliability.

Identify any issues or areas for improvement and make necessary changes.

Evaluate the system's performance metrics, including recognition accuracy, false acceptance rate, response time, and scalability.

[9]User Interface Design:

Design and develop a user-friendly interface for the bank locker security system, ensuring ease of use for both customers and bank staff.

Incorporate clear instructions and feedback messages to guide users through the authentication process.

[10]Continuous Check and Improvement

We regularly check the model using new data to improve the model performance over time.

[11]Implementation:

If the OTP is late or delayed due to some issues like network, we already created secret code to unlock the system.

1]The system aims to enhance the security, convenience, and efficiency of accessing bank lockers using biometric authentication. The proposed system utilizes advanced fingerprint recognition algorithms, secure data management techniques, and user-friendly interfaces to ensure reliable and user-centric operations.

2]Finger Print Module:

1.Finger Print Sensor



Fingerprint module is a such type of sensor in that it captures the image of the finger, and it stores the templates.

2.LCD display 16*2:



This component displays messages to the user, such as a welcome message or instructions on how to use the locker.

3] Power supply 12V-2A:

The AC input i.e. 230V from the main supply. The supply which is transformed to the fed rectifier is 12v.This component provides power to the entire system.

4]Solenoid Lock: This component is used to lock and unlock the locker door

5]Buzzer 5V: This component emits a sound that can be used to alert the user when the locker is locked or unlocked.

6]Keypad 4*3:



This component allows the user to enter PIN code to access the locker. Here we use 4*3 Keypad.

7]Fingerprint scanner R307 Arduino UNO:

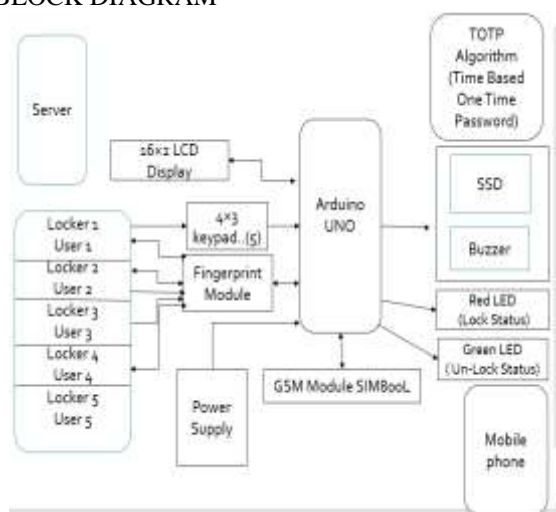


The Arduino Uno R307 acts as the main controller. The system includes a fingerprint scanner, a locking mechanism. The fingerprint scanner reads the user's fingerprint and sends the data to the Arduino Uno. The Arduino compares the fingerprint data with the stored data in the system. If the fingerprint matches, the Arduino sends a signal to the locking mechanism to unlock the bank locker. The Arduino also keeps track of the fingerprints that are stored in the system and can add or remove fingerprints as needed. component allows the user to scan their fingerprint to access the locker.

8]Red LED lock status: This component indicates whether the locker is currently locked or unlocked.

9]Green LED unlock status: This component indicates whether the locker is currently locked or unlocked.

BLOCK DIAGRAM



V. RESULT

The experiment results, system Demonstrate high accuracy in identifying authorized users, low false acceptance and rejection rates, fast response times, and the ability to handle an increasing number of users. The results of the research project show that the secure locker system is a reliable and user-friendly solution for storing valuables. The system provides multiple layers of authentication to prevent unauthorized access, and the components used are reliable and easy to use. we recommend that the system be further developed to include additional features such as a camera for added security. Overall, the secure locker system is a great example of how technology can be used to provide secure and to everyday problems.

VI. CONCLUSION

The finger-print based bank locker security system is a secure and reliable way to protect valuable assets. By using fingerprint recognition technology, our system provides a high level of security for users. The system is based on image processing and pattern recognition algorithms that extract unique features from the fingerprint and compare them with stored features in a database. The system is highly accurate and can detect fraudulent attempts to access the locker. The system can be improved by implementing additional security features, such as encryption of stored data, secure communication protocols, and physical security measures. Overall, this system has the potential to be used in various applications where secure access control is required.

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