

Lockers Security by Using Biometric Based Authentication Method

Madiha Asif^a, Sabahat Safadar^{a,b} ✉

Quaid-e- Azam Allied Public School, Taxila, Pakistan

ABSTRACT

Security is a major issue faced by the people of the world. It is a major concern in all location like banks offices houses educational institute and so on. Everyone wants a secure system for the protection of personal information and valuable things. It can organize in Banks, offices, schools, colleges, universities and industries. In this system, we registered the user by our desktop application store its information in our database. In proposed system locker is assigned to the user on the basis of fingerprints and these fingerprints will be stored in database. When user wants to access the locker, he has to simply place the finger in fingerprint sensor if its fingerprint matches with pre- store fingerprint then the locker will automatically unlock and if no match is found then user will try up to three attempts. After three attempts system sends the alert message to the owner. Our system also maintains user locker access report and stores it in database. Hardware part of system is developed in Arduino Integration Development environment (ide) and our desktop application is developed in visual studio. Main goal of proposed system is to design and implement a secure bank lockers security system based on fingerprint sensor, GSM technology.

Keywords: *Arduino, Fingerprint sensor, Solenoid lock GSM module, Mosfet Driver module, Desktop Application*

© 2020 Published by UWJCS

1. INTRODUCTION

Security is a major issue faced by the people of the world. It is a major concern in all location like banks offices houses educational institute and so on. Peoples are more concern about their security. They are worry about the risk of unauthorized user can easily get access to their personal information and their valuable things. Everyone wants a secure system for the protection of personal information and valuable things. In banks traditional lockers are used which can be opened by inserting key. This system provided not as much security because keys can be lost or stolen.

In [1] Aruna.D. Mane, Sirkazi Mohd Arif proposed Locker security system using RFID and GSM technology. These system provides security to the banks home offices using passive RFID reader and GSM technology and verify the authorized person and open the locker for user. Current system read the RFID tag and validate it and send the message to the user for original password and compare it with the password enter by the user through keypad. In [2] Sheweta.S. Joshi, BinayakEkke, PankajYedurkar, Ajit Lokhande proposed a Locker security system using GSM and Random password. In proposed system authorized user can open the locker by entering random password and directed to the

authorized person mobile through GSM. In [3] Abhilasha A Sayar, Dr. Sunil N Pawar proposed Securing Bank Locker System Using Embedded System this proposed security system is implemented by using RFID and GSM. RFID holds user's information. RFID reader is used which helps user to open his lock automatically. GSM used to send text messages for user validation and in case of invalid RFID tag and key.

Biometric based system is a perfect solution of the security issues faced by the people. In biometrics include face recognition, voice iris, and fingerprints. Among these available biometrics techniques, we used in our system is fingerprint authentication technique because fingerprints have been proven more secure and reliable. Because every person has unique finger prints and it can't be cheated and user do not need to memorize it like passwords or keys. By using of fingerprint system, we are capable to get easily and fast access to our information.

2. RELATED WORK

In [4] P V L N Phani, O Narendra Kumar Reddy, R Manisha Reddy proposed Keypad based bank locker security system using GSM technology. In this era security is major concern of everyone. Traditional key based system is not providing as much security. So to overcome the security issue different techniques are proposed. In this technique Keypad and GSM module are used which ensure that only authorized person can access the lockers.

In [5] Ch.Sumalatha, A.Viyayamasana, K.Ramasujana,I.Meghamala, K.Lakshmi Prasanna, K.HemaRani this proposed Bank Locker Security System Using RFID and GSM Technology. The system first activated then authenticates and verified the authorized user and unlocks the locker. In this system microcontroller, RFID, GSM and LCD are used. RFID reader reads id number from tag and this id number to microcontroller if card is valid then account holder name displayed on LCD by microcontroller and locker will opened. if card is invalid then SMS send that someone enters in your bank locker. In case if unauthorized user try's to break the door of locker then buzzer starts ringing and message send to bank manager.

In [6] Shweta S. Joshi, Binayak Ekke, Pankaj Yedurkar, Ajit Lokhande proposed RFID BASED AUTOMATED BANK LOCKER SYSTEM. In previous bank locker system if user wants to access his locker he waits for banker to become free so he can access to his locker. This results in wastage of time for both. In this proposed system a RFID tags are user for user's identification. Each user has its own RFID card with unique number so user can access his locker without waiting for banker.

In [7] MS.D.Binu, M. ArunAthitayan, G.k.Felins, A. Mohammad Anish, D Satish Kumar proposed a Secure Bank Locker System with Biometrics model. To make peoples things secure at banks there is need of secure and automated locker system. For this there is much option like biometric, iris face recognition system. In this system first fingerprint of user and banker is verified. After that user password is verified if user fingerprint and password is matched then the signal transferred to the sensor and the required lock will be opened. If it is not matched, then the signal will be send to the buzzer and it is ringing for a few minutes to alert the banker that there is a something wrong.

In [8] N. Anusha, A. Darshan Sai and B. Srikar proposed a Locker Security System Using Facial Recognition and One Time Password (OTP) system. In this system face recognition and OTP used. PCA analysis and Eigen face detection method used in this system to

detect the face. When user wants to access her locker he should type Pin which he has set if pin is valid then camera connected to locker capture image of her face and compare it with store image in database and OTP generates and send SMS by GSM to owner of locker. If it's not matched than a complete log detail is send to owner so, he can easily complaint to police about unauthorized access of her locker.

3. OBJECTIVES OF THE STUDY

The objective of our proposed system is

- To extend the level of security.
- To prevent lockers from unauthorized access.
- To provide user more security in cost effective way.

4. PROPOSED SYSTEM

In this Paper we proposed a Biometric based locker system to prevent locker security issues. Lockers Security by using Biometric Based Authentication Method is based on user finger prints. According to this system locker is assigned to the user on the basis of fingerprints and these fingerprints will be stored in database. In search mode when user wants to access the locker, he has to simply place the finger in fingerprint sensor if its fingerprint matches with pre-store fingerprint the locker will automatically unlock and message is sent on user mobile number through GSM module in case of unauthorized access alert message will sent on user's mobile number. Proposed system is also maintaining user locker access report and stores it in database. Proposed system maintains every users log report means which date and time user open the locker and close the locker. All this information stored in the database. Anytime when admin wants to see the log report of users can easily see it.

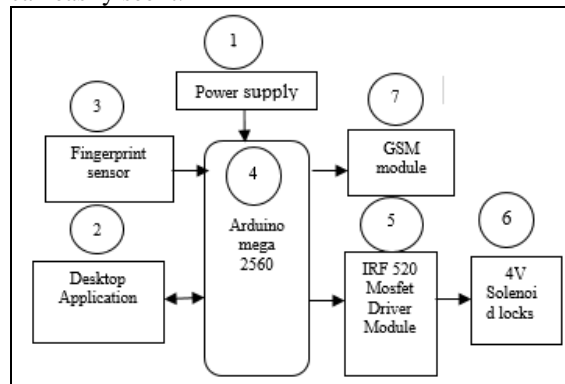


Figure 1 Block Diagram

Figure 1 is block diagram of our project. Lockers Security based on biometric authentication method implementation on Arduino mega 2560 R3 is proposed as shown in figure 1. Arduino will perform action according to Fingerprint scanner R307 input. When fingerprint is verified then Arduino send open signals to solenoid lock to provide access to locker. If fingerprint is invalid, then after third wrong attempt Arduino send SMS details

to GSM module in order to send message to owner of locker that someone is trying to access your locker.

5. SYSTEM DESCRIPTION

A. SYSTEM COMPONENTS

The components of our system are as follows

i. Power Supply

Each project needs a power supply to start its working. Different people use different batteries or some use mobile charges to provide power to their system. But we have used power supply for our system which provide power to Arduino and solenoid lockers.

ii. Desktop Application

Desktop application is used by the admin. In desktop application, firstly login form is appeared from where admin login the application. After login home page of our application appear. At home page, different options are shown from where admin can select one of them according to her desire. In Registration form, admin can register new users by filling user information in the registration form and save this information into database with help of save button. Admin can also update and delete the registered user information.

When user is register in the system, then admin from allotment form assign available locker to the registered user on the basics of fingerprint. Admin can easily remove stored fingerprint from fingerprint sensor and from database of application by using delete option that is also available in allotment form. After allotment button we have next option is report. From report, user can easily get her report about her login and logout with date and time. Our desktop application also maintains user locker access report and stores it in database.

iii. Fingerprint Sensor R305

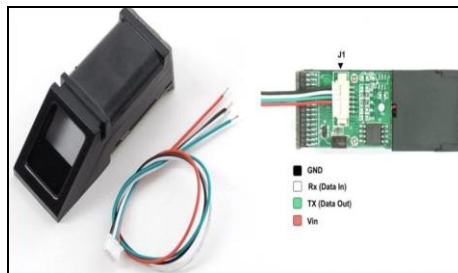


Figure 2 Fingerprint Sensors R305

Figure 2 Fingerprint Sensors R305 is a fingerprint sensor. It is used for detection of fingerprints of human. We are using R305 fingerprint sensor .it is used in biometrics devices

or systems for security purposes. It detects fingerprint and verified it with stored fingerprint which is stored in its memory. Storing fingerprints capability is 277. It has built in memory for storing fingerprints.

iv.Arduino Mega 2560 R3

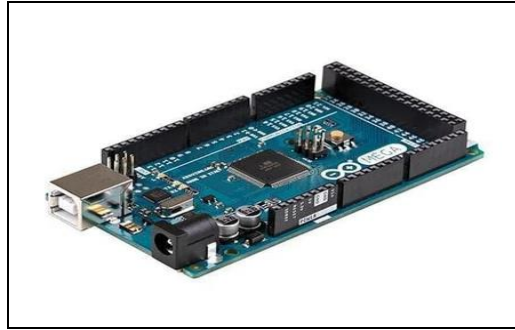


Figure 3 Arduino Mega 2560 R3

Figure 3 is Arduino Mega 2560 R3. Electronic platform based on both hardware and software. Board get input's and produce its output. It is used for many purpose like turn led ON and OFF for performing any functionality we just tell Arduino board what we want to perform by using Arduino programming language (IDE). Arduino can be easily used by beginners'. By using Arduino at low cost we can make different things like robots etc. just by programming. Arduino is brain of multiple projects. Arduino is microcontroller board based on mega2560 we have used in over project. It has 54 I/O pins .16 analog input pins ,4 hardware ports, power jack, USB connector, reset button ICSP header.

v.IRF 520 MOSFET DRIVER MODULE

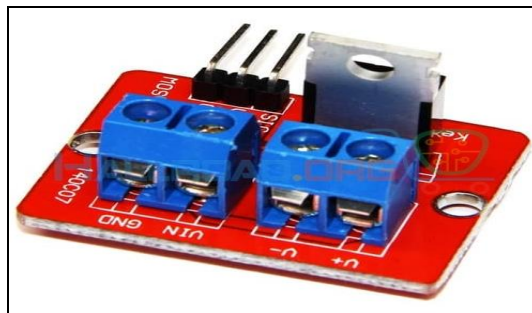


Figure 4 IRF 520 Mosfet Driver Module

Figure 4 is IRF 520 Mosfet Driver Module. It is designed to pass heavy DC from single digital pin of Arduino. It used for providing low cost to drive a DC load for applications. It

can control most heavy current DC. It has a LED indicator for indicating that load is switched.

vi. Solenoid Locks (4V)



Figure 5 Solenoid locks

Solenoid locks as shown in figure 5. These are used for locking purposes. They are used in drawer, lockers, cabinet etc. It is made of coil of copper wire with metal in mid. We have used in our project for locking locker. It is used in many banks locker for electronic access to open and close the door of lockers.

vii. GSM module



Figure 6 GSM module

Figure 6 is GSM module. GSM is mobile communication module. It contains a chip or circuit to build communication between mobile devices. Used for sending and receiving purposes. GSM has sim socket on the back. 2G micro sim worked in it proper. There is LED on top of it which indicates cellular network. Antenna is required in getting connectivity.

6. WORKING OF SYSTEM

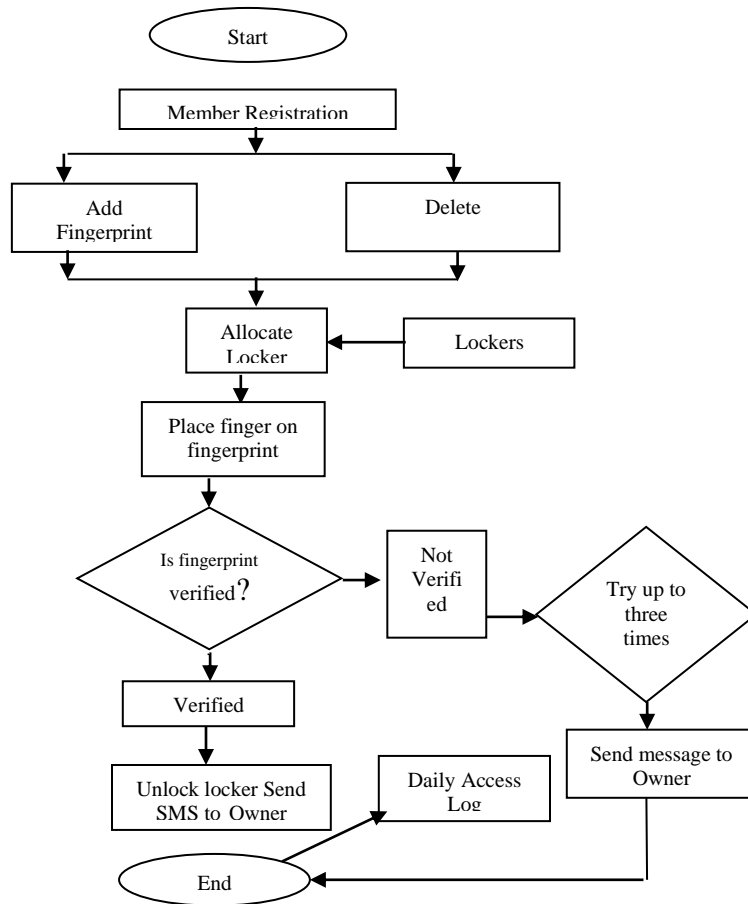


Figure 7 Flowchart of Proposed System

Figure 7 is a Flowchart of proposed system. In propose system firstly we registered the user by our desktop application store, its information in our database. In our system, locker is assigned to the user on the basis of fingerprints and these fingerprints will be stored in database. So firstly we enroll the user finger print and allocate the locker to the

user on the basis of his/her fingerprint authentication. When user wants to access the locker, he has to simply place the finger in fingerprint sensor if its fingerprint matches with pre- store fingerprint then the locker will automatically unlock and if no match is found then user will try up to three attempts. After three attempts system sends the alert message to the owner. Our system also maintains user locker access report and stores it in database.

Proposed system is also maintaining user locker access report and stores it in database. Proposed system maintains every users log report means which date and time user open the locker and close the locker. All this information stored in the database. Anytime when admin wants to see the log report of users can easily see it.

In case of no fingerprint match is found, then users will try up to three attempts. After three attempts system sends the alert message to the owners that someone wants to access the locker. This system makes safe lockers from unauthorized access. Locker will not be opened for the user until user fingerprint matches with the pre-store fingerprints. So, unauthorized user cannot get access to the locker. This proposed system provide highly security to the users and keep peoples things and documents safe from unauthorized access.

System is consisting on different stages which show that how system is works. Basic stages in system are:

- *Data Accession*

In this stage fingerprints of users are taken by using Fingerprint scanner accession is done by Fingerprint Sensor R305. The received image of fingerprint is stored in fingerprint database and desktop application.

- *Feature Extraction*

Features of each fingerprint are stored in database. Captured fingerprint images are serve to feature extraction element and its features are stored in database as template.

- *Fingerprint Verification*

When user wants to access the locker, he has to simply place the finger in fingerprint sensor if its fingerprint matches with pre- store fingerprint then the locker will automatically unlock and if no match is found then user will try up to three attempts. After three attempts system sends the alert message to the owner.

7. CONCLUSION

Security is a major issue that faced by the people all over the world. It is a major concern in all location like banks offices houses educational institute and so on. Peoples are more concern about their security. They are worry about the risk of unauthorized user can easily get access to their personal information and their valuable things. Everyone wants a secure system for the protection of personal information and valuable things. To avoid these security issues, banks developed a traditional key based locker system to keep people,

things safe from unauthorized access. After key based system, password based and RFID based system are designed but these are not providing as much security as needed.

To avoid these types of security issues we proposed a biometric based locker system. Biometric lockers are much secure as compared to the previous system. Because Biometric information of every person is unique so it can't be cheated or stolen. It keeps things safe from unauthorized access because lockers are allotting on the basis of fingerprint so locker is opened only if the fingerprint of the user is matches with the pre-stored fingerprint.

Goal of our project is to provide user a highly secure system in cost effective way. Biometric based authentication system is pure technology based system which increases the level of security in lockers. Biometric based authentication method prevents lockers from unauthorized access and keeps the user documents and valuable things safe

Basically our proposed system based on two parts in. In hardware part we used Arduino that will perform action according to Fingerprint scanner input. When fingerprint is verified then Arduino send open signals to solenoid lock to provide access to locker. If fingerprint is invalid, then after third wrong attempt Arduino send SMS details to GSM module in order to send message to owner of locker that someone is trying to access your locker. With the help of Desktop Application, admin can easily register new users and on the basics of their user id's locker were assigned to them.

8. FUTURE WORK

Our proposed system Lockers Security by Using Biometric Based Authentication Method is developed for banks, offices, school colleges and homes to provide highly security and keep people important documents and things save from unauthorized access. In future different methods and change could be implementing on the system. Proposed system will be further extending and updated according to the security requirements. The desktop application of our proposed system should be extended in to mobile application. We have developed the desktop application for the registration of user and enroll user fingerprints. This application can be further converted in to mobile application. This mobile application will be integrated with hardware part of the system and all the action performed through mobile.

REFERENCES

- [1] Aruna.D. Mane, S. M. (2013). LOCKER SECURITY SYSTEM USING RFID AND GSM. *International Journal of Advances in Engineering & Technology*, 8.
- [2] Sheweta.S. Joshi, B. P. (2015). Locker Security System using GSM and Random. *International Journal of Advanced Research in Electronics and Communication*, 3.
- [3] D. S. N. P. Abhilasha A Sayar, "Securing Bank Locker System Using Embedded," *International Journal of Advance Research in Electronics and Communication*, vol. 4, p. 8, August 2014.
- [4] O. N. K. R. R. M. R. P V L N Phani, "Keypad Based Bank Locker Security System Using," *International Journal of Research in Engineering and Science*, vol. 5, p. 6, 2015.

- [5] A. K. P. K. Ch.Sumalatha, "Bank Locker Security System Using RFID and GSM," *International Journal for Research in Applied Science Engineering*, col.6, p.5, 2015\
- [6] B. P. A. Sheweta.S. Joshi, "Locker Security System using GSM and Random," *International Journal of Advanced Research in Electronics and Communication*, p. 3, 2015.
- [7] M. A. G. A. M. A. D. S. K. MS.D.Binu, "A model Secure Bank Locker System with Biometrics," *National Conference on Networks, Intelligence and Computing Systems*, p. 6, 2017.
- [8] A. D. S. a. B. S. N. Anusha, "Locker Security System Using Facial Recognition and One Time Password"Locker Security System Using Facial Recognition and One Time Password," p. 5, 2017
- [9] C. M. B. P. M. B. A. KanigiriAnush, "Biometric based security authentication for bank locker system," *IJIRT*, p. 6, 2019.
- [10] S. S. P. W. K. A. Mr. Lokesh M. Giripunje, "IOT Based Low Cost Smart Locker Security System," *IJARIT*, vol., vol. 3, p. 6, 2017 [11] S. Nema and B. Mishra, "Advance App Design Methods of Leaf Disease Detection using Image Processing Approach--A Review," *Int. J. Innov. Res. Sci. Eng. Technol.*, 2017.
- [12] M. Fuljana, J. Prasetyo, and K. Muludi, "Expert System of Chili Plant Disease Diagnosis using Forward Chaining Method on Android," *Int. J. Adv. Comput. Sci. Appl.*, vol. 8, no. 11, pp. 164–168, 2017.
- [13] B. Mishra, S. Nema, M. Lambert, and S. Nema, "Recent technologies of leaf disease detection using image processing approachA review," in *2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)*, 2017, pp. 1–5.
- [14] E. Kiani and T. Mamedov, "Identification of plant disease infection using soft-computing: Application to modern botany," *Procedia Comput. Sci.*, vol. 120, pp. 893–900, 2017.
- [15] S. Guleria, A. Kaushal, R. Shahi, and M. Sood, "Designing Assembled System for Plantdisease Diagnosis using IoT and Android," 2018.