Smart Bank Locker Using Fingerprint Scanning and Image Processing

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***Abstract*— In the present work, a smart locker has been designed for banking sector. The main feature of this work is it keeps track of time, date and number of access of locker by a user in the bank. The smart lock program will compare your image and fingerprint with the data already stored in the database. After checking the authenticity of the user, the microcontroller (Arduino) will give signal to the lock and it will open. It also gives a message when the number of permissible access turns increases in a given duration.**

Keywords—Face recognition, Fingerprint scanning, Security, Atmega32, Webcam, LCD.

I. INTRODUCTION

In banking sector most, advanced technologies are not being used. Bank safety is an important issue at present. Our money is not safe in bank lockers when people cheat and misuse bank account and take unauthorized access to bank account. For safety purpose locks or alarms are installed in the bank lockers. For the safety of bank lockers latest technologies are used. Designing of our prototype, involves the image comparing technique. Also, manpower used in managing these lockers is vast in banks whereas there are less people to attend to the consumers, banks can deploy more employees instead of wasting manpower in locker management system as our project will automate the locker system in banks.

Automation of locker management system involves from various technologies: Combination of biometric and GSM technology has been used in [1] for the purpose of security in banks. Some bank locker systems use RFID and GSM and password is required for authentication hence is safer [2]. Face recognition technology is used and password is also required for accessing bank locker [3]. Implementation of a locker security system using fingerprint, password and GSM technology has been developed in [4][5]. Fingerprint verification and ATM security has been done in [6][7].

Use of embedded technologies is used in bank locker system [8][9][10]. In present work combination of fingerprint scanning and face recognition technology has been used.

It is very important to get authentication of the user of bank locker done. For avoiding misuse of bank locker, advanced security system has been developed which will give fair access of locker. For this face detection technique and the finger print scanning has been used.

Face detection technique is very effective and in many banking security systems it is used. After entering in the locker section, the person has to capture his image in webcam and then system will compare test image with the data image already present in the software all this is done on MATLAB software. Then the fingerprint module gets activated for the second level of verification.

II. DESCRIPTION OF THE PROJECT

Automation of the banking locker system with enhanced security features has been done. We have incorporated multiple levels of security such as face recognition and fingerprint scanner and password logger together to bolster the security access to the locker.

When a person wants to access his locker, initially at the main door of locker his face will be captured by the camera installed at the main gate. This image will be given to the PC where the Met lab software will compare this image with the

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authentic image stored in the PC. If authentic, then only using the gate control the door will be open otherwise it will remain close & buzz the alarm.

After entering in the locker section, at locker the person has to enter his confidential password provided by the bank as well as has to scan his fingerprint on fingerprint scanner module. This data will be given to the ARM controller which will verify it with the data stored in it, If his fingerprint and password found genuine then only the locker will be open to use otherwise remain closed.

Following components are used in the project:

A. *Microcontroller ATMega32*

It consists of board with microprocessor which has input-output pins for the purpose of communication with other devices and controlling objects connected to it. The board will typically be powered via USB or an external power supply which in turn allows it to power other hardware and sensors.

B. *Fingerprint scanner and module*

This is the secondary security clearance level which deals with the fingerprint scanning. It has benefits such as high identification performance, consumes low power consumption. This is durable and compact device with fingerprint identification module and has NITGEN optics-based fingerprint sensor.

C. *Webcam*

For capturing image of the user, webcam is used in this project. ROBO 351 i-boll is used for this purpose. After capturing image, it is sent to computer via USB data cable. Webcam operates on voltage rating of 5V and current rating of 0.35 A.

D. *LCD Interface*

Display is required for this system. This is done with LCD (Liquid Crystal Display). For embedded systems, LCD is common choice because of low cost and reliability. In this project, 16*2 LCD display is used.

E. *Serial Interface*

For communication purpose, RS232 is used as serial interface.

Flowchart of the process is given below describes flow of process.

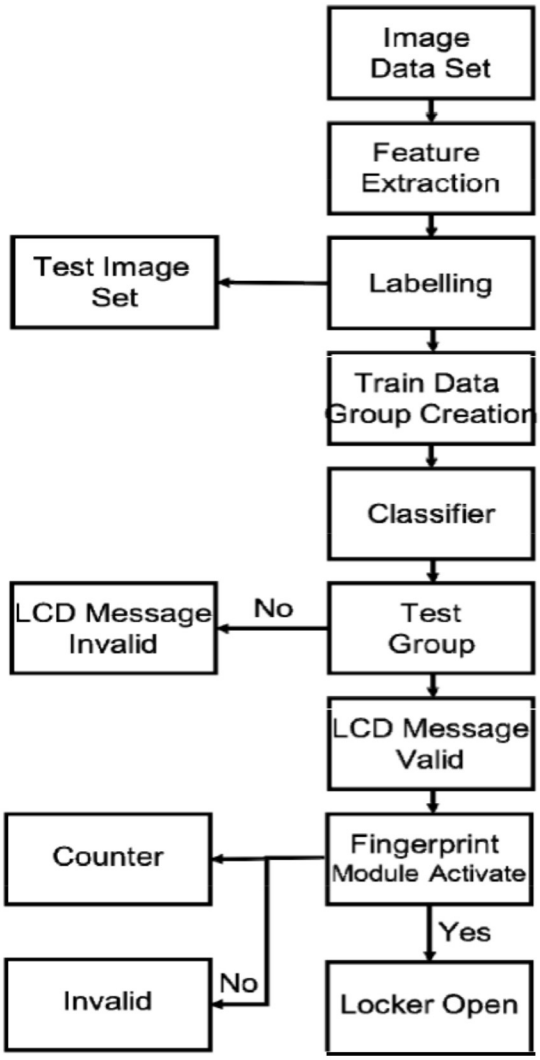

Fig. 1. Flow Chart of the Process

III. TECHNOLOGY USED

A. *Face Recognition Technology*

It is driven by computer application for the purpose of automatic identification and verification of a person from an image or video. This is done when comparison of live image and facial database is done.

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There are number of Face Detection techniques available like:

- Facial Geometry
- Skin Pattern Recognition
- Facial Thermo gram
- Smile Recognition

but we are using the advance, fast and most accurate technique called 'histogram of oriented gradients'.

B. *Fingerprint Scanner*

Fingerprint identification device, FIM30N has been used in this project which is low price and has many excellent features. It has benefits such as high identification performance, consumes low power consumption. This is durable and compact device with fingerprint identification module and has NITGEN optics-based fingerprint sensor.

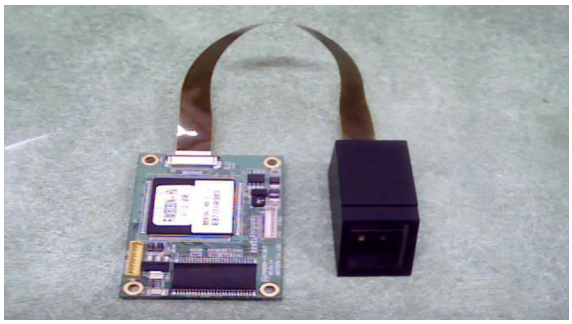

Fig. 2. Fingerprint Scanner

IV. Result And Discussion

Fig. 3. Valid User Image

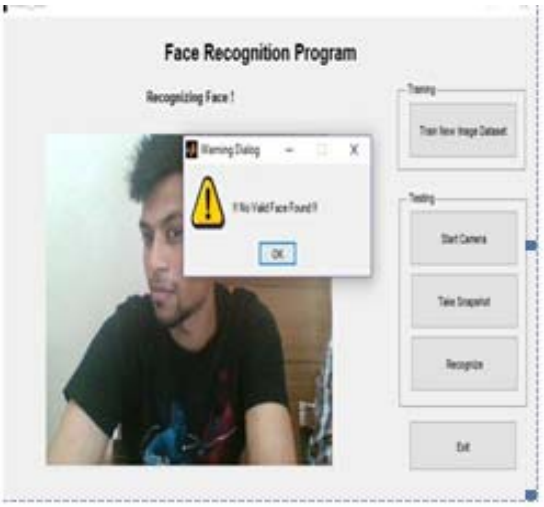

Fig. 4. Invalid User Image

In Fig. 3 we can see when the test image is authentic then message displays valid user name and move forward to fingerprint verification after which locker will open. Whereas in Fig.4, when the test image is not valid then dialog box shows not valid user. And in one active session user can access his locker up to 3 times only.

V. Conclusion

In this project, we have managed to improve the locker management system in banking sector. With the help of image processing technique, we are able to compare features of the test image with the data image. We were able to note the log of the customers accessing the locker with date and time and were also able to restrict the customers, once the maximum number of access granted are crossed.

All this will help banks to utilize enormous manpower wasted for maintaining locker system in banking sector. For making this system more safer as it is related to banking sector we added fingerprint authentication hardware setup which work in sink with image processing program. Hence this will help banks to automate their locker system

References

[1] Sagar S. Palsodkar*, Prof S.B. Patil , "Review: Biometric and GSM Security for Lockers" Int. Journal of Engineering Research and Applications , Vol. 4, Issue 12(Part 6), December 2014.

Authorized licensed use limited to: M S RAMAIAH INSTITUTE OF TECHNOLOGY. Downloaded on September 07,2023 at 05:15:19 UTC from IEEE Xplore. Restrictions apply.

[2] R.Ramani , S. Selvaraju , S.Valarmathy, P.Niranjan , "Bank Locker Security System based on RFID and GSM Technology '', International Journal of Computer Applications (0975 – 8887) Volume 57– No.18, November 2012

[3] P. Sugapriya#1, K. Amsavalli#2, "Smart Banking Security System Using PatternAnalyzer",International Journal of Innovative Research in Computer and Communication Engineering ,Vol.3, Special Issue 8, October 2015

[4] M.Gayathri, P.Selvakumari, R.Brindha "Fingerprint and GSM based Security System" International Journal of Engineering Sciences & Research Technology, ISSN: 2277-9655, Gayathri et al.3(4): April, 2014

[5] Mary Lourde R and DushyantKhosla "Fingerprint Identification in Biometric Security Systems" International Journal of Computer and ElectricalEngineering, Vol. 2, No. 5, October, 2010

[6] Pramila D Kamble and Dr. Bharti W. Gawali "Fingerprint Verification of ATM Security System by Using Biometric and Hybridization" International Journal of Scientific and Research Publications, Volume 2, Issue 11, November 2012

[7] Ashish M. Jaiswal andMahipBartere "Enhancing ATM Security Using Fingerprint And GSM Technology", International Journal of Computing Science and Mobile Computing Vol. 3, Issue. 4, April 2014

[8] Abhilasha A Sayar1 , Dr. Sunil N Pawar2 , "Review of Bank Locker System Using Embedded System" , International Journal of Advanced Research in Computer and Communication Engineering .,Vol. 5, Issue 2, February 2016

[9] SanalMalhotra, "Banking Locker System With Odor Identification & Security Question Using RFID GSM Technology". International Journal of Advances in Electronics Engineering – IJAEE Volume 4 : Issue 3

[10] Vaijanath R. Shintre, Mukesh D. Patil, "Banking Security System Using PSoC". International Journal of Advanced Research in Computer and Communication EngineeringVol. 4, Issue 7, July 2015.

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