BIOMETRIC BASED LOCKER USING FINGERPRINT

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ABSTRACT

In this paper various papers are explained, which used biometrics technique for locking system. Our main aim to design a locker with no security flaws so we introduced BIOMETRIC based locker which is used fingerprint as a verification system. Nowadays competition is increasing day by day so it's our responsibility to provide security to our belongings like gold, important documents, rupees, etc. In our project we use two different microcontrollers i.e. ATmega16 and PIC16F877A which are interfaced with different peripheral devices respectively.

KEYWORDS: *Fingerprint Module, Microcontroller, DC Motor, Computer System, etc*

I.   INTRODUCTION

Theft is one of the major problem in today's world, places like schools, colleges, offices, etc should be secure. To reduce these incidents, different techniques to secure belongings and documents were done. Most peoples use lockers for securing important documents, files and other personal belongings for privacy and security purpose. Some lockers are used simple padlocks which have multiple keys and can be used by number of users. These types of padlocks do not guarantee full security and safety to the personal belongings and documents as they can be break by applying come force.

So the BIOMETRICS came as the most effective method for protection of the personal belongings and documents. It is considered as most effective method when we talk about security. BIOMETRIC is a technique in which we recognise some human attributes like eyes, face, hand geometry, etc but in our project we are using fingerprint for the verification. As fingerprint recognition is simple and easy to use and the duplication of fingerprint is like impossible. BIOMETRIC data are varies from person to person so there is no worry of same patterns. The organization of the paper is as follows first of all it come literature review, in which we discussed about some published paper. After this we discussed about the problems identification, in this we discussed about the problems related to various locking systems. Then we come at design and implementation of the project, after this result is discussed then conclusion and in the last we discussed about future scope.

II.   LITERATURE REVIEW

Pavithra.B.C *etal* focused on the implementation of finger print based locker using microcontroller and MAX232. Power is available in the form of AC 230V, 50Hz but microcontroller operates at 5V so, 7805 constant 5V, 1A positive voltage regulator which provides output of 5V is used. Crystal is connected to 18th and 19th pins of microcontroller. The microcontroller 10th and 11th pins are connected to 11th and 12th pins of MAX232 to initialize fingerprint module and to enable serial communication. The fingerprint module's pins 2 and 3 are connected to DB9 connector which is in turn connected to 13th and 14th pins of MAX232 through the pins 2 and 3. LCD module consists of 8 data lines D0 – D7, out of which four pins are connected to port1 (P1).Additionally this module is having 3 control lines namely RS, R/W and EN, where RS and EN are connected to P1.0 and P1.1

respectively and R/W is grounded. Keypad connections are given to Port0 entirely because it is a 4x4 matrix keypad. DC motor is connected to microcontroller's P2.0 and P2.1 through ULN2003 driver circuit.

A step by step approach in designing the microcontroller based system for securing the transactions of the user and providing the security for the locker system and even more for the PASSPORT verification using a finger print scanner has been followed. The result obtained in providing the security is quite reliable in all the three modes. The system has successfully overcome some of the aspects existing with the present technologies, by the use of finger print Biometric as the authentication Technology.

Subhash H. Jadhav *etal* focussed on the design and implement a highly secured and reliable smart bank locker security system based on RFID, Biometric fingerprint, password and GSM technology. This can be organized in bank, offices, schools and homes. In this system only the authentic person can open the lock and collect the important documents, jewellery or money from the lockers. In this security system RFID, biometric fingerprint, password and GSM technology systems are used. In our proposed system first the user will enroll his user name, password and his mobile number, then the person will put finger on finger print module and finger print will be scanned and stored with fingerprint id. In this way user enrolment process will be completed. Then user will perform login operation. During login operation user first swipe RFID tag on the RFID reader if it is ok then finger print of authentic person will be scanned. If the finger is correct of that particular person then it will allow and display finger is matched and if the finger is not matched of that particular person then it will gives the signal to the siren and will play some time and then message goes to the user that the unauthorized entry is there please check. And if the finger print is matched then it will gives the signal to do next step to enter the Password, then the authorized person will enter the password. If the password is incorrect then it will play siren and the system will send the message to the user i.e. the unauthorized person is trying to open the lock so please check it and so on, if all the conditions are matched then the microcontroller processes the data and correspondingly drives the motor to operate the load i.e. lock will be opened. The main advantages of using RFID, biometric fingerprint, password and GSM technology is highly secure and reliable locker system than any other locker systems. This system can also create a log containing check in and check out of each user along with basic information.

Atar Nasrin *etal* focused on the design and implement a locker high security system based on fingerprint, password and GSM technology which can be organized in banks, protected offices and homes. In this system bank will collect the biometric data of each person for assigning the lockers only authentic person can be recovered money, documents from the locker. We have implemented a locker security system based on fingerprint, secret word and GSM technology containing door locking system which can activate, authorize, and validate the user and unlock the door in real time for locker secure access. Fingerprints are one of many forms of biometrics, used to identify persons and verify their identity. The technology can be used to identify, track, sort or detect a wide variety of objects. They use only one Fingerprint module scan for number of only authorized persons to open the separate bank locker with GSM technology. The more peoples stored the data in the RAM of LPC2148. The scanner is interfaced to LPC2148 ARM microcontroller; this controller will be controlling the scanning procedure. After the scanning has been completed, user has to enter the secret code to open his locker with the help of a keypad. Instantly the locker will be opened. After the work has been completed if key is press again with help of keypad the locker door will be closed again. If an illegal person tries to scan his fingerprint image then an signal will be given by a buzzer which is interfaced to the controller and also if incorrect code word is entered by the user again indication will be given by the buzzer. The current user instead of him/her can make a new person as the user of the similar locker by new registration procedure and the old user's fingerprint image will be deleted. Option for changing the secret code is also available.

Jordi Sapes *etal* This project consists of the development of a low-cost and competitive security environment of fingerprint recognition based on a GT (511C1R) device, and embedded into a Raspberry Pi B+ (from now on, it is denoted as Raspberry) with Raspbian Linux. This work presents a preliminary study about the viability of integrating a fingerprint device and a Raspberry with Linux into the same framework and, at the same time, providing a user interface by means of a web server.

This first prototype, called Finger Scanner, is a security system that provides the users a means to be validated by using a fingerprint scanner. Finger Scanner can then be used to build much more complicated systems on top of it. However, we are interested in focusing our attention on designing an efficient prototype with a competitive performance. This manuscript can be the basis for other possible projects that encourage Raspberry and similar boards developers to create interesting projects about accessibility, security, etc, combined with low-cost fingerprint scanners. A sample project could be a safe deposit box with a Finger Scanner. Nowadays some enterprises in the sector of cash handling that use finger-print sensors complain about the fingerprint tools (to develop an application) and sensor cost. So, our project can become the basis of the low-cost systems based on fingerprint sensors.

Omidiora E. O. *etal* refused the traditional methods of locking system for the bikes, they introduced finger print based locker which is the robust security mechanism in various security domain. In their prototype software module is used for the database storage of valid users and hardware is provided for the interfacing. Programming was done with the help of Visual Basics, Visual C and Visual C++. The programming of this prototype was done in Visual Basic 6.0 Enterprise Edition. The prototype was tested with 20 test images stored in the database. The implementation was successful and the microcontroller was clearly differentiated between authorized and unauthorized users. Logic 1 transferred for authorized user and logic 0 for unauthorized user.

Crystalynne D.Cortez *etal* focused on the development of microcontroller-based biometric locker system with short message service. A 9-12Vdc was used to supply power to the system. The microcontroller ATMEGA 644 housed in Arduino board was utilized to interface the input and output hardware devices. Input devices include the fingerprint sensor for biometric recognition, keypad was for the encoding of passcode and real time clock for display of current date and time. The microcontroller is programmed with the help of Arduino Integrated Development Environment. ATmega644 housed in Arduino board, was the microcontroller unit used in the system. It controlled the functions of the biometric locker system. The ATmega644 is a 40 pins, low-power complementary metal oxide semiconductor (CMOS), 8-bit microcontroller based on the AVR enhanced reduced instruction set computer (RISC) architecture. ATmega644 can achieve throughputs approaching 1 million instructions per second per MHz through the execution of powerful instructions in a single clock cycle. This allowed the optimization of power consumption versus processing speed in system designs. It can store up to 64 kbytes of program instructions. The Arduino board of the ATmega644 was compatible to other input and output hardware devices used in the biometric Locker system.

Sagar S. Palsodkar *etal* proposed project was for Bank lockers security system using biometric and GSM. In our proposed system first the user will enrol his user name password and his mobile number .then the camera of pc will automatically on and capture the face store with face id then the person will put finger on finger print module finger print will be scan and store with finger id . In this way user will enrolment process will be completed.

Then user will perform login operation during login operation user face of person will detect and finger print will be scan. if the id get matches LCD will show mobile number of the user which entered during enrolment .then code will send to person mobile through GSM. And user will punch the code through keypad if the code get match then led will be blink or lockers will be open. And LCD will show message access granted.

In our project we are using R305 finger print module. This module take finer of person and store the it as finger print ID .It is having FAR value is <0.001% .and FRR value is<0.1%. This sensor is having Good image processing capabilities, can successfully capture image up to resolution 500 dpi. ARM is a 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64package. It has 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip. It offers high performance small size low power. It is having two UART pin UART0 AND UART1 from UART0 interface through pc using serial cable.

III.   PROBLEM IDENTIFICATION

There are many systems introduced for providing complete security for all domiciles. But there is no complete security discovered up to date.

Lock and Key System: First step towards security was Lock and Key System. In the beginning this system was proved best but later on this system was failed as multiple keys can be made easily for a

single lock. Thief can also make duplicate keys for the same lock. Hence this system failed for providing complete security.

Password Authentication: Password as an authentication system is the next level of security system. The password is pre-stored in the database. This password authentication system provides respectable security to the users. This system also have the limitation that password is easily guessed.

Authentication by RFID card: Third level of security was authentication by RFID card. This system was decorated with levels of security. Access is granted only for the user whose RFID card matches with the database. But the duplication of RFID cards is possible so this system was failed later on.

IV.   DESIGN IMPLEMENTATION OF PROPOSED MODEL

This project consists of two microcontrollers Atmega16 and PIC16F877A. Both microcontrollers are interfaced with each other through different ports. Atmega16 is connected to various peripheral devices like LCD, Keypad, and Fingerprint Module. PIC16F877A is connected to Buzzer, DC Motor and Computer System. Here we use two microcontrollers to reduce the price of the locker because these microcontrollers are very commercial so that anybody can afford the locker.

The port A of Atmega16 is connected to the port B of PIC16F877A. The fingerprint module is connected to the port B of Atmega16 at pin 14 and pin 15. Buzzer and DC Motor are connected at port A and computer system is connected at port C of PIC16F877A.

We used the MATLAB software for the programming of the project. The main part of this project is the fingerprint module without which user cannot open his/her locker. The fingerprint we used is a optical scanner, the heart of this scanner is a charged coupled device(CCD). The CCD has an array of light sensitive diodes, known as photosites. These photosites generate an electrical in response of light signals. These signals are stored in the form of dark and lights pixels for ridges and valleys respectively in the fingerprint module, these dark and light pixels are used to differentiate between different fingerprints. These scanned pixels collectively forms and image which is inverted. An analog-to-digital converter is present in the scanner which converts the analog electrical signals to the digital form(in the form of 0 and 1 which is a binary representation). Before comparing the scanned image of fingerprint to the prestored image, the scanner checks average darkness level of the pixels, it rejects if the scanned image is too dark or too light.
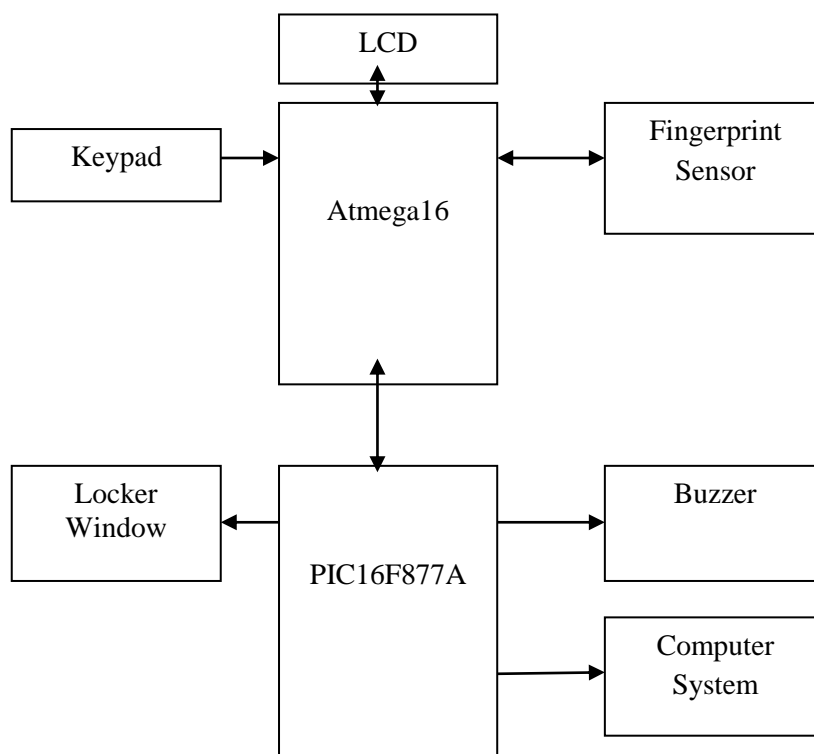
Figure 1: Block Diagram of Advance Locker with High Security System

Our project is a two-step verification system, which includes password and fingerprint authentication system. It also includes the image capture of the unauthorized user. Stepwise working of this project is given below:

Step 1: Enter your password with the keypad.

Step 2: Now, scan your fingerprint on the fingerprint scanner. If your fingerprint is not matched then image capture by the Camera module and store in the computer system.

Step 3: If the password and fingerprint are of authorized person then the door attached to the dc motor will open.

Step 4: Now, you can access to your locker.
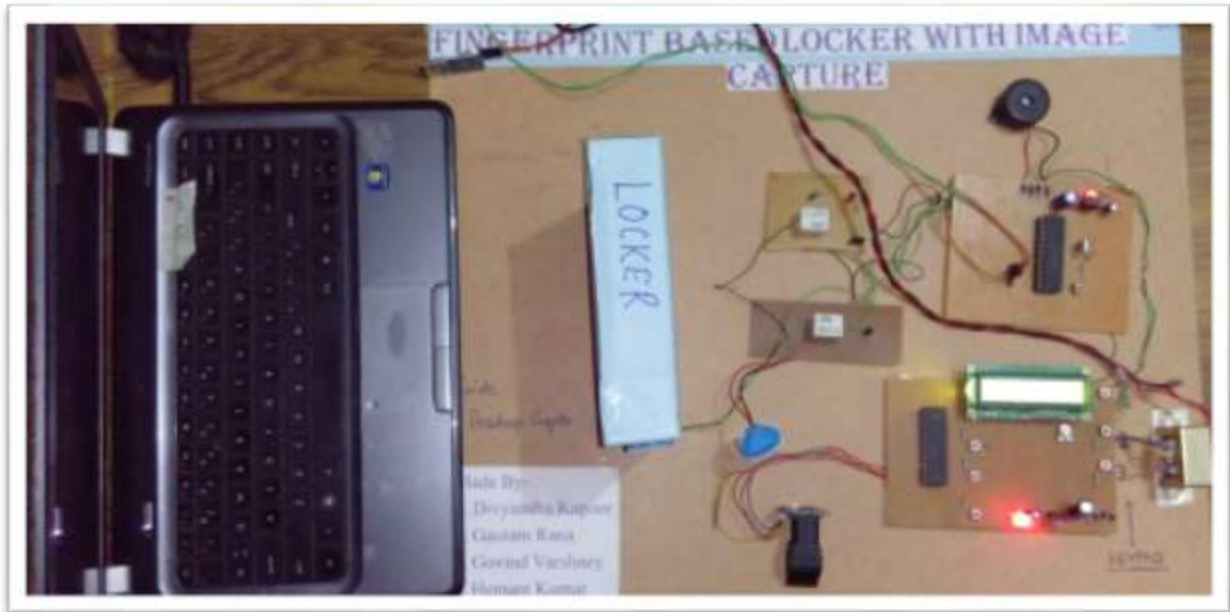
V.   RESULT AND DISCUSSION

Figure 2: Hardware of the Project

The complete hardware of the project is shown in the figure 2. The different components of the project are clearly shown. We used the MATLAB Software for the programming of the project. This is project is cheap in cost and very reliable in case of higher security. This BIOMETRIC based locker have many merits over the conventional locking system which make it more important. This is very easy to use.

VI.   CONCLUSION

In this paper, we reviewed some papers which have worked on this project. In our paper we introduced biometric based locker which provide high degree of security. Any unauthorized user will unable to access the locker. We are using fingerprint as the verification system as duplication of fingerprint is like unable. This system is cheap and easy to use. This system can be mounted anywhere, where you need high degree of security. The low cost of the project is a very important factor in this project. This locker is very reliable and safe.

VII.   FUTURE SCOPE

- We can use this biometric system in bikes for anti theft systems, this biometric system will use in bike locking and to ignite the engine of the bike.
- To provide advancement in cars biometric system can be implement which is a good idea for ignite the engine and to run the car so that only owner off the car would drive the car.
- Retina scanner can also be implement at the place of fingerprint.

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