

# Multifold Security for Bank Locker System using ARM

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**Abstract**—In this age of technology the bank Security system is a prime challenge as still we don't have efficient system which effectively replaces the traditional physical lockers. Everyone's ultimate concern would be to be as much secure as possible. The OTP (One Time Password) based authentication technique had proved itself to be a much secure as long as the authorized person keeps the received OTP safe. But still OTP alone is not so effective implementation. Basically, in this project we are providing two options for an authorized person to have an access to his locker. One is Face Recognition system and other option is OTP along with static password. Our ultimate challenge would be how effectively and accurately we will implement this methodology. The system has Object Detection sensor for detecting object inside the locker. When somebody enters into bank then the buzzer will be on. The system includes the Object Detector, Wireless Motion Detector (WMD), microcontroller, LCD display, buzzer and 5V power supplied to operate the system.

**Keywords**—Security System; Face recognition; OTP; Static Password; Authentication; Theft Detector.

## I. INTRODUCTION

In this age of technology we have seen some advances which are even difficult to imagine. But best of best companies or organizations are not able to implement the effective way for Bank locker security system. To solve all those security issues associated with the banks, we need an effective replacement for our traditional physical lockers. When any Authorized person wants to access a bank locker then he supposed to get his face scanned by our face recognition system. If the authorized person is not in town and someone behalf of him would like to access the locker then they have to present the static password and OTP generated upon request as shared by authorized person. The authorized person will also be given a static password previously and he should change his static password time to time. The OTP with Static password is an alternative method of accessing the locker. The motion detector which functions in night helps in a guarding the locker area for any the furthermore.

## II. METHODOLOGY

At the time of enrollment the person should give his face pattern to the system. The system will ask the person to provide face pattern. This registered face pattern is saved for

this particular locker, whenever an authorized person would like to access the locker should give his face pattern while standing in front of our face recognition system. And our other option to access the locker is OTP with Static password. The working of the OTP with static password will be as follows:

A. At first, the user should request for OTP password. Our system will generate one random OTP password and sends it to registered mobile and email. The system will ask for OTP and the static password that has been given at the time of issuing the locker. If the static password matches then only our system will give access to the locker. Otherwise it will not process.

B. The person can change his locker's static password immediately after one use.

Once the locker has been accessed, the concerned message with time and date will be sent to authorized email and mobile number. So that it will be in concern of the owner of the locker that transactions with locker is fully secured and his locker is safe.

The IR sensor inside the locker has been programmed such that whenever it finds locker empty it sends a message to the authorized email or mobile number.

The locker is equipped with theft detection module and vibrating sensor so that whenever the locker detects the physical and mechanical changes it sends message to the concern people with a pre-written text message. GPS and GSM are used to track the location and send messages respectively

III. BLOCK DIAGRAM

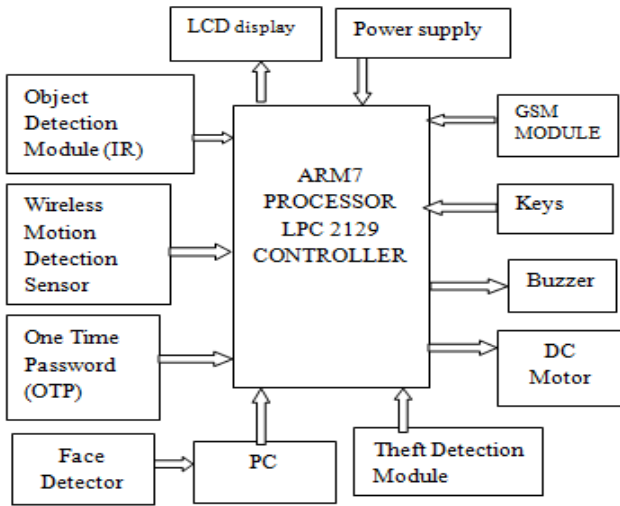


Fig.1. Block Diagram

IV. HARDWARE DESIGN

The hardware module for proposed microcontroller, power module, real-time clock module, and LCD display module. The Figure shows the architecture of hardware design. ARM TDMI Processor is interfaced using RS232 interface in the form of transmitting and receiving data packet with the output of the CPU. The power module supplies the necessary power and makes sure that the system is functional even when the available power is less. The real time clock module satisfies the accuracy of the time needed for the database purpose. The LCD display tells if the authentication is confirmed or not. The leads to the next arm processor level even if the validation fails.

This will authenticate the person and will act as a medium to lead the locker holder to the next level of validation. This will be issued to the holder when they opt for the locker and can be changed only by the authorized bank officials after their validation is done. This lock consists of a LCD screen, keyboard and an ARM TDMI Processor. The keyboard consist of 12 keys (4\*3) from 1,2,3,4,5,6,7,8,9,\*,0,# and is used to input the password. Where \* is used to delete one single digit. When 6 digit passwords are being entered, # is pressed to submit that password. LCD screen is used for display. Here LCD is used to show the typed digits and to acts as an interface between the ARM TDMI PROCESSOR and the user. The architecture has been shown in figure picture is used to create a template which is stored and then compared whenever required.

Motion detecting sensors are revolutionary security equipment's which give excellent security to banks. They can detect any kind of physical movement in their environs and can elicit alarm with the help of infrared heat sensors. The crystals, which show piezoelectric effect i.e. if they encounter any slightest change in the infrared radiations in the form of heat they generate current on their surface, are the material

which are used as thermal sensors. Every human body emits infrared radiation which is approximately 9.4 micrometer in wavelength. Hence, motion of any human results in changes in local infrared radiation pattern in the vicinity of the sensor. With the use of 'Fresnel lens', the radiation can be focused on the sensor. As this is made to function only in night there is no possibility that any sunlight related temperature changes triggers the response of a motion sensor unnecessarily. Wireless motion detector consists of arm processor and PIR sensor module. PIR sensor is a 3 pin connector: VCC, output and ground.

V. WORKING OF THE SYSTEM

The working of the system is mainly explained by taking face detection system into account. In this face detection technique we are initially will have the authorized person's face pattern saved in our database. The system has 60 reference points to recognize the person's face. These reference points vary from person to person in their position, angle, shaded, and bright area. Whenever a user makes a request to access the locker through face recognition system, he/she must give their face pattern, then our algorithm compares the persons face with all the images which are stored in bank's database and if that image is found to be associated with any of the account then that grants the access to locker.

In this technique we have an algorithm which compares the reference points of each image with every image of the database. Depend upon the results of face recognition algorithm the ARM processor processes the request and grants access to the locker. Once the locker has been given access, the locker access message will be sent to both bank manager and the owner of the locker. The GSM module sends messages to registered mobile number upon request.

VI. SOFTWARE DESCRIPTION

The software selection is the backbone of the entire project. Software development includes programs written for the interfacing of the Microcontroller with LCD display, keyboard, ADC, Auto-dialing circuit and the mobile interface. Having had a look at the software and hardware Fundamentals of the system, the next step is to understand the software programming incorporated in the microcontroller to achieve the given task. The software has been written in structured manner in which all the subroutines are linked to a single main program. Each subroutine is further divided into sub-sub routine as per the requirement. When complete PCB with assembling is finished it comes to software where both assembly and c language is used. The main code consists of initialization of all ports. Then in sub modules LCD initialization, ADC initialization, writing into the memory and reading the memory is done.

VII. EXPECTED OUTPUT

This system can effectively implement the bank locker security system, which can also be implemented in various other fields like Military applications, CBI files locker applications, University services, the techniques can be

extended to get access to ATMs, shops, buildings and secured rooms. The best application is in banks and Military verifications.

#### VIII. ADVANTAGES

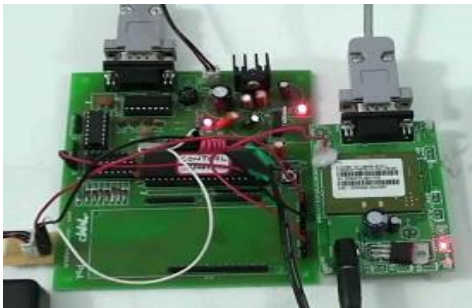
- Fully Secured Bank lockers.
- Even ATMs can have this locking and tracking facility.
- Unauthorized access prevention.
- High Security in the Bank Transactions
- Hygienic as face detection doesn't involve any physical contact with the locker.

#### IX. APPLICATIONS

- Using of ARM 7 processor for bank locker system increases system security, reliability and the system speed.
- In military applications, by using this system we can restrict unauthorized person entry into our zones and infrastructure.

#### X. FUTURE ENHANCEMENT

The system totally concentrates on all round security of the locker systems either it may be in banks or shops or in houses. We can enable the system to be accessible remotely as similar to net banking. We can make system to capture the person's picture every time someone tries to get access to the locker.



[1] Fig.2. Control Section

#### XI. CONCLUSION

This is a real time application based project which tells that there is a need to bring in a revolution in the bank locker security system by making the procedure a little easy and more systematic for the bank officials. This is just a proposed model which when implemented would surely give a very good protection of the lockers curbing theft and making the lockers more reliable. The assurance it will give to the bank customers will force them to use it and hence protect their valuables from theft or any kind of robbery. As this is protected by the vicinity sensor hence can detect any unwanted or forced entry inside the bank locker area and can protect the lockers in the most efficient way.

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