IoT Based Bank Locker System using OTP Technology

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ABSTRACT

This paper proposes a method to design and implement a secure bank locker system based on Fingerprint and OTP technology that s can be organized in banks, offices and homes. The system allows only an authenticated person to recover the documents or money from the lockers. Initially, the person has to enroll username, password and mobile number in an authorized data baser. If the username and password matches, then Finger print of the person will be detected and stored with an unique ID. If the ID matches, then four-digit code (OTP) will be sent on authorized person's mobile to unlock. This system can also create a log containing check in and check out details of each user along with basic information.

Keywords - OTP, Arduino UNO

I. INTRODUCTION

In the real world, people are more concerned about the safety of their valuable things like jewelry, money, important documents etc. So the bank lockers are the safest place to store them. The arrival of fast growing technologies makes users to have high security systems with electronic identification options. These identification technologies include Bank Lockers and ATM as well as other intelligent cards, user IDs and password based systems and so on. Unfortunately, these systems are not protected from hacker attacks, thefts, and forgotten passwords. In spite of all these disadvantages these systems are still existing; however, the biometric or fingerprint authentication based identification is the most efficient and reliable solution for stringent security [1]. Biometrics measure an individual's unique physical or other characteristics to recognize or authenticate their identity. The physical characteristics used are fingerprint, hand, face, iris etc. and other characteristics are signature, voice keystroke patterns etc. The conventional biometric system operates in two modes; verification mode and identification mode. In the verification mode, the system validates a person's identity and in the identification mode the system recognizes an individual by searching entire template data base for match. And the system performs one to many comparisons to establish the individual identity or fails if the subject is not enrolled in the system data base. Hence use of fingerprint to ensure security in the system is being explored. Although safety is an important issue in the banking sector most advanced technologies are not being used currently. Money in

bank lockers is not safe as it is prone to cheating and misuse. For safety purpose locks or alarms are installed in the bank lockers [2]. Also, manpower used in managing these lockers is vast in banks whereas there are less people to attend to the consumers. The proposed work involves image comparing technique and automates the locker system in banks. Thus banks can deploy more employees for core banking services instead of wasting manpower in locker management system.

II. LITERATURE SURVEY

These are some of the existing Smart Security designs that have been implemented- GSM Based Security System [3],[4] PIR sensor detects motion by sensing the difference in infrared or radiant heat levels emitted by surrounding objects. The output of the PIR sensor goes high when it detects any motion. The range of a typical PIR sensor is around 6 meters or about 30 feet. When the PIR sensor detects any motion, the output of the sensor is high. This is detected by the Arduino. Then it communicates with the GSM module via serial communication to make a call to the pre-programmed mobile number. An important point to be noted about PIR sensors is that the output will be high when it detects motion. Use of finger prints recognition for authentication of secure locker systems have been discussed [5-7] and performance of such systems for ration card application is also presented in [8]. Security threats in such systems such as dropping has been reported in literature [10].

IR based security alarm system- IR based security alarm circuit can detect any movement and trigger the alarm [9]. This circuit is very useful in homes, banks, shops, restricted areas where an alert alarm is needed on any suspicious movement. This circuit is based on IR sensor where an IR beam is continuously falling on a photodiode, and whenever this Infrared beam breaks, by any kind of movement, alarm is triggered. In this IR based security alarm circuit, IR LED is placed in front of photodiode, so that IR light can directly fall on photodiode. Whenever someone moves through this beam, IR rays stops falling on photodiode and Buzzer start beeping.

Internet of things has been governing the electronics with cloud services influencing the ever increasing electronics product segment. Security and safety has always become a basic necessity for urban population. The paper proposes a security system based on Open source cloud server "things speak .com" and a low cost esp8266 Wi-Fi module. The work presents a PIR module which constantly monitors the Home or Work space. When the PIR module detects an intruder it sends a signal to the at mega 328p microcontroller and the controller is connected to a Esp8266 Wi-Fi module and also to an alarm system. The System transmits an alert signal to the Open source cloud which provides a alert signal on the users mobile phone. The system employs a second esp8266 module which is programmed to act as a web server, which allows the user to activate or deactivate the security system by means of any device with internet. The system also employs a thumb print reader rs305 which controls the opening and the closing of a safety locker door. Thus the system uses esp8266 Wi-Fi module and atmega328p to control the security system from the user's mobile phone by means of any device with a potential internet connection. A four-digit code will be sent on authorized person mobile to unlock. So biometric and Bluetooth security is more advantages than other system. This system can also create a log containing check in and checkout of each user along with basic information

III. OVERVIEW OF THE PROPOSED SYSTEM AND COMPONENTS REQUIRED

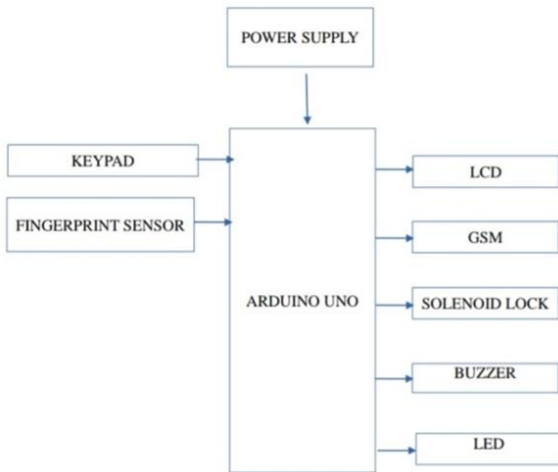The block diagram of the proposed system is shown in fig.1.

Figure 1 block diagram

This on-board computer consists of number of input and output ports. The input and output port of the micro controller are interfaced with different input and output modules depend the requirements. In other words, micro controller acts as a communication medium for all the modules involved in the project. The device also consists of Bluetooth device, Serial Communication, Keypad, 16x2 LCD which displays the information about transactions, dc power supply, alert unit. User need not carry any physical cards (credit, debit etc.) or mobile phones for money transaction. User just need to keep finger print enter transaction amount using keypad. This transaction information is sent to server over secure IOT (Bluetooth) and further processing done there. If the transaction is successful, then user gets SMS confirmation message to his registered phone number.

A. Arduino UNO

Arduino is an open-source microcontroller board based on AT mega 328P.It has 16 MHZ clock, 14 pins for an input output purpose, USB connection, reset button and power jack as shown in fig.2. It contains everything which is required to implement or design the microcontroller based embedded system applications. In order to process the analog data given by analog sensors it also contains 10bit ADC (Analog to Digital converter).

Figure 2 Arduino UNO

B. Key pad

A keypad is a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers, then it can also be called a numeric keypad. Keypads are found on many alphanumeric keyboards and on other devices such as calculators, push button telephones, combination locks, digital door locks, which require mainly numeric input. 4*4 matrix keypad is used to enter the OTP. A key board is shown in fig.3.

Figure 3 4X4 Keypad

C. GSM SIM 800L

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls as shown in fig. 4. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity.

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221

Figure 4 GSM sim 800l

D. 16x2 LCD Display

This 2×16-character LCD Module with YELLOW Backlight uses an I2C interface to communicate with the host microcontroller, as shown in fig. 5. This budget-conscious LCD is used on projects requiring the display of text, data, or ASCII characters of all types.

Figure 5 16X2 LCD Display

IV. CIRCUIT DIAGRAM

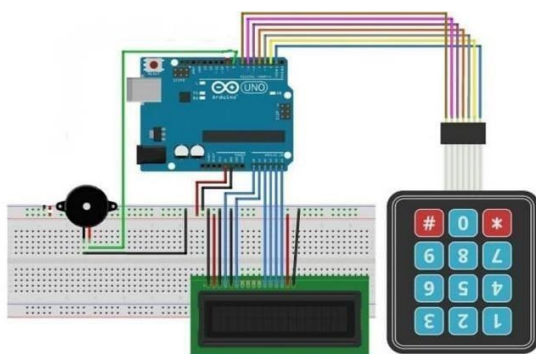The circuit diagram of the proposed work is shown in fig. 6

Figure 6 Circuit Diagram of the system

V. RESULTS AND DISCUSSION

In this system first a person enrolls user name and password and mobile number. If user name and password matches, then Finger print of the person will be detected and stored with ID. A default password "1234" has been set by coding the Arduino. When a password is keyed in, it is compared with the stored password. If it is correct, then a 4 digit OTP is generated and sent to the registered mobile number. Also, the message 'OTP sent' is displayed. If the password is wrong, then the message 'Sending SMS' is displayed. The output of the system is displayed in fig 7a and 7b. The buzzer will also beep once when any key is pressed.
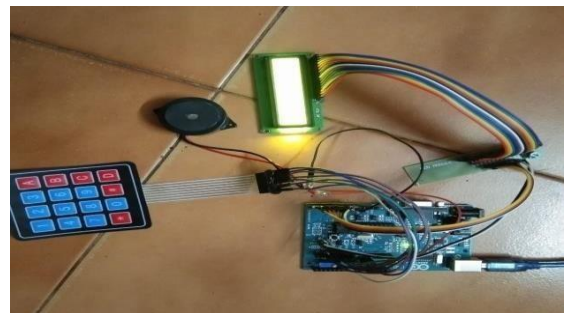

Figure 7a. Output on successful authentication

Figure 7b. Message displayed on the LCD display

VI. CONCLUSION AND FUTURE SCOPE

In this paper, an IOT based secure digital locker system has been designed and implemented. Finger print and GSM security system will provide higher security than

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 1

222

existing system. The design system 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.

VII. REFERENCE

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223