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Smart ATM

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Abstract: Economic growth of the world makes the life smarter and better. A smart step towards economy is introduction of automatic teller machine (ATM) for faster and easier money transfer. ATM systems today use no more than an access card and PIN for identity verification .A group of people do malpractices over this ATM system. In fact there were many such incidents reported. This paper proposes a framework which will provide high security in ATMs. The framework includes Face recognition system for face identification in case of unauthorized entry. It also includes a vibration sensor for detecting vibrations if theft occurs by smashing the ATM machine. The system also contains a fingerprint module for accessing money without ATM cards. Our proposed system will provide advanced theft security system. Whenever ATM theft attempt occurs, vibration produced from the machine will be sensed by attached sensor module to it, and a high alert message will be sent to the nearest police station. At the same time the doors of the ATM counters closes and an unconscious gas will be sprayed inside the counter. Meanwhile if someone else is using the card ie, if the user is unauthorized then after face recognition on OTP (one time password) will be send to the authorized person. And only if the real user resends the OTP the unauthorized person will be able to access the ATM.If there arises an emergency need for money and the user doesn't have his/her ATM card, he/she can access the ATM machine by fingerprint technology. The respective user image and fingerprint will be compared and if it matches then the user can withdraw money, if the user knows the pin number.

Keywords: Vibration sensor, DC motor, RFID, Fingerprint module, GSM.

I. INTRODUCTION

In today's technical advanced world, autonomous systems are gaining rapid popularity. In case of banking and money transactions ATM (automatic teller machine) is highly useful for faster and easier money transfer. Therefore the security of this system should hold highest priority. Our proposed system provides advanced theft security system also high security in ATM applications.

Among the crime for financial organization, the cases of theft and robber have very high proportion of over 90%. Security of Automated Teller Machine (ATM) is to be given paramount importance as financial institutions. Traditionally, security is handled by requiring the combination of a physical access card and a PIN or other password in order to access a customer's account. This model invites fraudulent attempts through stolen cards, badly-chosen or automatically assigned PINs, cards with little or no encryption schemes, employees with access to non-encrypted customer account information and other points of failure.

In this proposed system, an automatic teller machine security model that would combine a physical access card, a PIN, and electronic facial recognition. By forcing the ATM to match a live image of a customer's face with an image stored in a bank database that is associated with the account number. The face recognition system in the ATM counter compares the image of the person who is in the ATM counter with the image already stored in the database of bank associated with the account number. If a match is found the access is permitted. If the images do not matches then a onetime password (OTP) will be send to the authorized person's mobile phone. The authorized person must send the OTP to the person standing in ATM counter and he must retype the OTP in the machine in order to withdraw money. The face recognition is done using MATLAB.

The proposed system also contains a vibration sensor in the ATM machine so that if theft occurs by smashing the ATM it will be sensed by the sensor and the information will be send to the nearby police station using GSM.

The proposed system also helps to withdraw money without ATM cards when emergency occurs. For withdrawing the money the person must know his PIN number. A fingerprint module is used for this purpose. The fingerprint module takes the impression of the finger and compares with already stored ones. If a match occurs then, the money can be withdrawn.

II PROPOSED SYSTEM

In today's technical advanced world autonomous systems are gaining rapid popularity. In case of banking and money transactions ATM is highly useful for faster and easier money transfer. Therefore the security of this system should hold highest priority. Our proposed system provides advanced theft security system also high security in ATM applications.

Whenever there occurs an attempt of theft, the vibration sensor fixed in the ATM machine will senses the

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vibrations. The value of the vibration is set on a threshold value and if the vibration occurred in the ATM gets equal to or more than that threshold value the vibration sensor get activated. And a high alert message will be send to the nearest police station. At the same time with the activation of vibration sensor, the occurrence of theft detected and using a DC motor the doors of the ATM counter gets closed, and unconscious gas will get sprayed inside the room making the thief unable to escape.

In cases where, someone steals your card or someone knows your password, it will grant him/her full access to your money. In such cases if an unauthorized user swipes the ATM card in the machine. Image comparison is done and if it does not matches with the authentic one an OTP (One Time Password) will be sent to the authentic users mobile. And only if user resends the OTP to the user in the ATM counter. That person will be able to access the machine.

In times when there occurs emergency need for money and the user doesn't have the ATM card then he/she can access the ATM using fingerprint and take money. Before the fingerprint recognition face is compared and then the user needs to place his/her hand in the fingerprint module placed in the ATM machine. The fingerprint is compared with already stored images and if it matches the user will be able to take the money from ATM, only if the user knows the pin number of his ATM card.

III BLOCK DIAGRAM EXPLANATION

In this block diagram the vibration sensor sense the vibration and if the vibration is beyond a particular limit then the dc motor gets on and starts rotating and thus the door gets closed and at the same time the chloroform will be sprayed out from the solenoid valve and at the same time the information will be send to nearby police station.

The face recognition system in the ATM counter compares the face of the person standing inside the counter with the already stored images in the database and if it matches then the person can access the money. If the face does not matches then an OTP will be send to the authorized person and the person standing inside the ATM counter must retype the OTP in order to access money.

A fingerprint module is placed in the ATM. If a person does not have his ATM card and he is in emergency of money he can access money by his fingerprint if know his PIN.

A. MICROCONTROLLER- PIC16F877A

A Microcontroller is a complete microprocessor system built on a single IC. Microcontrollers was developed to meet the need for microprocessors to be put into cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often. The microcontroller that has been used for the project is 16F877A. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. The 16F877A is a low power, high performance CMOS with 8Kb of flash Programmable and Erasable Read only Memory (EPROM)

B. MOTOR DRIVER IC

Here we use L293D Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. It can drive small and quiet big motors as well. VCC is the voltage that it needs for its own internal operation 5V; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply).L293D will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply. The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA.

The operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

C.VIBRATION SENSOR

Here we use a piezoelectric vibration sensor. A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. Based on piezoelectric technology various physical quantities can be measured; the most common are pressure and acceleration. For pressure sensors, a thin membrane and a massive base is used, ensuring that an applied pressure specifically loads the elements in one direction. Here we use a ceramic piezoelectric vibration sensor.

D.GSM MODEM

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. SIM900 works on frequencies 850/ 900/ 1800/ 1900 MHz It is very compact in size and easy

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to use as plug in GSM Modem. The Modem is designed with RS232 Level converter circuitry, which allows you to directly interface PC Serial port .The baud rate can be configurable from 9600-115200 through AT command. Initially Modem is in Auto baud mode. This GSM/GPRS RS232 Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS as well as DATA transfer application in M2M interface.

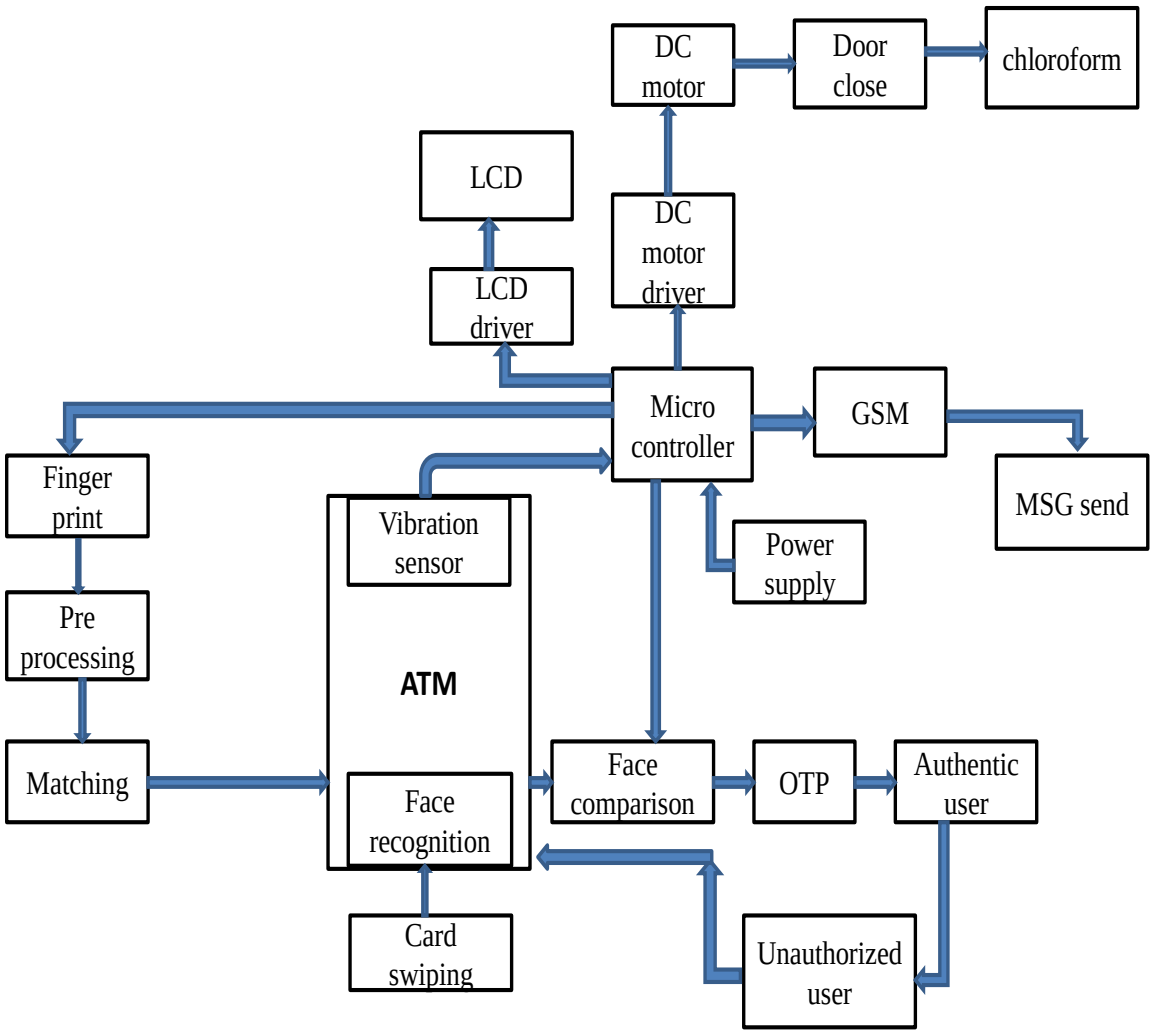

Fig.1 Block diagram

E.FINGERPRINT MODULE

Here we use R305 fingerprint module. It is a finger print sensor module with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The finger print module can directly interface with 3v3 or 5v Microcontroller.

A level converter (like MAX232) is required for interfacing with PC. It has a voltage consumption of 3.6V to 6V. It has a working current of 100mA.Finger print module is shown in figure 2

Fig.2: Fingerprint module

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A fingerprint consists of ridges and valleys. They together provide friction for the skin. The main identification of the skin is based upon the minutiae, which actually is the location and direction of the ridge endings and splits along a ridge path. The figure 3 shown below represents two types of minutiae.

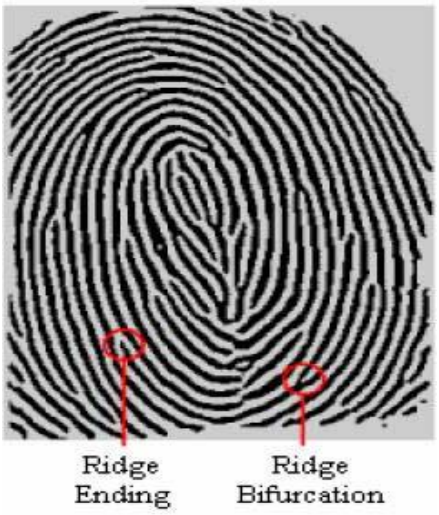

Fig.3: Fingerprint

The image below shows all the other characteristics of a fingerprint. These characteristics may also be helpful during the process of minutiae extraction. Take a look.
The scanning device consists of a glass plate, on top of which you are supposed to place your finger. After the scanning takes place, an inverted image of the finger is stored. This image will show the ridges and valleys of your finger. The ridges can be spotted by the darker areas where the light reflection is greater. The valleys can be spotted by the lighter areas, where the light reflected is lesser. The scanner is also designed to recheck the image captured. The scanner checks whether the image captured has satisfactory pixel darkness.

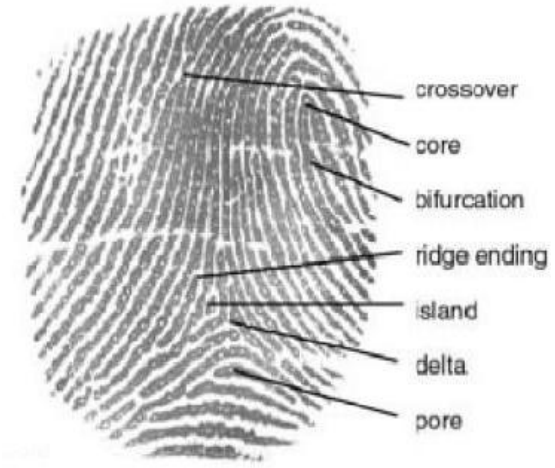

Fig.4: Fingerprint Characteristics

If a problem is seen in the checking process, the image will be rejected and the suitable adjustments will be made so as to get a better quality picture. After all these procedures, the image will be compared with the existing stored images. Figure 4 shows the fingerprint characteristics.
The unique information used for the identification includes the flow of the friction ridges, the sequence and also the presence/absence of the individual friction ridge path features.

F.EM-18 RFID

EM-18 RFID reader module uses a RFID reader that can read 125 KHz tags. So, it can be called as a low frequency **RFID reader**. It gives out a serial output and has a range of about 8-12 cm. There is a built-in **antenna** and it can be connected to the PC with the help of **RS232.**

Fig.5: EM-18 Rfid

IV. WORKING PRINCIPLE

The circuit has one microcontroller which PIC16F877A.The PIC16F877A is a low power, high performance CMOS with 8Kb of Flash Programmable and Erasable Read Only Memory (EPROM).A piezoelectric vibration sensor is used to sense the vibrations. Here a SIM300 GSM modem and a R305 fingerprint module is used. The 5V supply is given to the VDD and the Vss pin of the microcontroller 4MHz crystal oscillator is used in the controller.

Here we use piezoelectric vibration sensor. Based on piezoelectric technology various physical quantities can be measured; the most common are pressure and acceleration. For pressure sensors, a thin membrane and a massive base is used, ensuring that an applied pressure specifically loads the elements in one direction.

We use R305 fingerprint module. It is a finger print sensor module with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. A fingerprint consists of ridges and valleys. They together provide friction for the skin. The main identification of the skin is based upon the minutiae, which actually is the location and direction of the ridge endings and splits along a ridge path

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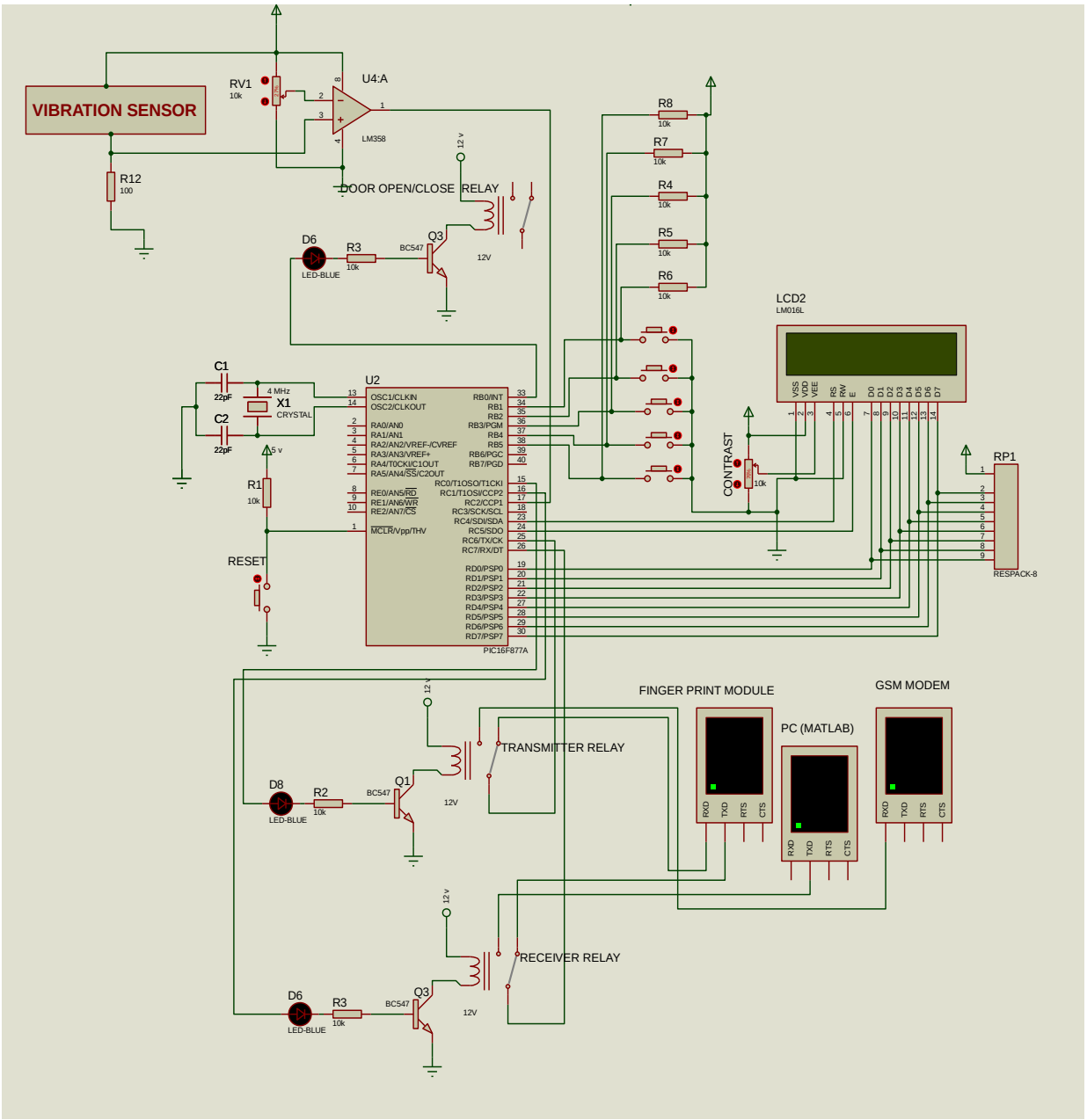

Fig.6: Circuit diagram

V ADVANTAGES

- High security.
- It will provide strong authentication.
- We can access money without ATM cards, in case of emergency.
- Helps the higher authority to take necessary steps before happening of a theft or unauthorized access

VI. DISADVANTAGES

- Time consuming.
- Biometrics recognition devices are costly

VII APPLICATIONS

- To access money without ATM card.
- Helps higher authority to take immediate action in case of robbery

VIII FUTURE SCOPE

- Efficient biometric methods can be used like iris scanner.
- Voice recognition can be used instead of image processing

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IX. SNAPSHOT

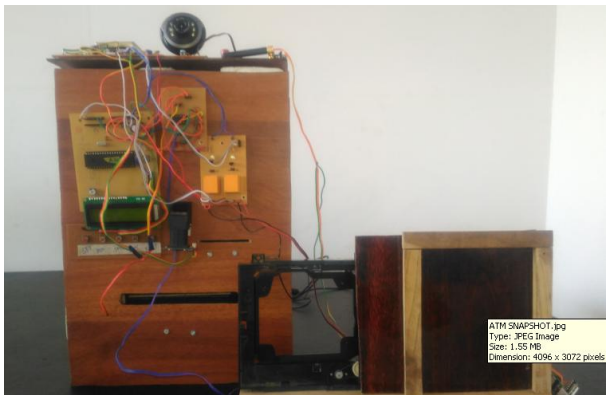

Fig.7 Smart ATM

X CONCLUSION

The main objective of the proposed system is to develop high security in ATM applications. ATM is the faster and easier way to get money. Since there occurs the risk of getting robed.

Whenever ATM theft attempt occurs, the vibration sensor placed in the ATM machine will senses the vibration and an alert message will be send to nearby police station. At the same time with the activation of vibration sensor the doors of the ATM counter will get closed and unconscious gas will get sprayed inside the counter making the thief unable to escape.

If the authentic person is not using the ATM card ie, if the user is unauthorized. It will be recognized by image comparison. An OTP (one time password) will get generated as soon as the unauthorized user swipes the card and it will be send to the authentic user. If the authentic users resend the OTP to the unauthorized one he/she will be able to access the ATM machine.

This system also provides an advanced ATM access just by using the fingerprint of the user. In situations when the user needs money but does not contain the card the user can take money from ATM by using his/her fingerprint. Along with the fingerprint image of the respective user is compared and if it matches then the user can further access the ATM, if the user knows the pin number.

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