Fingerprint Based Bank Locker with Image Capture

Ambrish Kumar[1],Anish Kumar[2], Kushagra Gohil[3]
Laxit Porwal[4], Manish Cheepa[5], Ankit vijayvargiya[6]

[1]Department of Electrical Engineering, SKIT, Jaipur,India - 302033
[2]Department of Electrical Engineering, SKIT, Jaipur,India – 302033
[3]Department of Electrical Engineering, SKIT, Jaipur,India – 302033
[4]Department of Electrical Engineering, SKIT, Jaipur,India – 302033
[5]Department of Electrical Engineering, SKIT, Jaipur,India - 302033
[6]Department of Electrical Engineering, SKIT, Jaipur,India - 302033
manishchhipa98@gmail.com(only corresponding author)

ABSTRACT

As today fingerprint based system provides high accuracy in terms of security. Also there is a high demand for integration of fingerprint matching techniques for making secure authentication systems. This research paper introduces this door locker system which integrates fingerprint reader in it so as to provide a good level of security. The main goal of fingerprint door locker with image capture project is to provide security with no manual security flaws. It is easy to use and requires no special training or equipment. This system needs fingerprint authentication while operating the door locker as well as captures the images of person who is handling the locker and saves it in memory card which can be later viewed with card reader to the authorized person. The functionality of system is that it will scan the fingerprint and if it matches with registered fingerprint the locker opens and also captures the image of user. The system uses an atmega 328 microcontroller for this purpose. The microcontroller processes data sent by theaccess. Controller operates the motors to open the locker door on encountering registered valid users. If the fingerprint does not match with register fingerprint of user, it will show the error message as unauthorized user and immediately saves the picture in memory card. So, the system is very beneficial for stopping the robbery by providing security.

Key words: **Fingerprint Module, Arduino Camera, SD card Module, DC Motor, LCD**

INTRODUCTION

Bank is an organization where we keep our cash and different assets. Where there is cash there are cheat, now days there are more instances of thievery so securing bank has turned out to be critical. With developing advancement in hardware security framework today all manual locks are supplanted by electronic contraptions. These contraptions incorporate different innovations like movement sensor, odouridentification,face recognition, Finger print scanning, RFID, GSM etc.In this way, we have chosen to present an embedded system for locking which depends on the Finger print scanning. Our task will furnish high level of security with no manual imperfections. Our task fundamentally, is a blend of Implanted Frameworks and Biometrics.

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is designed for a specific function or for specific functions within a larger system.Design engineers upgraded the size and qualities of the microcontrollers, the cost of the item likewise diminished which make it commercial. Basically, embedded system is "Real Time Operating system" which operates immediately without any delay.This paper describes the design andimplementation of an Embedded Fingerprint Authentication.

system with image capturing using Arduino camera and saving photos in SD card for further identification of unauthorised user.The present innovative period is requesting dependable and financially savvy personal authentication system for a vast number of day by day utilize applications where security and security execution of the data is required. Biometrics confirmation strategies in mix with installed embedded system gives a requesting answer for this need.

FINGERPRINT IDENTIFICATION

Fingerprint identification is based on pattern recognition where the arches, loops and whorls of the fingerprint ridges are compared with stored data. Identification is performed in three parts. (1.) A picture is taken of the fingerprint. The picture can be taken optically with a camera in the reader or electronically, or as a combination of these two methods. The end result is a digital black and white photograph of the ridges in the fingerprint. (2.) The fingerprint is then transformed into a numerical model which stores the fingerprint's unique characteristics, such as the arches and loops and their distance from each other, as a series of numbers. (3.) A recognised numerical model is compared with a stored numerical model (or models) to find similarities.

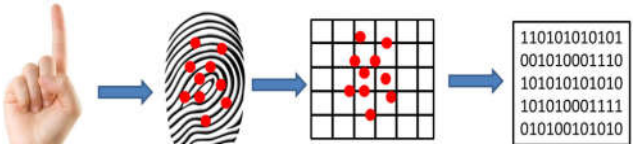

Fig. 1 Optical Scanner Working Steps

There are basically two requirements for using the optical fingerprint sensor. First is you'll need to enrol fingerprints - that means assigning ID #'s to each print so you can query them later. Once you've enrolled all your prints, you can easily 'search' the sensor, asking it to identify which ID (if any) is currently being photographed.
You can enrol using the Windows software (easiest and neat because it shows you the photograph of the print) or with the Arduino sketch (good for when you don't have a Windows machine handy or for on-the-road enrolling).

IMAGE CAPTURING

We should have surveillance cameras in public places because they ensure public safety. Rarely will anyone attempt to harm you when they know their actions are being recorded on camera. Cameras keep you and your personal property safe.The police can identify criminals recorded with cameras. Through surveillance cameras, the police can both prevent crimes from happening and can quickly solve criminal cases with material evidence. In addition, surveillance cameras protect against property theft, and vandalism. It is very difficult to get away with stealing something if there are cameras filming you. Therefore, the thief will often get caught. Surveillance cameras will catch the thief before, or during the process of committing the crime. If no one is aware of the crime until after it has been committed, the surveillance footage is always a crucial piece of evidence during a police investigation. Surveillance cameras have, and will prevent many crimes.Cameras, through video analytics, now have the ability to zoom in to reveal someone's identity which can be beneficial to crime prevention when used in the correct way. In this manner we can prevent the bank robbery as well as if it happens we can get back what was lost in the robbery by identifying the criminals using police records.
Here we are using an Arduino camera module, using the surveillance camera's digital image processing chip-OV0706.The OV7670 image sensor is a small size, low voltage, single-chip VGA camera and CMOS image processor for all functions. It provides full-frame, sub-sampled or windowed 8-bit images in various formats, controlled through the Serial Camera Control Bus (SCCB) interface.

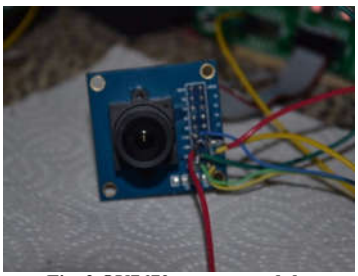

Fig. 2 OV7670 camera module

In our project the camera is used to capture the images of unauthorised user during transaction from bank after going through the fingerprint sensor. First the fingerprint sensor identifies the user by scanning user's fingerprint using its database, if it is in its database then transaction can be done normally and camera is inactive while if the fingerprints are not in database the camera captures user's image and save it in a SD card and transaction is failed the SD card then can be used to recognise the suspect.

DESIGN, MATERIAL, PROCEDURE, TECHNIQUE OR METHODS

Design

The following block diagram describes the configuration and design of the project as well as the component with their connections with the ICs. The design of the project is done on PCB so that its size can be reduced and be compatible with the small lockers. The power supply is also taken into consideration that should be available always and should not be affected with any power failure that is why we use batteries instead of direct ac supply. So that the even in the condition of the power failures our security system keep working and it does not have to comprise.

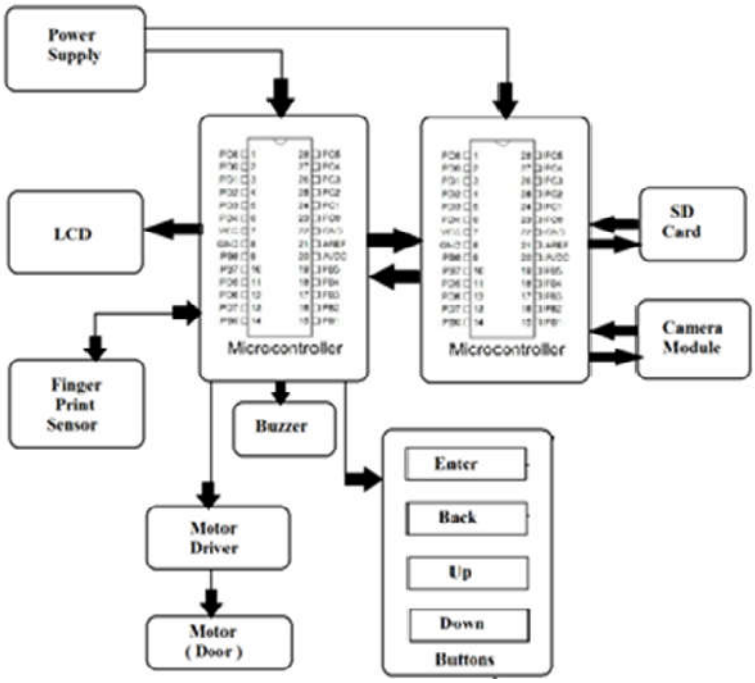

Fig. 3 Block Diagram of Secure Fingerprint Bank Locker with Image Capture

Material

Table 1. List of Component Required

S.NO.	HARDWARE COMPONENTS	SOFTWARE REQUIRED
1	Transformer (230 – 12 V AC)	Arduino Compiler
2	Voltage regulator (LM 7805)	Proteus 8
3	Rectifier	MC Programming Language: C
4	Filter	
5	Microcontroller (ATmega328)	
6	Fingerprint module	
7	Led's	
8	Motor driver(L293D)	
9	Dc motor	
10	DTMF decoder IC	
11	Inverter IC	
12	1n4007	
13	Resistor	
14	Capacitor	
15	Camera OV7670	

Fig. 4 Optical Fingerprint Scanner

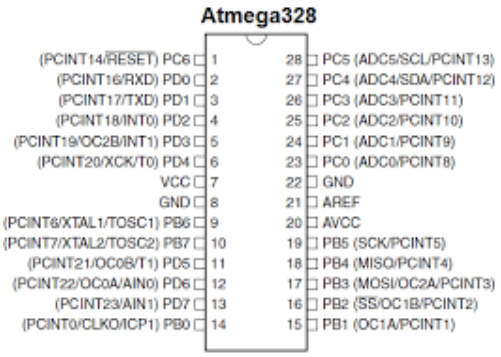

Fig. 5 Atmega328 Microcontroller

Procedure

The project was done in following steps:

1. All the components were tested separately so that their correct working can be ensured and their working can be realized in every environment.
2. After every component testing they were simulated using software on computer like Fingerprint sensor and camera with Arduino.
3. Then the rough draft and circuit diagram were drawn in an optimised way so that each component can be used wisely.
4. The whole circuit was tested on project board/bread board so that before implementing in real environment its pro and cons can be realized.
5. Then the circuit was lied on Proteus 8 and PCB layout was created so that it can be implemented permanently, after it using soldering technique all components are brought together.
6. Now finally all the authorised fingerprints are saved in the fingerprint sensor's flash memory and it is finally interfaced with microcontrollers.
7. Finally, it can be implemented wherever we want.

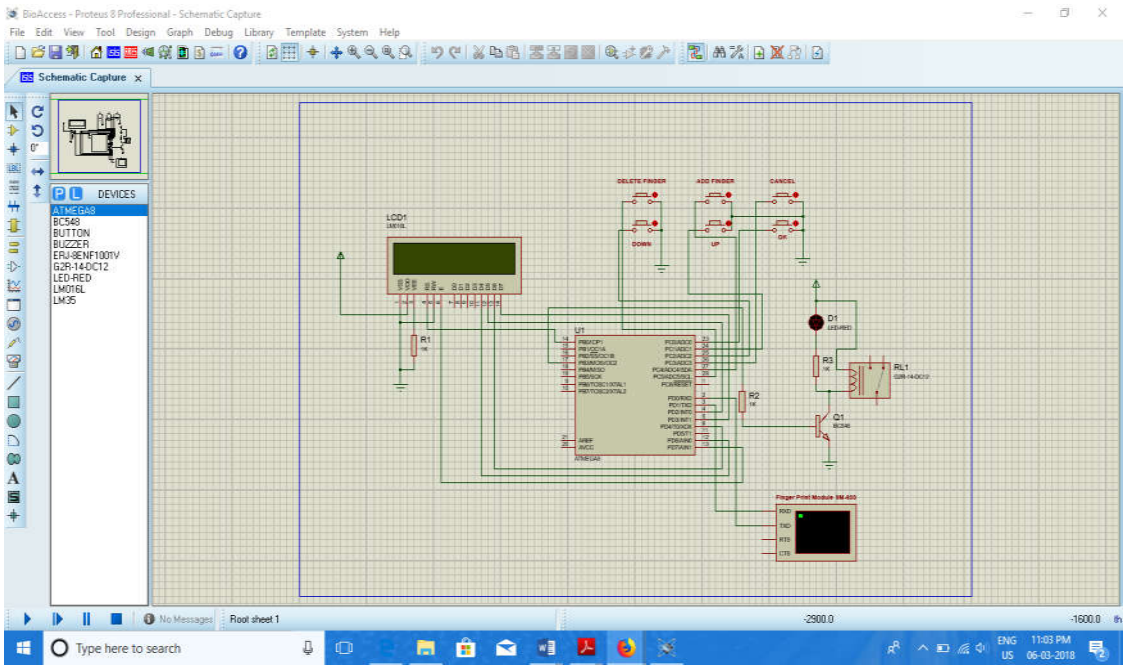

Fig. 6 Proteus Circuit Designing

Techniques

It requires following techniques to carry out project:

- C and C++ programming, which is very crucial part of this project. It is also required to interface our core hardware like Fingerprint module, camera module, SD card module with microcontroller.
- Designing of circuit on Proteus 8 and making PCB layout.
- Soldering Technique.

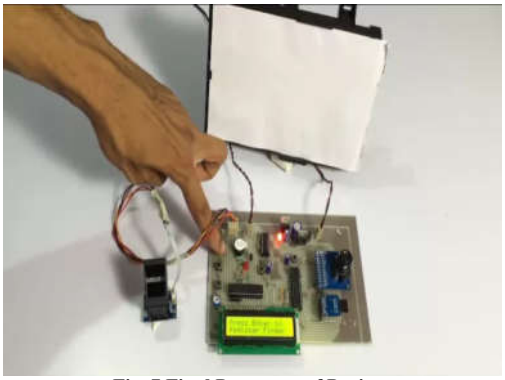

Fig. 7 Final Prototype of Project

RESULTS AND DISCUSSION

Results

After the implementation of project, it did as well as we required to be there was no any security flaw during its use. The fingerprint verification and image capturing were simultaneous in a such a manner that there is no quiet much or less delay during their workings.

Discussion

The project has a great future scope in terms of security it is the best way to secure our money or other important loggings using biometrics because a fingerprint can't be copied and can't be hacked as it could happen in conventional security system like RFID cards and in password based lockers. This project moreover important because it provides surveillance also which makes it more interesting in the field of security. So it not only prevents thefts but also it reduces the possibility of theft in future because of its capturing capacity which can be used by authorities to recognise the ambiguous person in a quiet good manner.

CONCLUSION

a security system is proposed by using Image capturing and Fingerprint. It is a low cost, low in power conception, compact in size and standalone system. The microcontroller compares the fingerprints scanned by it with its flash memory. If these fingerprints are correct, the microcontroller provides necessary control signal to open the bank locker otherwise the door remains locked and image is saved in SD card after capturing. The proposed system can be used in other places such as offices and diamond jewellery shops.

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