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A Review on Advance Biometric Fingerprint Based Security Systems

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Abstract: There are many applications where the security system is required like home, bank, offices etc. To give security various technologies are used like barcode, RF-ID card, Magnetic Card, Identity Card. Biometric is more popular because of its uniqueness. But fingerprint based biometric security system is mostly recommended. These systems used for security so that only the authorized persons are allowed to pass or for attendance measuring purposes. The Finger print based system has more secured and too many advantages. The aim of this paper is to give comparison, advantages, and limitations of various technologies and propose the system which will give best results. The use of IoT technology in biometric secure authentication system is explored in this paper

Keywords: Biometric, IoT, Fingerprint, Scanner, Wi-Fi.

I. INTRODUCTION

Biometric security is based on physiological characters of person. This may include Finger print, Iris, Ear etc. The finger print based biometric system is most convenient as it is easy to use and low cost. The Iris based systems has best security results but it required HD camera and more powerful DSP processor to process it. The biometric finger print based security systems can be used in various applications Like ATM, Attendance, Point of Sale, Bank lockers. Biometric security system consists of scanner unit and computer where database is saved. Scanner unit connected to Computer by either RS232 protocol or by RJ45 in LAN. So both scanner and computer must be in same network then only it works. Recently the internet of things has been created various services that can be used to connect embedded device to internet. We can use this technology for connecting scanner wirelessly using Wi-Fi to computer.

II. RELATED WORK

A. Survey of Biometrics Security System

Mohammed Nasir Uddin and Selina Sharmin [1] has done comparative study and explores the different biometric technologies. This paper includes the details about physiological characters that can be used to identify person. These are

1) *Finger Prints:* A finger print is the pattern of rids and valley on the surface of a fingertip. The finger prints of the identical twins are different. It is affordable to scan the finger prints of a person and can be used in computer for number of applications.
2) *Hand Geometry:* The hand geometry recognition systems are based on a number of measurements taken from the human hand, including its shape, size of palm, length and width of the fingers. This method is very simple and easy to use.
3) *Face:* The face is the commonly used biometric characteristics for person recognition. The most popular approaches to face recognition are based on shape of facial attributes, such as eyes, eyebrows, nose, lips, chin and the relationships of these attributes.
4) *Voice:* The voice recognition systems have been currently used in various applications. Voice is a combination of physical and behavioural biometrics.
5) *Iris:* The iris is biological feature of a human. It is a unique structure of human which remains stable over a person lifetime. The iris is the annular region of the eye. The left and right irises of an individual can be treated as separate unique identifier.

The Biometric security Systems overcomes the drawbacks of the traditional computer based security systems which are used at the places like ATM, passport, payroll, drivers' licenses, credit cards, access control, smart cards, PIN, government offices and network security.

B. Biometric Security System based on Fingerprint Recognition

Amber Habib, Ijlal Shahrukh Ateeq [2] has given information about fingerprint recognitions system implementation. As shown in block diagram fig.1 the fingerprint base security system is implemented. Matlab software is used for implementation and analysis. The major difficulties encounter to author are that with respect to programming. Trouble in matching the matrix. Then the next

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problem that he came across was with the storage of the fingerprint data in MATLAB. Then, the third problem come across was the verification of fingerprint. They tried a couple of commands in MATLAB to resolve the problem. Then due to the difference of version, some of the commands that tried did not work. To overcome that problem, they installed the new version of MATLAB.

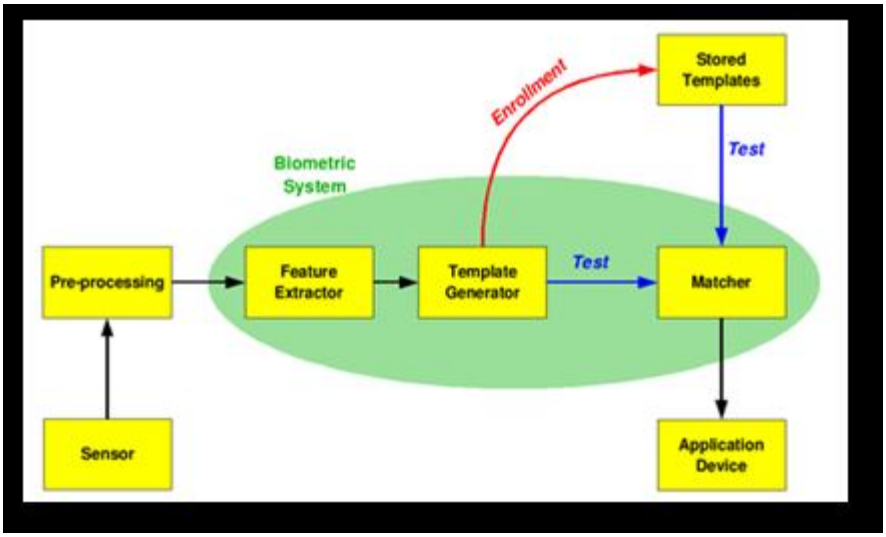


Fig. 1 Block diagram of Biometric system

C. A survey paper on Various biometric security system methods

Ms. Shraddha S. Giradkar [3] has given review on iris recognition, fingerprint recognition and face recognition. In this survey they presented an overview of various biometric methods for security. These are Watermarking Scheme for iris, Canny Edge detection Technique for iris, AdaBoost algorithm for face and Retinex algorithm for iris, Fingerprint and Iris recognition using Fuzzy Logic Scheme. In this paper author focused on fake identities .By making use of image quality measurement it is very easy to identify the real and fake user because fake identities few different features than the original one it always consists of different colour, general artifacts, luminance levels, quantity of information and quantity of sharpness, which may be found in both types of images, structural distortions and natural appearance. They propose the Multibiometric system which is a challenging system than unibiometric system as well as it is more secured.

D. Fingerprint Based Authentication System using ARM7

Ambavarapu Bhavana and M. Jasmine implemented the [4] 'Fingerprint Based Authentication System using ARM7'. They developed an authentication system using finger print and GSM technology. Finger prints of the users are stored in first and the verified at the time of use. If fingerprint is matched to the trained prints then access was accepted again through GSM OTP was generated automatically and then send to registered mobile number. If it was typed by keypad then LCD displays authorized person accessed. The main aim of this project is to provide the security to your bank locker or for your home. This is the multi way security. To do this author used fingerprint module, GSM module and keypad as shown in fig.2.

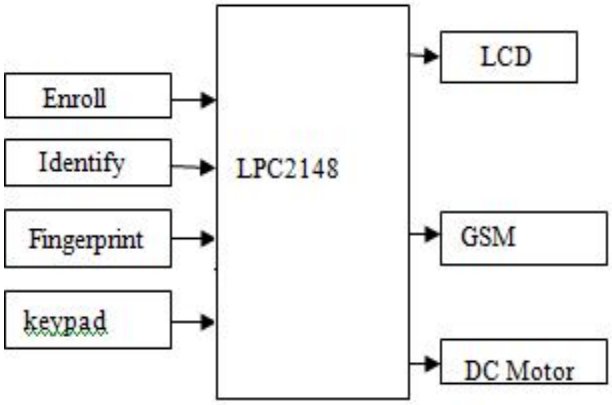


Fig.2 Block diagram of Fingerprint based system using ARM7

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E. Automotive Security and Safety System Using ARM Microcontroller

Suhas S.Kibile, Wasim Ustad [5] has implemented security system for automobile. They used fingerprint Identification Module R303A and Microcontroller LPC2148 in their system.

F. IoT based Biometric Access Control System

Divil Jain and Dr. P.S. Ramkumar has proposed and implemented the [7] IoT Based Biometric Attendance System. They use system are as shown in Fig3.

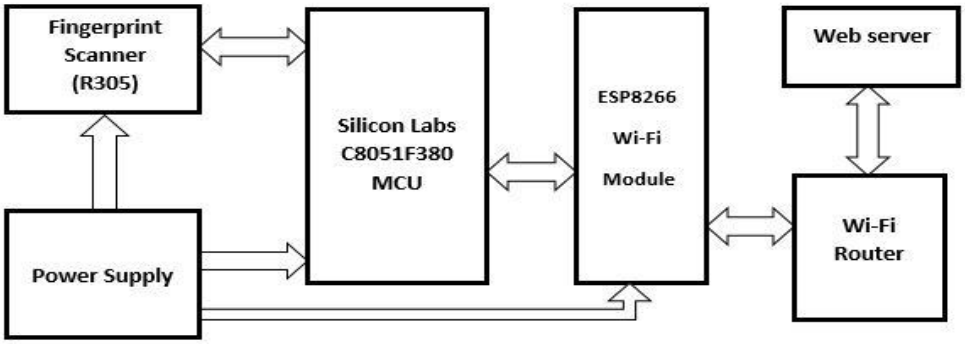


Fig.3 IoT based biometric attendance system

R305 Fingerprint scanner is used here to capture and process the fingerprint image. Silicon Labs C8051F380 acts as a core MCU which performs all input/output operations. ESP8266 12E Wi-Fi module acts as a communication module between C8051F380 and web server. It's used to send incoming data from ESP to web and vice versa. Web server is used to store the attendance related information. Power Supply system Provides power supply as per the requirements.

G. IoT Based Biometric Attendance System

Piyush Devikar, Ajit Krishnamoorthy [8] has proposed system involves a biometric attendance system that integrates an ESP8266 NodeMCU breakout board and a fingerprint scanner. The fingerprint scanner processes the user's fingerprint to verify the student's attendance. NodeMCU uploads the attendance data to Google Spreadsheet using a service called PushingBox API.

III.PROPOSED SYSTEM

From the related paper it is clear that fingerprint authentication system is best for security system. Use of IoT in this system provides the mobility to Scanner unit. The propose system consist of basically two parts Mobile Fingerprint scanner unit and second workstation computer/Laptop. These two units are connected by internet. Mobile Fingerprint scanner is portable can be place anywhere, only needs internet enable Wi-Fi connectivity.

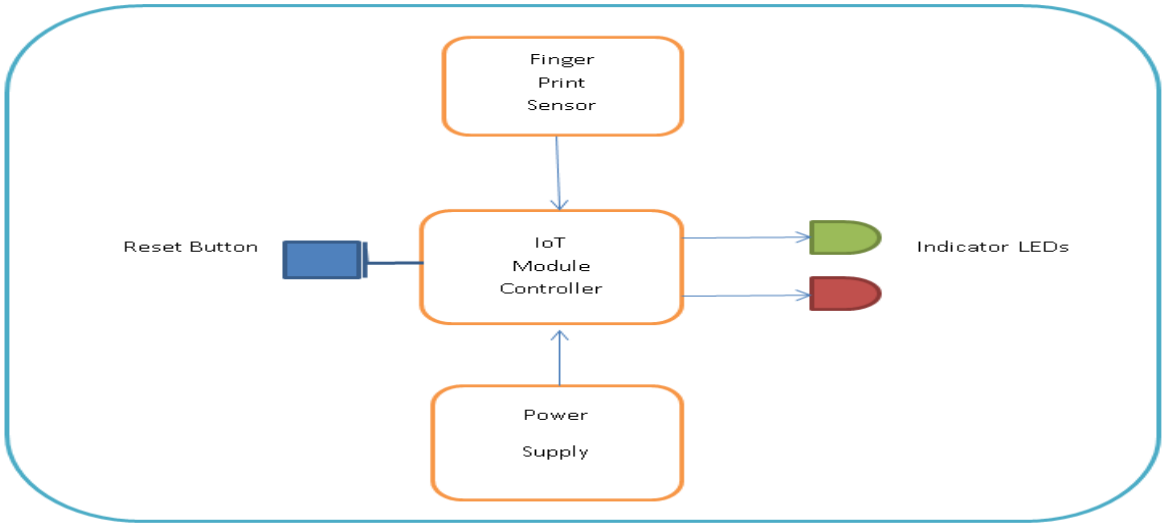


Fig. 4 Block Diagram of IoT based fingerprint scanner unit

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As shown in block diagram Fig. 4 the fingerprint scanner unit consist of battery power supply, IoT module which is NodeMCU and fingerprint scanner GT-511C3, Indicator LED, Reset button. Main controlling unit is NodeMCU which has inbuilt Wi-Fi connectivity. At computer receiver end the system consist of IoT module as shown if Fig. 5 microcontroller and serial to USB interface module.

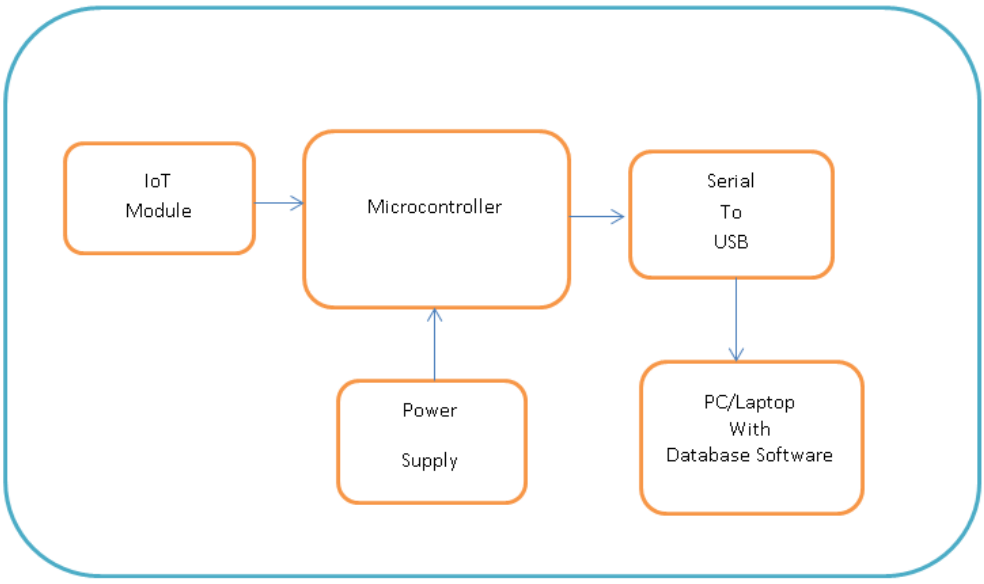


Fig. 5 Block Diagram of IoT based receiver for fingerprint sensor with PC interface

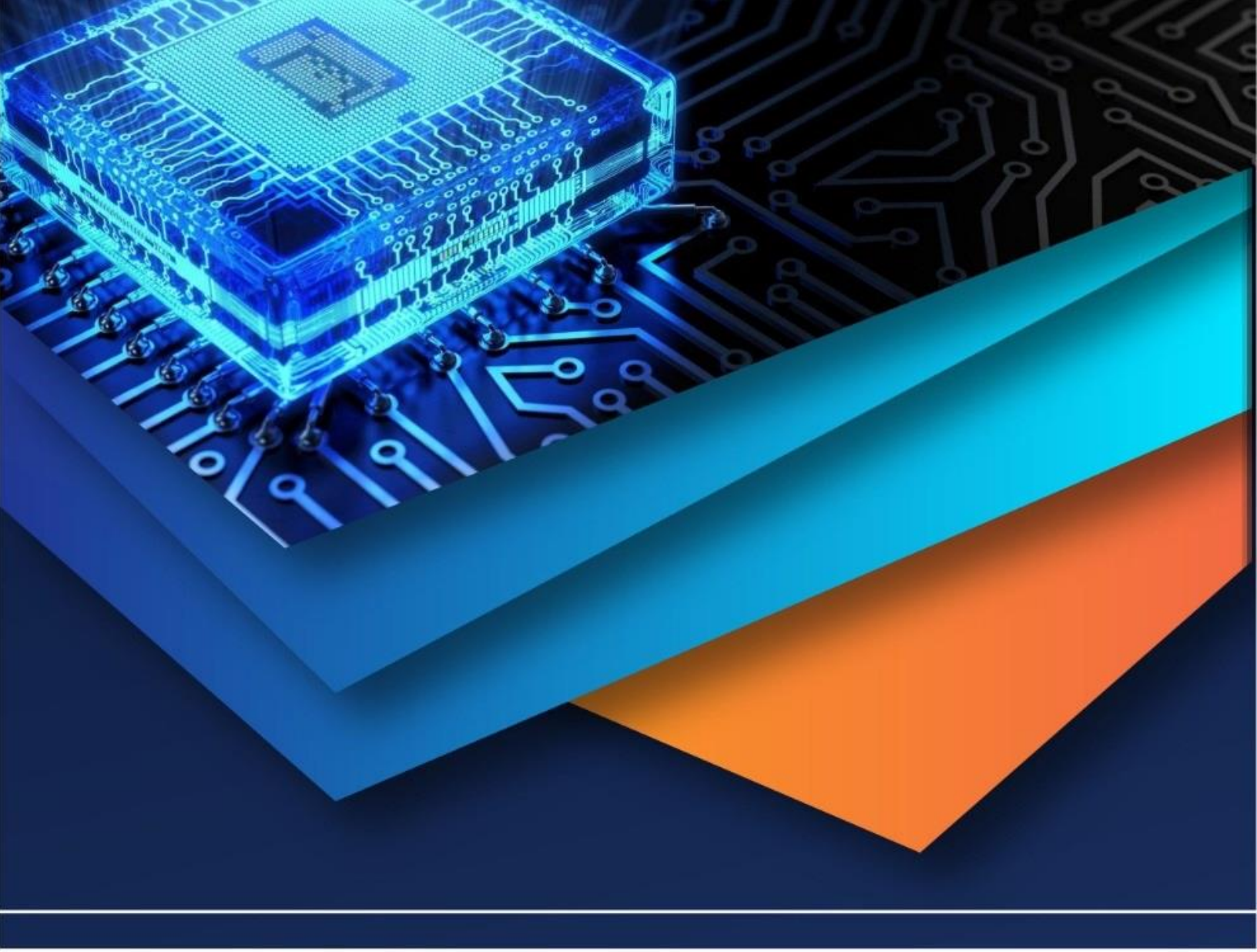
IV. CONCLUSIONS

The fingerprint based security system is best for authentication. But system also needs some modification to avoid fake detection. One of the methods is to use multi biometric authentication. Other method is to use GSM messages based OTP for better security. By use of IoT we can have the advantage of system mobility, feedback message to user. We can move and install IoT based fingerprint scanner unit anywhere, only requirement is the internet connectivity.

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