

FINGERPRINT BASED ATTENDANCE SYSTEM

¹chetna Anand, ²Himanshu Sirohia

¹B.Tech Scholar, ²Assistant Professor

¹chetnaanand1996@gmail.com, ²himanshusirohia@gmail.com

Abstract

Proper attendance recording and management has become important in today's world as attendance and achievement go hand in hand. Attendance is one of the work ethics valued by employers. Most of the educational institutions and government organizations in developing countries still use paper based attendance method for maintaining the attendance records. There is a need to replace these traditional methods of attendance recording with biometric attendance system. The unique nature of fingerprint makes it ideal for use in attendance management systems. Besides being secure, Fingerprint based attendance system will also be environment friendly. Fingerprint matching is widely used in forensics for a long time. It can also be used in applications such as identity management and access control. This review incorporates the problems of attendance systems presently in use, working of a typical fingerprint based attendance system, study of different systems, their advantages, disadvantages and comparison based upon important parameters.

Key Words: Biometric, Fingerprint, GSM, Lab VIEW, MATLAB, RFID, ZigBee

I. Introduction

Presently, attendance of students in most institutes is taken by the teacher on paper based attendance registers. There are various disadvantages to this approach such as data is not available for analysis because paper based registers are not uploaded to a centralized system, time taken for data collection

reduces the effective lecture time and fake attendance by students. Some universities also use wall mounted RFID swipe card systems. RFID (Radio Frequency Identification) is a wireless technology which uses electromagnetic waves for communication between RFID reader and RFID tag. Though better than paper based systems, RFID based systems also have certain problems such as the system is complex, costly and absent student's card can be swiped by other students. Biometric techniques can be used to solve these problems. Biometric is derived from two Greek roots "bios" meaning life and "metrics" meaning measurement. Biometric technology identifies a person uniquely based on his/her characteristics which can be physiological or behavioral. Among the various biometric techniques, there are nine main biometric techniques which are widely used. These include fingerprint, face, hand vein, hand geometry, iris, retinal pattern, voice print, signature, and facial thermo grams. Comparison of different biometric techniques has shown that fingerprint biometric is a reliable, mature and legally accepted biometric technique [1]. Therefore, Fingerprint based attendance system can be used for identification of large number of students in universities and also for attendance monitoring of employees in organizations.

2. Literature Review

Many researchers have implemented Fingerprint based attendance system which makes use of a Fingerprint sensor/scanner along with other technologies. These systems are classified based on the tools and techniques used to implement the system.

A. LabVIEW

The system is designed using 8051 microcontroller, R305 optical fingerprint sensor and LabVIEW [2]. Block diagram of the system is shown in Fig. 2. Microcontroller communicates with computer in which LabVIEW is installed. RS 232 is used for serial communication between microcontroller and PC. LabVIEW is a system design software from National Instruments which is used in the system for storing attendance records, maintaining it in a text file and displaying it to the user. Student ID is also displayed on the LCD screen after fingerprint matching.

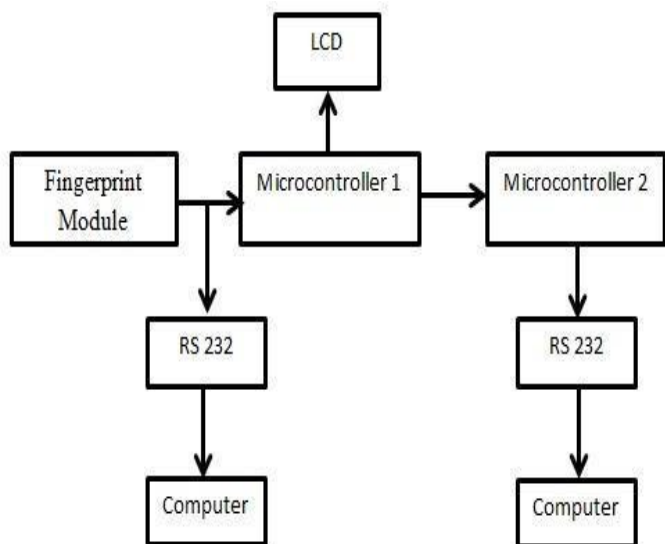


Fig -1: Block diagram of LabVIEW based system [2]

B. Internet of things

Hardware of the system includes ARM9 S3C2440 processor board, FPS200 solid state fingerprint sensor as shown in Fig. 3. Database is designed using SQLite database management tool. In addition to fingerprint

biometric, Vein recognition is also used [3]. The main function of the system includes automation of attendance and login of grades. Internet of things is an interaction of devices using internet.

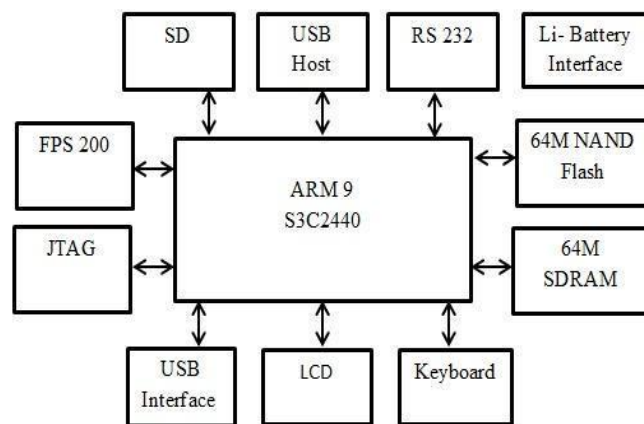


Fig-2: Hardware block diagram [3]

C. GSM and ZigBee

The attendance system shown in Fig. 4 incorporates a low power consumption 2138 microcontroller, SIM 900 GSM module and a ZigBee series 2 OEM RF modules [4]. GSM (Global system for mobile communication) and ZigBee are the additional technologies used in this system.

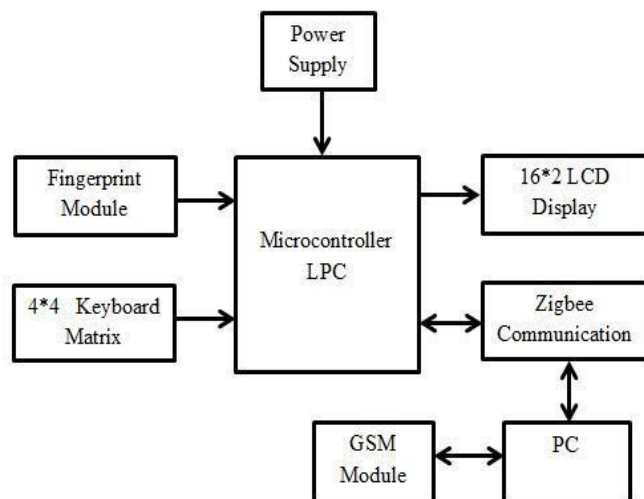


Fig-3: GSM and ZigBee based system [4]

GSM module is used to communicate the daily attendance report of students for every subject along with start time and end time of lecture to head of the department. Parents

are also intimated about the attendance of their ward via SMS. ZigBee uses low power radios to transmit and receive the signals wirelessly. Attendance data is transferred from classroom module to centrally located PC via ZigBee. Data is then stored and analysed in the centralized system. Attendance system using only GSM is implemented by [5] [6] and ZigBee based system is implemented by [7].

D. RFID and Android

This attendance monitoring system uses RFID technology where student has to swipe RFID card along with his fingerprint to mark the attendance as depicted in Fig. 5. An android application is developed through which system can be accessed from any remote location and record of any student can be checked. The system can also detect the location of students, faculties and other members anywhere inside the campus [8]. Online SMS service is used to inform the parents about student's attendance.

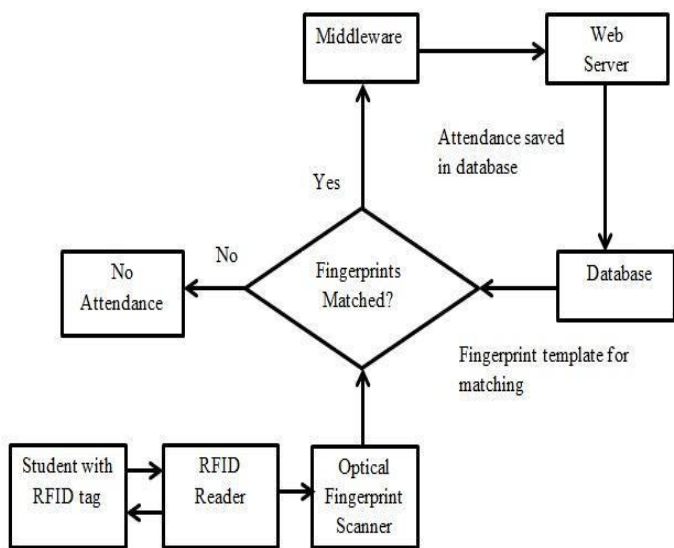


Fig- 5: Flowchart of attendance recording process [8]

E. Cryptography

A portable fingerprint attendance system is designed using Arduino board based on ATmega1280. Different blocks of the system are shown in Fig. 9. Fingerprint scanner ZFM

20 is used having its own processor and memory. TFT touch screen provides user friendly interface. SD card is used for storage of student's records. RTC (Real time clock) provides the exact attendance date and time. Caesar Cipher cryptographic technique is used so that data cannot be manipulated by unauthorized user [9].

3. Conclusion

Biometric technology is a reliable tool for authentication. Various fingerprint based attendance systems have been reviewed .Some of the systems look promising to be practically implemented in developing countries. The existing systems can further be improved or combined which helps in making the system more user friendly, secure and fast. Low cost embedded platform can be combined with the user friendliness of LabVIEW and added functionality of GSM technology.

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