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Fingerprint Based Attendance Management System with SMS Alert to Parents

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Abstract: The system includes terminal fingerprint acquisition module and attendance module. It can realize automatically such functions as information acquisition of fingerprint, processing, and wireless transmission, fingerprint matching and making an attendance report. After taking the attendance, this system sends the attendance of every student to their parent's mobile through GSM and also stored the attendance of respective student to calculate the percentage of attendance and alerts to class in charge. Attendance system facilitates access to the attendance of a particular student in a particular class. This system eliminates the need for stationary materials and personnel for the keeping of records and efforts of class in charge.

Keywords: Fingerprint identification, Attendance System, GSM MODEM, 89c52.

1. INTRODUCTION

Fingerprint is a form of biometric identification which is unique as well as does not change in one's entire lifetime. It consist of two processes namely; enrollment and authentication. Fingerprint based attendance management system is one of the most advanced application in biometric technology. It cannot be forged easily. With the integration and use of biometric technology getting simpler, our proposed system also contains a GSM Modem which can be used to send the attendance information of the students automatically to their parents and also stored the attendance of respective student for calculate the stored attendance percentage weekly and alerts to class in charge of respective class . The design system using a small LCD user interface can be interfaced with the microcontroller by using serial communication interface. The previous projects done were only the fingerprint based attendance system and a report generation. It does not have any SMS alert to her/his parents. This project is to send SMS alert to parents by means of GSM when attendance is calculated.

Fingerprints are matched with the stored fingerprints by using the scanner. Fingerprint authentication has many advantages such as very high accuracy, the most economical biometric PC user authentication technique. If fingerprint is matched then attendance is accepted otherwise it is rejected. For that purpose we are introducing here different fingerprint techniques for maintaining the student attendance system.

2. LITERATURE REVIEW

A number of related works exist on the application of different methods and principles to effectively monitor the attendance of students. An embedded computer based lecture attendance management system was proposed. The system provides an improvised electronic card and card reader serially interfaced to the digital computer system.

A wireless attendance management system that authenticates using the iris of an individual. The system uses an off-line iris recognition management system that can finish all the process including capturing the image of iris recognition, extracting minutiae, storing and matching [7].

Attendance management has also been carried out using attendance software that uses Passwords for authentication. The design and implemented a system that authenticates the user based on passwords, this type of system allows for impersonation since the password can be shared or tampered. Passwords could also be forgotten at times thereby preventing the user from accessing the system [5].

Other attendance solutions are RFID-based student attendance system and GSM-GPRS based student attendance system. This are all device based solutions. Attendance system. These are all device-based

3. PROPOSED SYSTEM

The Fingerprint authentication has many advantages such as very high accuracy, the most

economical biometric PC user authentication technique. It is one of the safest biometric authentication methods widely used. It is very easy to use. Small storage space required for the biometric template, reducing the size of the database memory required and it is standardized. Fingerprint module started to compare the results and it gives the hex codes to the microcontroller for further operations. The microcontroller starts to send the control to GSM based on the results from that module [6].

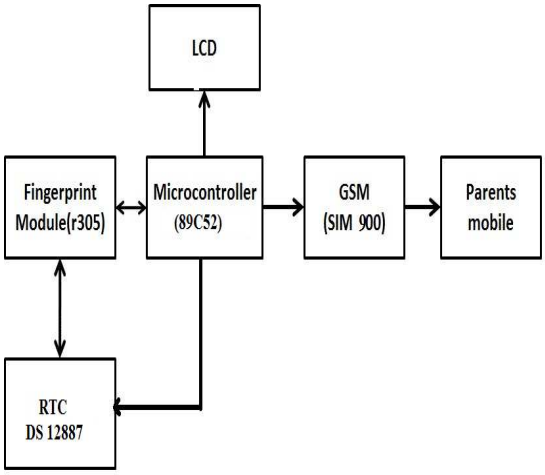

Fig. 1: Generalized Block Diagram

4. STRUCTURE OF SYSTEM

The system consists of fingerprint acquisition module and a GSM modem. Fingerprint acquisition module is used for capturing the fingerprint and pretreatment. GSM modem is used to send the attendance of the students to their parents in the form of SMS.

In a structure of system mainly fingerprint module is most important module by using fingerprint module we take fingerprints of student and generate template of that particular student and stored these template for future used concern that is to collect the attendance for the total one week attendance report generation and to sending these report to parents by means of GSM.

In our system we use 89c52 microcontroller to control overall system hardware and RS232 for the serial communication between fingerprint module and controller.

5. DESIGNING SYSTEM HARDWARE:

The system hardware includes: fingerprint acquisition module, GSM modem, Microcontroller, RTC, EEPROM, MAX-232 and LCD.

5.1 Block Diagram of System

Figure 2 shows the block diagram of the fingerprint based student attendance system. Attendance is marked after student identification. For capturing the fingerprint, a fingerprint scanner is used. After capturing the fingerprint by the fingerprint scanner, system matches this captured data with the data stored in the memory chip. If it is matched attendance is marked of that student and the ID number of that student is display on the LCD screen. After that weekly attendance sends to the parent's mobile through GSM modem.

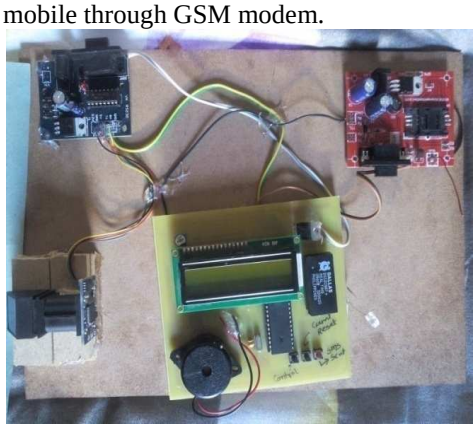

Fig. 2: Fingerprint based attendance management system

Students will hand over the device to other students whose attendance is not marked. After a time interval, device will not allow any attendance. The main function of the device will be fingerprint identification of students followed by report generation and sending report through GSM. Fingerprints are considered to be the best and fastest method for biometric identification. This system has advantage to track the attendance of the student by their parents.

In our system we can also collect the fingerprint template of every student for every day in week and generated attendance report are send to class in charge.

In our design system also contain RTC for providing the real time concept to our design system, And we use EPROM of RTC for store the weekly attendance and these attendance is erased after one week. Here RTC DS12887 is used to design our system.

5.2 Fingerprint Acquisition Module

Fingerprint acquisition equipment mainly has three kinds, Optical Fingerprint Sensors, Semiconductor Fingerprint Sensors and Ultrasonic Fingerprint Sensors. In this system, 305 fingerprint sensor is used as shown in Fig. 3. It consists of optical fingerprint sensor, high performance DSP processor and Flash. It has 64kb user flash memory. It can store 512 fingerprint templates. It perform the functions such as fingerprint login, fingerprint deletion, fingerprint verification, fingerprint upload, fingerprint download, etc [1]. When reading fingerprint images, it has self-adaptive parameter adjustment mechanism which improves imaging quality for both dry and wet fingers.

Fig. 3: Fingerprint Module R305

A fingerprint scanner system has two basic jobs - it needs to get an image of the finger and it needs to determine whether the pattern of ridges and valleys in this image matches the pattern of ridges and valleys in pre-scanned images. The heart of an optical scanner is a charge coupled device (CCD).

A CCD is simply an array of light-sensitive diodes called photo sites which generates an electrical signal in response to light photons. The scanning process starts when the finger is placed on a glass plate and a CCD camera takes a picture. The scanner has its own light source, typically an array of light-emitting diodes, to illuminate the ridges of the finger.

The CCD system actually generates an inverted image of the finger with darker areas representing more reflected light (the ridges of the finger) and lighter areas representing less reflected light (the valleys between the ridges) [1].

5.3 GSM Modem

Global System for Mobile Communications (GSM) is a standard developed by the (European Telecommunications Standards Institute) ETSI in order to represent the protocols for 2G cellular networks used by mobile phones. We have majorly two types of SIM modules. They are SIM 300 and SIM 900. In SIM 300, we have to face network problem in sending message which is overcome in SIM 900. So, we used SIM 900 in our project[8].

The main purpose of the GSM in is to send and receive the messages. We not only make a call but also browse using the GSM. The GSM has the operating voltage of 12v. It has mainly of three pins namely transmitter, ground and the receiver pin.

To perform these tasks, a GSM modem must support an "extended AT command set" for sending/receiving SMS messages. GSM is one of the most useful inventions in the modern world. It has many advantages than other technology standards. The Advantages of GSM are-

- Worldwide roaming
- Security
- Reasonable devices and facilities

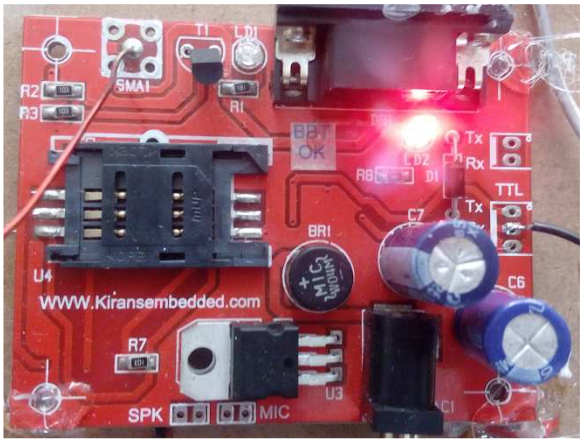

Fig. 4: GSM modem

The communication with the system takes place via RS232 serial port [2]. It works in frequency band 900MHZ or 1800 MHZ and baud rate is 300 bps to 115 kbps, where between 1200 to 115 kbps is automatically configured [3].

5.4 Microcontroller

Microcontroller forms the backbone of the system. In this system 89C52 microcontroller is used. The AT89C52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes by the software interface.

6. SYSTEM SOFTWARE DESIGN

For designing of our project we used 3 software i.e. EAGLE, program studio and Micro C Pro. EAGLE software is used for designing the PCB layout. For writing our program, we used program studio software. After writing our program, we cannot burn that program directly into microcontroller. First we have to generate hex file of that program and then we can burn that hex file into controller. For generating

that hex file we used the Micro C Pro software. Assembly language is used for programming.

7. EXPERIMENTAL RESULTS

The proposed system scanned the fingerprints placed on the device sensor and compared them against those stored in the database successfully. The performance of the system was acceptable and would be considered for full implementation especially because of its short execution time and reports generation. This system takes the attendance of the student and sends this attendance to their parent's mobile through GSM.

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Fig. 5: LCD display

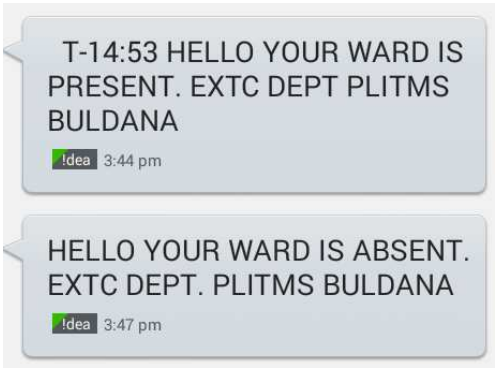

Fig. 6: Message display on parents of mobile

8. CONCLUSION

The main purpose of this project is to monitor the student attendance in lecture, tutorial and laboratory sessions in more efficient way and send this attendance to their parents. This system resists students from bunking classes through SMS sending feature to parents. Biometrics has been used effectively for more than a decade for time and attendance system. Fingerprint attendance system is a cost effective simplified system that uses fingerprints for identification.

9. FUTURE SCOPE

When student is regularly absent within four day or six days, a free voice call is generated to call the parents mobile number by using GSM technology.

For developing a multiple face detection and recognition device as a replacement of the fingerprint reader for easy login and logout transaction in the system.

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