Biometric Attendance Monitoring System

Mrs.Sakhalkar Neha[#1],Ms.Dubal Rutuja[#2], Ms.Gurav Sayali[#3], Ms.Gurav Snehal[#4],Ms.Haldavanekar Siddhi[#5]

[1,2,3,4,5]*Department of Electronics and telecommunication Engineering, Finolex Academy of Management and Technology, Ratnagiri, Maharashtra, India*

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Abstract - Attendance for the students is an important task in class. When done manually it generally wastes a lot of productive time of the class. As it the repetitive, Student authentication can be automated using various methods available in the market like biometric attendance. This proposed solution for the current problem is through automation of attendance system using fingerprint recognition. Now a day's speed and efficiency is what needed to reduce the time of work and performance of an individual or a system. Hence we are presenting an automated attendance management system using raspberry pi which is a smarter and more efficient way.

*Key Words***:**Fingerprint, Biometric,Raspberry

1.INTRODUCTION

Monitoring the attendance is very important in all the institutes for checking the attendance and presence of students. Every institute follows their own method for maintaining attendance. Some teachers take attendance manually using the traditional pen and paper and some uses automatic attendance methods. There are many ways existing for this purpose they are as follows:1) Biometrics based Attendance System (Iris, Face, Thumb, etc..).2) RFID Based System.3) Extracting Features from an image based Attendance System.4) Bluetooth Based Attendance System

The mostly used method for taking attendance is totally manual based i.e. by using sheets of papers or books. Sometimes the attendance sheet could be lost because of this method and may easily allow for the impersonation. This method is time consuming hence for reducing this weaknesses, there is a need of an automated and reliable system. Due to our manual attendance system lot of time is being wasted because of calling each student numberand name and also the teacher has to do lot of paper work and maintaining that paper sheet is quite difficult. Sometimes the problem of illegal attendance is faced. So it became necessary to do all this online and automated. Biometric authentication is one of the most popular and accurate technology.

A fingerprint is based on the biometric system that records the attendance automatically. This system consists of Raspberry pi, the heart of the project and the fingerprint sensor which is used to detect person's identification. Each time it is checked whether the obtained fingerprint matches with the record in the flash memory and accordingly the attendance will be stored. By making the use of the system, we overcome the problems such as proxysignature, securityrisk etc.

2. LITERATURE SURVEY

One of the main aim of this research is to empower biometrics as an authentication method forthe security purpose like authenticating for cloud services, unlocking the door, accessing a particular service etc. taking into account the privacy and security challenges that fingerprint biometrics when used for remote application.Fingerprint based system is better than other because it saves valuable time that could be efficiently used for teaching.[1]

Table1. comparison of different techniques

TECHNIQUE	SPEED	SECURITY LEVEL	COST	PORT-ABLE
Paper based attendance system	Very low	Least	Low	Yes
RFID based attendance system	High	Moderate	High	No
Barcode based attendance system	High	Moderate	Moderate	No
GPS/Bluetooth based attendance system	High	Moderate	Moderate	Yes
Fingerprint based using Raspberry Pi	High	High	Low	Yes

Problem associated RFID based system is that students have to carry RFID cards and also the RFID detectors are needed to be installed. While GSM-GPRS based system is not dynamic and if at some times the schedule or location of class changes wrong attendance might be marked. These problemsare not in the fingerprint based system so proxies can't be given.[2]
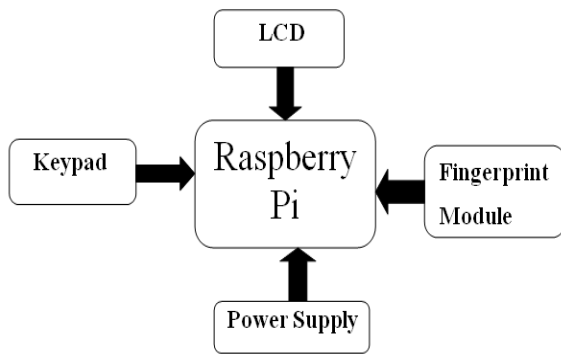
3.BLOCK DIAGRAM

Fig-1: Block Diagram

4.HARDWARE

4.1 Raspberry Pi:

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation. The Raspberry Pi is a smart-card-sized computer that Plugs into your LCD and a keyboard. It is very small Computer which can handle all electronics related Projects that can be handled by your desktop PC. The Raspberry Pi 3 Model is the third Generation Raspberry Pi model. Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster Than the first generation Raspberry Pi.The Raspberry Pi devices are developed with varieties of memory size. Raspberry pi is developed for the Educational types of project.

Fig-2: Raspberry Pi

4.2. Fingerprint Module:

There are many kinds of fingerprint module. They are Optical, capacitive, piezoresistive, ultrasonic, piezoelectric, RF, Thermal, etc. An optical fingerprint sensor is used in this systemThis sensor read the fingerprint pattern. The scan image is Converted as template and saved in memory.

Fig-3: Fingerprint module

4.3 LCD:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. LCDs are available to display low information content, which can be displayed or hidden, such as present words, digits, and seven-segment displays.

Fig-4: LCD

4.4. Keypad 4X4:

Keypad 4X4 is used for loading numerics into microcontroller. It consists of 16 buttons arranged in a forms an array containing 4 lines and 4 columns. It is connected to the development system by regular IDC 10 female connector plugged in some development system port.

Fig-5: Keypad 4X4

4.5 Serial to USB Converter:

PL2303- PL2303HX USB to TTL serial UART converter module is a handy, low cost module. Adopt imported controller RS232 TTL, which can stabilize the flash with high speed 500 mA self recovery fuse for protection. Two data

transmission indicator can monitor the data transfer status in real time. Reserve 3.3 v and 5 v pin interface, easy to DDWRT of different voltage system that needs power. The entire board is coated by a high quality transparent heat shrinkable sleeve, making the PCB in insulation state from outside, so that the board won't be burnt down by a material shortcut.

Fig-6:Serial to USB Converter

5. SOFTWARE

5.1 PuTTY:

PuTTY is a free an open source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP<SSH, Telnet, rlogin and raw socket connection. It can also connect to a serial port.The name "PuTTY'" has no official meaning. PuTTY was originally written for Microsoft windows,but it has been ported to various other operating system.Official ports are available for some Uniux like platforms, with work-in-progress ports to classic Mac OS.

5.2 VNC Viewer:

VNC is a graphical desktop sharing system that allows you to remotely control the desktop interface of a one computer from the another computer or a mobile device. VNC viewer transmits the keyboard and either mouse or touch events to the VNC server, and receives updates to the screen in return.

steps:
1. Enable VNC

Click on the Raspberry Pi icon and select preferences > Raspberry Pi configuration. After click the interfaces tab which is followed by the Enabled radio buttons beside VNC

2. Check your credentials

Click the VNC buttons and note down the 4 b numbers that appears below connectivity which are your computer's IP address on the network.

3. Open VNC viewer

Click the Raspberry Pi icon and select the VNC viewer from the internet sub menu if you are connecting from another Raspberry Pi then enter the IP address of your original machine otherwise, open it on your computer of choice and enter the IP address there.

5.3 FingerprintLibrary(pyR305):

It is easy to use Python Library for R305 fingerprint sensor. It is used to interface your R305 with Raspberry Pi. There are many functions to interface R305 module with Raspberry pi.

- f.enroll() function takes the finger two times.
- f.match() used to match with database.
- f.delete() deletes enrolled fingerprint.
- f.empty() it clears all the enrolled fingerprints.

6. WORKING AND RESULTS
A. Biometric Attendance Monitoring System Consists 4 basic functions of attendance system namely 1. Attendance 2.Enrollment 3. Delete 4. Shutdown

B. After initialization , the main menu , which contains all above basic functions , is displayed on LCD
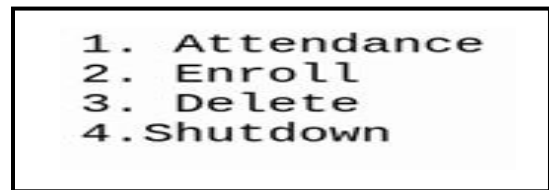

Fig-7: Output

C. STEP 1:
1. The first step is to create database of the student before actual attendance.
2. Enrollemnt procedure is carried out when key 2 on keypad is pressed .
3. The roll no of student and proper month are entered which leads to generate the ID of perticular student.
4. The confirmation will be asked and finger print is taken.
5. All such fingerprints are taken and stored in the database.
6. During the attendance , student's fingerprint will be compared with the fingerprints stored in database.

```
key2
2
2
Password
Graduating Month
(Two Digit)
key0
0
0
next no
key2
2
02
02
Student Number
(Two Digits)

key1
1
next no
key2
2
student
ID: 12-FEB
1 : Confirm
2 : Cancel

key1
1
Student ID: 12-FEB

*Waiting For Finger*

*Remove Finger*

*Place Finger Again*

Fingerprint Registered
```

Fig-8: output of STEP 1

D. STEP 2:
1. The second step is to take the attendance on daily basis.
2. Attendance is taken when key 1 on keypad is pressed.
3. Fingerprint is scanned using fingerprint module.
4. Scanned fingerprint is compared with the fingerprints in the databse .
5. If fingerprint is matched then student's ID is displyed and attendance is recorded.
6. If fingerprint is not matched then inavlid user will be displayed.

```
key1
1
1
Currently used templates: 13

*Waiting For Finger*

Found template at position #5

PLEASE WAIT


YOUR ID NUMBER:11-JAN

Sign In Successful
```

Fig-9: output of STEP 2

E. STEP 3:
1. The stored fingerprint can be erased from the database using DLETE function.
2. To delete fingerprint of any perticular student , key 3 on leypad is pressed.
3. The student's ID is entered.
4. Confirmation is asked.
5. After the confiramtion , student's ID is deleted from the database. So attendance of perticular student will not be taken .

```
key3
3
3
Currently used templates: 14/1000

user to be deleted
key0
0
also enter 2nd no
key3
3
User Deleted!
```

Fig-10: output of STEP 3

F. STEP 4:
1. Last step is to shutdown the system
2. If key 4 on keypad is pressed , System recognize the command of shutdown
3. After the confirmation, system will be automatically shut down.

```
key4
4
4
**Confirm Shutdown**
1. Confirm
2. Cancel
```

Fig-11: output of STEP 4

G. The stored attendance of student is transferred to the Excel software and total mothly attendance will be calculated and displayed.

7.CONCLUSION

Biometric technology is an effective tool to verify identity and detect fraudulent issues.This system is designed to make whole attendance taking process to become more reliable,convenient, effective and accurate This project is designed to aim in eliminating spotted problems during initial analysis.

This system is user friendly and very reliable. Therefore, it can be implemented both in organization and educational institutions.

8.SCOPE

The scope of this project is to develop a student attendance management system through the fingerprint scanning.

The student attendance management system will only be developed for managing the student attendance status and allowing lecturers/faculty staffs to easily analyze the information regarding the student attendance. In other words, it means that this attendance system will only cover the functions related to student attendance but not any others function related to another thing. So at the end of the project, a system will be developed which is used for recording the attendance of students more efficiently and effectively through the fingerprint scanning.

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