FINGERPRINT WIRELESS ATTENDANCE SYSTEM WITH REPORT GENERATION

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Abstract— In many real time applications available today many users get attracted towards BIOMETRIC ATTENDANCE SYSTEM because of its accuracy and simplicity. There had been a big challenge to develop such fingerprint based attendance system.

In this approach, the attendance system using Linux based Raspberry Pi has been proposed. The process is initiated with the database creation through fingerprint reader and proceeds with the recognition and authentication using given system. The entire process is done on Raspberry Pi platform. This paper presents the sta-ndardized fingerprint authentication model which is able to extract the finger print of the individual and test it against the stored database. It can also provide daily and monthly attendance summary to the teachers and parents.

In the following study, the main purpose and focus of biometric system is to utilize it for verification and authentication of physical attendance of the inmates of any organization and this is entirely based on working principle of biometrics on control of prominent scalability, flexible properties,/ and reduction of cost for reducing requirements of biometric systems for numerous computational resources.

Keywords*—attendance system, fingerprint, Linux platform, raspberry pi*

I. INTRODUCTION

The human body has an advantage of having the unique features for each individual. These unique characteristics proceed in the field of biometrics and its application in the field of security. Biometrics gained popularity in less time and proved to be reliable mode ensuring the privacy and security. This system has number of applications in the places like schools, colleges, airports, hospitals, offices etc.

Biometric is the study of involving the application of statistical analysis to biological data. The main concern in the biometrics is the inherent and uniqueness in the features. It includes various physical traits like fingerprint, palm, veins structure, face, iris etc. When it comes to the term of security, the accuracy and reliability are two important parameters.

Fingerprint based biometric systems are one of oldest techniques and widely used for biometric authentication because of its simplicity and accuracy. Fingerprint of everyone is different , hence it is most useful to initiate the model.

The concept of attendance exists in different places like hospitals, institutions to mark presence of person during start and end of the day. The traditional way of taking attendance in a class contains a person, register and a pen. This is the huge drawback where attendance can be manipulated and it is very time consuming process. There are chances of students who don't respond to the attendance and later start to claim it for. Hence the new procedure of taking the attendance by using fingerprint is much easier and therefore overcomes all the above mentioned drawbacks [1-2].

Fingerprint sensor is used to detect the human being identification by detection of fingerprint. For example, the students need to place their fingers on the fingerprint sensor to obtain their attendance in schools and colleges. Then it is cross checked with the flash memory's records and then after the students get the attendance [3-4]. By using this system, issues of proxy attendance overcomes and thus none of the students can give attendance for their friends who are absent. In Raspberry-pi the software platform used is (Linux Operating system), Python language. The additional features in the attendance management system can also indicate whether the employee or student is late. Some future enhancements for the system are extending the current flash memory to store the complete data of the student. The system is well equipped to track the departure and arrival time of the student or employee for additional monitoring. To develop a biometric architecture rraspberry pi has been

used as it has provision of connecting with cameras, fingerprint scanners etc. via USB ports. In this paper, Raspberry Pi is used as a wireless, low-cost, remote enrolment node and the biometric authentication can be hosted on the cloud as Software-as-a- Service.

II. LITERATURE SURVEY

Sasse et al. [6] experimentally investigated the password problem's main cause such as technical/organizational requirements and memorability issues (e.g., forced to change password). The study concluded that Human Computer Interaction (HCI) techniques can be used to address almost all password problems.

Similarly, Yan et al. [7] empirically studied passwords security and memorability. In [9] among the biometrics of face, finger, hand, voice, eye, DNA and signature, the face biometric ranks first in the compatibility evaluation of a machine readable travel document (MRTD) system based on the six criteria as: enrolment, redundancy, storage requirements, renewal, machine assisted identity verification requirements, public perception, and performance.

In [10] ,authors projected an image capturing technique in an embedded system based on Raspberry Pi boards. On a PC, most of the recognition systems are always centered, the portability of which is limited by its weight, size and the high power consumption.

In [8], implementation of feature extraction of fingerprint and footprint in Raspberry Pi has been conversed. Numerous image processing techniques are implemented on Raspberry Pi using open source open CV library into a Linux platform. A cloud based biometric architecture is proposed [14] on Raspberry Pi which has aid in developing a low-cost, saleable and portable biometric system.

In [11] authors have proposed a face recognition system on cloud. This paper tries to elaborate on the issues such as the most common challenges and obstacles encountered, when moving to a cloud platform, standards and recommendations pertaining to both cloud-based services as well as biometrics and existing solutions.

From the literature survey it is revealed that less work is done in generating reports of exam results and delivering them to parents automatically along with attendance records. In the smart attendance system, record of marks of respective exams will be generated and an excel sheet of marks will be prepared and it will be delivered to parents. This will help to improve the academic performance of students. Average record of attendance will be analyzed daily and monthly report of attendance will be created.

III. PROPOSED SYSTEM

The block diagram of the proposed system is as shown in Fig. 1.

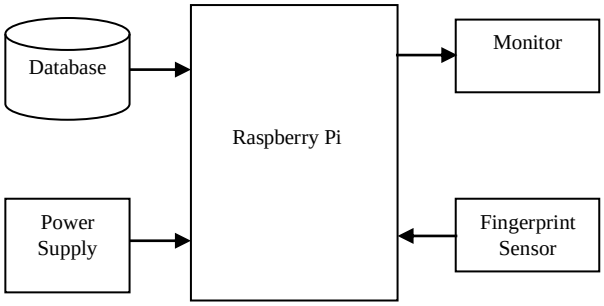
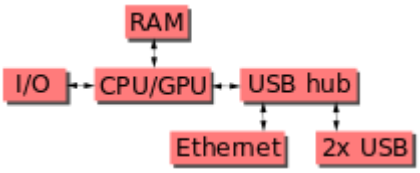


Fig. 1. Proposed Fingerprint based attendance system

The proposed fingerprint based attendance system with report generation consists of Raspberry Pi as main controller and fingerprint module with GSM module. The fingerprint wireless attendance system with report generation gives the facility of real time authentication.

A. Raspberry Pi

Raspberry Pi is an affordable and tiny computer which can be used by us to learn programming which is very enthusiastic, challenging and can be used for practical projects. It is a little device which helps to enable people for exploring computing and pi helps to learn different programming languages like **scratch and python**.



The pi foundation works on putting the power of digital making and computing all over the world. SMS can also use Raspberry Pi for business intelligence as a dashboard. This board has a inbuilt Bluetooth 4.1 module and powered by Broadcom BCM2837 64bit ARMv8 processor. It is clocked at 1.2 GHz. It has HDMI, 4 USB ports , Ethernet and one 802.11n WLAN. It can be powered by 5v via GPIO header or micro USB. It also has 26 pins including 8 General purpose Input/output(GPIO), one I2C bus, one SPI bus, one UART bus and3.3V, GND and 5V(supply voltage). An external SD card is used for booting its operation . [14]

For raspberry pi, the recommended programming language is python and Linux is its operating system. It is neither micro-controller nor microprocessor. It is single board computer. If we can compile languages for ARM's chip, these languages then can run on pi.

A and B are two models of Raspberry Pi but preferable is B if there is any general cause.

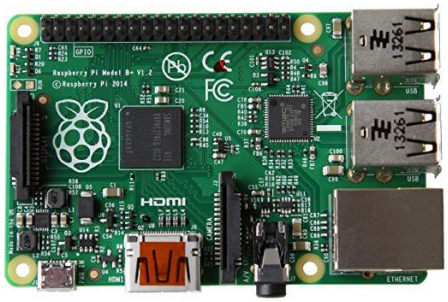


Fig. 2. Raspberry Pi3B module

B. Fingerprint module

Fingerprint left by friction edges is an impression of human fingers. They get deposited on any surface by sweat which occurs from endocrine glands present in epidermal ridges. On friction ridges even an impression of foot can be there which is detectable. Fingerprint records contain impression on last joint of fingers and thumb from pad.

Here, R307 fingerprint module is used. The system module contains TTL UART interface to connect it with microcontroller through RS232 serial bus. This module is reliable for all kind of Operating System. It is even easy to interface with Raspberry Pi (Debian OS). [8]

Features of Finger Print Sensor (R232) -TTL UART:

- Power DC : 3.6V-6.0V
- Interface : UART (TTL logical level)/ USB 1.1
- Working current : 100mA
- Peak Current : 150mA
- Matching Mode: 1:1 and 1:N
- Baud rate (9600*N)bps, N=1-12 (default N=6 57600bps)
- Character file size: 256 bytes
- Image acquiring time : <0.5s
- Template size : 512 bytes
- Storage capacity: 256
- Security level : 5 (1, 2, 3, 4, 5(highest))
- FAR : <0.001%
- FRR: <0.1%
- Average searching time: < 0.8s (1:880)

Fig. 3. Fingerprint Module R307

fig 4: Thumb Scannning

Fig 5: An illegal fingerprint where access is denied

Fig 6: Scanning of thumb

C. Power supply

MicroUSB slot is available on Raspberry Pi which has ability to provide 5V and at least 700mA supply. Apparently normal mobile phone chargers are applicable and do not have any efforts to power off the Raspberry Pi from a USB port of another computer or hub because they are mostly incapable of supplying the required current.

In most of the electronic products a power supply is needed for converting mains AC voltage to a regulated DC voltage. Each and every component is needed to be designed carefully for designing of the power supply. .

IV. SOFTWARE ARCHITECTURE

The fingerprint wireless attendance system with report generation works on python language. The algorithm and features of the python language are explained as under:

A. *Python*

The python language can be easily learnt and is being used in variety of applications. For the reason that this proposed system can execute code line by line, this language has been used and hence this is said to be an 'interpreted language'. Python is easily executable on different platforms like Linux, Windows, and Macintosh as well as on Unix. It is open source language. The language is recognized as object oriented language too.

B. *Software Algorithm*

Software Algorithm of the System works different manner in four different stages. The explanation of each step is as given below:

Key-1:

1. Select Key-1 using button.
2. Place a thumb.
3. By scanning thumb, it sends message to the parent that student is In/Out from college.
4. Finish.

Key-2:

1. Select Key-2 using button.
2. Place a thumb of authorized person to unlock the student database.
3. The student's appropriate information(e.g. Roll No, Name, Mobile No, Subject Marks etc.)will be stored, and an excel sheet of marks will be prepared automatically.
4. There is automatic transmission of message to parents after providing all required information.
5. Finish.

Key-3:

1. Select Key-3 using button.
2. The mode helps to record the attendance of students.
3. The attendance of students will be taken, verified and granted hourly, an excel sheet of attendance gets prepared.
4. Finish.

Key-4:

1. Select Key-4 using button.
2. The mode is useful in sending messages regarding the attendance of the student to respective parents.
3. First Roll number from excel sheet of Mode-2 and the attendance record from mode-3 excel sheet will be taken and after combining them it will be sent to respective parents.
4. Finish.

C. *Flow Chart*

Flow chart of the proposed system is shown in Fig. 4.

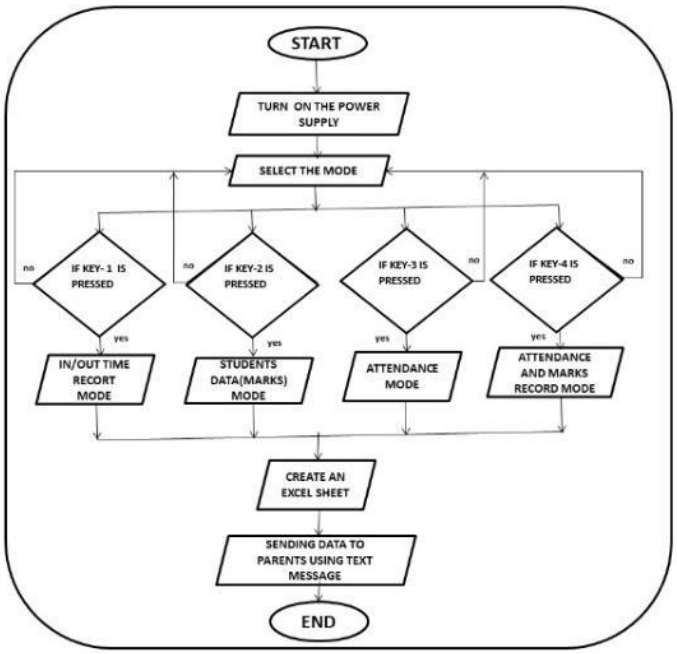
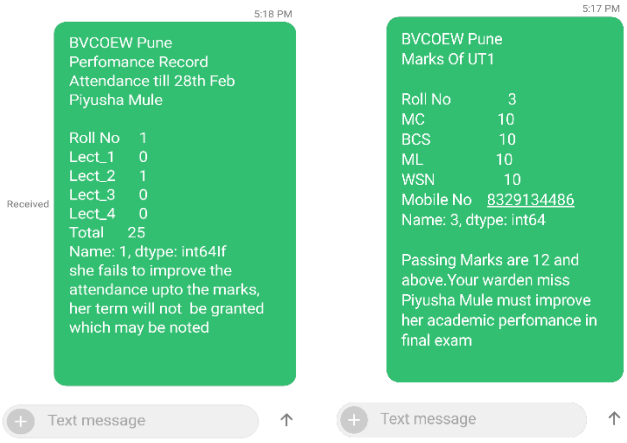


Fig 7: Flow chart of the proposed system

For marking the attendance, a student must place his or her finger on fingerprint sensor. As fingerprint is identified of each student, his or her attendance record gets updated in database. Here excel sheet gets created on computer and it will be sent to teacher and to student's parents via message.



V. EXPERIMENTAL RESULTS

1. Attendance of students is being maintained.

2. The delivery of the arrival and as well as departure times will be made available to parents.

3. It will save the record of student's marks in particular exam

4. Entire academic data of respective student's is delivered to parents via message.

VI. CONCLUSION

This system is very useful to Guardian Faculty Members, class teachers and as well as to respective parents, since every students academic record is maintained and it is for the betterment of students that their data is delivered to parents. Real time authentication facility is provided in the proposed smart attendance system. The problem of fake attendance (proxy) can be solved.

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