

Highly Secured Indoor Outdoor Localization for E-Hostel Management

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Abstract – This paper completely describes about the automatic attendance marking system and parent alerting system for high safety for the hostel students were present more than 500 in one institution. In this model each and every student has to store their finger print data base with their parents or guardians mobile number. We have proposed a system that takes attendance of student and maintaining its records in an academic institute automatically. Were the students has to place their finger print on two biometric system which is placed in the hostel office room and in the main gate of watchman room. When the both finger print matches with the help of WIFI interfaces which compared with previously stored data base of the student and the result produces true, then the students allowed to exit from hostel. At the same time SMS alert of the students exit time and the date will be send to the parents through GSM module to their mobile and a copy of total number of students exited from the hostel is stored in the PC. The LCD display is connected with the module to count the number of students exited from gate.

Index Terms – RF, GSM, BIOMETRIC system, WIFI finger print, LCD display, MATLAB 7.2.

1. INTRODUCTION

Fingerprint system is one of the main forms in biometric field which is used to identify the individual and their uniqueness. Fingerprint authentication is one of popular authentication systems in the world. Due to their consistency and uniqueness it is used widely. There are several sources available for the collection and their established use. In the past, magnetic card attendance system was widely used. But, this system has lot of bugs in it. The card may be lost or damaged. But in this fingerprint attendance system is highly secure and cannot be forged easily. In recent time, there has been high level of impersonation experienced on a daily basis in both private and public sectors, the ghost worker syndrome which has become a menace across all tiers of government, employers concerns over the levels of employee absence in their workforce and the difficulty in managing student attendance records.

Fingerprints are a form of biometric identification which is unique and does not change in one's entire lifetime. This paper presents the attendance management system using fingerprint technology in a university environment. It consists of two processes namely; enrolment and authentication.

During enrolment, the fingerprint of the user is captured and its unique features extracted and stored in a database along with the users identity as a template for the subject. The unique features called minutiae points were extracted using the Crossing Number (CN) method which extracts the ridge endings and bifurcations from the skeleton image by examining the local neighborhoods of each ridge pixel using a 3 x 3 window. During authentication, the fingerprint of the user is captured again and the extracted features compared with the template in the database to determine a match before attendance is made. Attendance management system is one of the most advanced applications in biometric technology. It cannot be forged easily. With the integration and use of biometric technology getting simpler, many institutions are using down the biometric road to verify the time and attendance of their students and staffs. The system also contains a GSM Modem, which can be used to send the attendance information of the students automatically to their parents. The Embedded system using a small LCD user interface can be interfaced with the computer by using serial communication interface.

The previous papers done were only the fingerprint based attendance system and a report generated and the SMS send to the parents. This paper helps to identify the students those who have not impressed the finger print properly and gives them alert to place it properly. And also counts the number of students exited from the hostel that which can be displayed in LCD and recorded in PC that which is connected with biometric system. And the exit time and date of the student's messages are send through the SMS using GSM module to their parents. 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.

2. RELATED WORKS

Biometric system is the most important technology that which is used in various applications. Here this has more advantages that which overcome the manual record analysis. That which

finds the uniqueness identification of each and every individual person that which represent the complete data of the persons. Which cannot be easily forgery?

2.1. Comparative Table

Title	Method	Strength	Limitation
An Energy-Efficient indoor Localization System Using ZigBee Radio to Detect WiFi Fingerprints (July-2015)	ZigBee, indoor localization , energy saving, Wi-Fi, fingerprint.	Low-power consumption. Low cost. WIFI-high range to transmit data.	Zigbee has only short range. Need more than one to transmit data to distance.
Biometric Attendance Recording and Communication System. (April-2015)	Fingerprint, Attendance ,GSM Module, microcontroller zigbee.	Reduce risk of false attendance. Reduce of keeping paper, manual report. Avoid loss of papers.	Entering fake attendance report using paper sheets. Sometime paper may get damage or missing of papers.
Automatic Attendance Marking and Parent Alerting System Using RFID And GSM (June-2014)	RFID, GSM, LPC2148 microcontroller	Unique RFID cards are given. preventing late, comers ,Save time, avoid noises from outside class	Once the door is closed then the students are not allowed till the class time ends.

ARM7 Based Smart ATM Access & Security System Using Fingerprint Recognition & GSM Technology (feb-2014)	ATM Terminal, ARM 7, Fingerprint Module, GSM Modem, OTP, Temperature and Tilt Sensor	Money transaction can be done with the help of biometric identification. Increases the safety of ATM machine	Portable of debit card and credit cards may be lost.
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Table 1 Comparative table

2.2. Automatic Attendance Marking and Parent Alerting System Using RFID And GSM by Augusta SophyBuelet. P, GaddamManoj Kumar, Gunda Venkatesh, Tanguturi Sai Jaswanth, (June-2014)

This paper presents the design and construction of automatic attendance marking and parent alerting system, in order to create an ideal environment for teaching in classes. In this model every student and lecturer shall be having a unique RFID card. As a student comes near the class door it opens only if his RFID matches with the database and once he entered the class the door closes. This process continues until the professor enters the class, once he enters the class the door is locked and the list of absent students is created. SMS shall be sent to the respective parents of the absentee students through the GSM module present in the model. During this process though the RFID of the student is matched he is not allowed to enter the class as he is late or any other student inside the class is allowed to leave the class. The class door opens only when the professor brings his RFID tag near the class door indicating the completion of class and the same procedure continues for every class.

2.3. Biometric Attendance Recording and the Communication System by Mahesh P Potadar, Vaibhav V Marathe, Akshay S Khose, Lokesh A Kotkar- (April-2015)

This paper deals with biometric, fingerprint attendance recording system. This paper focuses attendance recording system of students in educational institute. Truly it is an electronic attendance monitoring system which reduces the risk of false attendance recording. It also reduces the problems like keeping the paper attendance record, damage of paper record or loss of paper attendance record. It will record the attendance of subject teacher and students for a particular class and subject. Attendance of student will be also communicated to respective authorities through GSM module. The objective of

this paper is very simple to go for paperless attendance recording system and to save papers, save environment.

3. PROPOSED MODELLING

In the proposed model that the system which over comes the single biometric system. Here we use two systems which is place in the warden room and watchman room in main gate. This increases the security high for the exit of students. And collect the exit time and date of the student with the help of WIFI and sends the SMS alert to the parents through GSM module. The total number of exit students report will be send to the PC located in warden room.

4. RESULTS AND DISCUSSIONS

4.1. Software Analysis

In this analysis we have scanned the fingerprint data of students and stored in the PC. By using mat lab the simulation output is analyzed. When the finger is impressed in warden room that data is delivered to watchman rooms system and stored. When the same student places the finger in main gate that should be matched with previous data stored from warden room. Then the result generates "MATCHED", which allows the student to exit from hostel.



Fig.1 Matching With Different Impressions

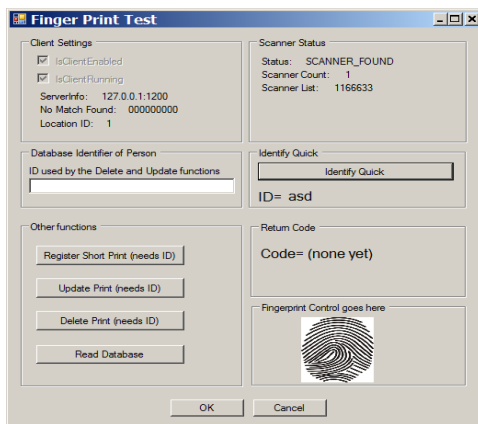


Fig.2 Finger print test

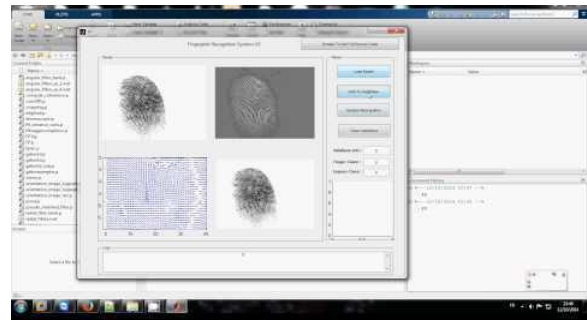
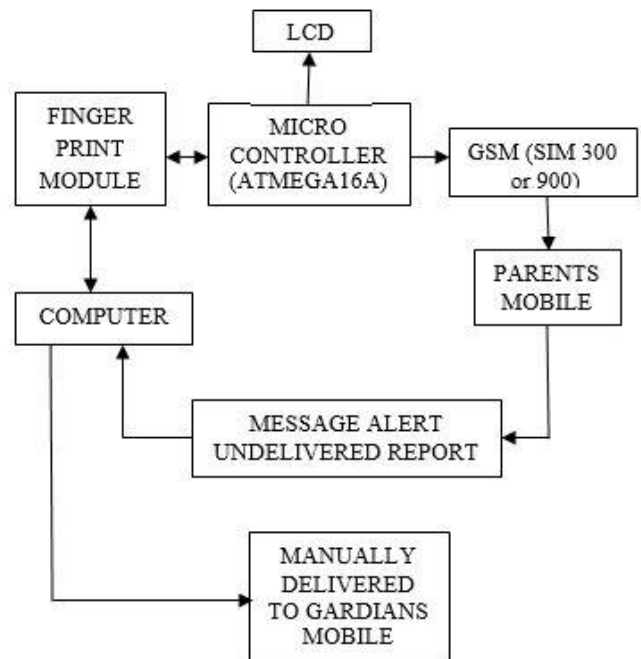


Fig.3 Matched data base with the two input

4.2. Hardware Analysis

General Block Diagram



4.2.1. Block Diagram Explanation

The finger prints from the various users are acquitted using the fingerprint module. For example we are taking the samples of three or four fingerprints and they are enhanced using several enhancement techniques. After that we detect the edges along the image using the edge detection function. Here we use the pewit operator for the detecting the edges. We use minutiae matching algorithm for matching the finger print images. Instead of doing all these image processing works, we had used Fingerprint Module (R305) in this paper. The circuit is made to be switched ON and all the initialization processes are done. The "Initialization done" message has to be displayed in the screen. Up to that user should not keep any fingerprints for scanning. After that "Show the Finger" will be displayed on the

screen. The fingerprint that has to be compared is already stored in the memory of fingerprint module. The fingerprint module is capable of storing about 100 images in the inbuilt memory. Now the fingerprints are kept for scanning with in a stipulated time period.

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 the finger print module. But the microcontroller has only one transmitter pin in it. We have to communicate both of the GSM and fingerprint modules but not at a time. For that we are using Relay for switching between the GSM and fingerprint module. There are also commands for holding the fingerprints and for comparing it. The system sense the finger print of each and every individual student and generate the result "Matched" then they are allowed to exit from hostel. At the same time the date and exit of time will be sending to their parents with the help of GSM module. If the finger print is not matched then they are not allowed to exit. If the fingerprint of an unknown person is kept for scanning then the scanning will not take place. If unknown persons fingerprint is kept then the message "Not Identified" will be displayed.

This helps the parents to know the exit of the student from the hostel. If the image is not placed in the hostel office room then it cannot be matched with the exit of hostel main gate. Due to this condition the student are not able to exit from main gate. The total no of students exited are calculated to compare with manual report taken by the warden. If the SMS is not delivered then it can be finding through the WIFI module connected to the pc. And the message can be send to the guardian's number manually. The fingerprints are one of the greatest authentication systems where students cannot forge very easily. This can be practically implemented by extending the time period and student's attendance can be managed.

4.2.2. Working Principle of Fingerprint Module

4.2.2.1. Image Acquisition

The Fingerprint images from various users are taken using the module. The finger module itself has an internal memory which can store about 100 images in it. These images are used for the enhancement in next stages.

4.2.2.2. Image Enhancement

The image is enhanced using the techniques like Histogram Equalization. It is nothing but the graph plot for number of pixels against the gray level. The overall contrast of the image is made uniform and image looks enhanced. Now the image is suitable for the extraction of minutiae extraction.

4.2.2.3. Edge Detection

They are many operators used for detecting the edges. The operators are Prewitt, Laplacian, Sobels, and Robertson

Operators. The Prewitt operator is one of the best edge detecting operator and we are implementing Prewitt operator in this paper. The edges have to be detected in order to match the input image with already saved image. There are two types of masking used here. They are

- i) Horizontal masking
- ii) Vertical masking

4.2.2.4. Extraction of Miniature Points and Matching

After the extraction of edges, the points are marked in it. Those points which are detected after edge detection are known as miniature points. The miniature points that are extracted are compared with already stored images. In order to find the matching process the correlation factor and the Euclidean distance has to be found out. Based on the tolerance value the matching results can be found out.



Fig.4 Minutiae before marking

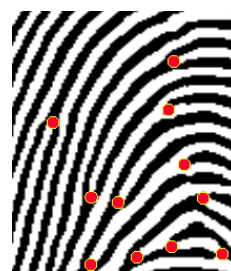


FIG.5 Minutiae after marking

4.2.2.5. GSM Module

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. Here the SIM 300 is enough for our purpose. SIM 900 is used for some advanced purposes and it has many additional features.

The advantages of GSM are,

- 1. Worldwide roaming
- 2. Security

3. Reasonable device facilities

4. Extensive spectrum available

4.2.2.6. Working Principle of GSM with Microcontroller

The result from the fingerprint module is taken and it is analyzed in the microcontroller. We use "ATMEGA 16" microcontroller in the paper. The result from the GSM module is received by microcontroller. If the already stored image in the memory and input image are matched then microcontroller will send the control to the GSM module. The GSM will send the messages to respective parent's mobile numbers. If the fingerprints are mismatched then the control signal will not be sent to the GSM module. After some time interval the details of the students who were not present were taken. Those persons details were taken and message of "NOT PRESENT" is sent to their respective parent's mobile numbers. So, the parents may know about the student's presence immediately. The Students cannot forget this system easily.

5. CONCLUSION

In this paper we have proposed the working model of the system that which overcomes the improper placement of finger prints and analyze the undelivered SMS to the parents due to network failure. In proposed method, the system that which sense the finger prints of the students and compare them with the stored data base. They have to impress their fingers in two systems which are placed in warden room and hostel main gate. If that system matches the impression then the result will be generated as "MATCHED" then they are allowed to exit if it is "NOT MATCHED" not allowed to exit until they place in warden room. And at the same time the SMS is send to the parents using GSM module. If SMS is not delivered the report will be submitted to the hostel PC. And manually the SMS is send to the related guardian's mobile number. The automatic recording system that which save the time of taking the attendance in the place of more than 500 students present in the hostel. Then the result of present and absent will be recorded correctly.

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