
Biometric Fingerprint Attendance System Using Arm7 and GSM

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Abstract

This paper is presented about a system of recording student attendance using fingerprint identification that allows students to monitor student attendance or an employee attendance to class or an institution is a true electronically. Biometric identification is one of the oldest methods which have been successfully used in numerous applications. Every person has unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The distinctiveness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending. It can reduce the presence of fraudulent students or employee and the system can also reduce problems such as the presence of the missing paper and easily damaged. With this system can replace the existing manual system to a more systematic and electronics. This attendance system will be displayed on a computer with more attractive statistics. This system can be used by lecturers to replace the old method of attendance recording, so that the integrity of the attendance record can be upheld. The actual attendance can be recorded and stored in database. The system is also capable of processing the record to determine students who do not fulfill the attendance percentage requirement.

Keywords: *Fingerprint, biometric identification, attendance monitoring, immutable.*

INTRODUCTION

Reliable personal authentication has become an important human computer interface activity in an increasingly digital world. National security, electronic banking, access to computer networks and attendance monitoring and verifications are some examples where establishing a person's identity is very important. Typical security measures rely on knowledge-based approaches like passwords or token-based approaches such as swipe cards and passports to regulate access to physical and virtual spaces [1]. Though ever present, such approaches are not very secure. Passwords and personal identification number (PIN) may be stolen electronically while signatures can be easily forged. Furthermore, those approaches cannot differentiate between authorized user and a person having access to the tokens or knowledge. Biometrics such as fingerprint offers means of reliable personal authentication that can address these problems and is gaining public confidence.

In this paper, an attempt was made to look at the prevalence in the 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 absence in their workforce and difficulty in managing student attendance during lecture periods. Sequel to this, a fingerprint-based Attendance Management System was developed to provide a faster, more secure, and more convenient method of user verification than passwords and tokens can provide for a reliable personal identification. [2]

EXISTING SYSTEM

Attendance management is the act of managing attendance or presence in a work setting to minimize loss due to employee downtime. Attendance control has traditionally been approached using time clocks and timesheets, but attendance management goes beyond this to provide a working environment which maximizes and motivates employee attendance.

Attendance management is a major part of today's human resource systems; take organization towards better human resource practice, systems and excellence, hence regular attendance and punctuality are expected of all employees or candidates in a work setting. Unsatisfactory attendance caused by unscheduled absences and tardiness cause a disruption in work, affects productivity,

and creates morale problems when workloads are shifted to other employees. Moreover, in many institutions, and academic organizations, attendance is also a very important criterion which is used for various purposes. These purposes include record keeping, assessment of students, and promotion of optimal and consistent attendance in class.

In developing countries, a minimum percentage of class attendance is required in most institutions and this policy has not been adhered to, because of the various challenges the present method of taking attendance presents. This traditional method involves the use of sheets of paper or books in taking student attendance. This method could easily allow for impersonation and the attendance sheet could be stolen or lost. Taking of attendance is time consuming and it is difficult to ascertain the number of students that have made the minimum percentage and thus eligible for exam. Thus, there is a need for a system that would eliminate all of these trouble spots

PROPOSED SYSTEM

This proposed system introduces a new automatic attendance management system, which integrates fingerprint authentication into the process of attendance management

for both staff and student. It is made up of two processes namely; enrolment and authentication.

During enrolment, the biometrics of the user is captured and the minutiae data are extracted and stored in a database as a template for the subject along with the user's ID. The objective of the enrolment module is to admit a user using his/her ID and fingerprints into a database after feature extraction.

These features form a template that is used to determine the identity of the user, formulating the process of authentication. The enrolment process is carried out by an administrator of the attendance management system. During authentication, the biometrics of the user is captured again and the extracted features are compared with the ones already existing in the database to determine a match. After a successful match, attendance is marked against the user's id used in matching the templates.[3]

The work utilized a fingerprint reader as the input to acquire images, developed program that has fingerprint recognition and identification system as well as database to store user's information. The database comprises the fingerprint

templates and other bio-data of the users together with the attendance records made by the users. Figure 1 shows the architecture of the proposed attendance management system.

This proposed system also facilitates to provide an SMS alert along with a URL to the concerned person as an information passing mechanism. On clicking the URL, statistic report of the person identifying is shown. If an unauthorized person is trying to identify, an alarm is buzzed out.

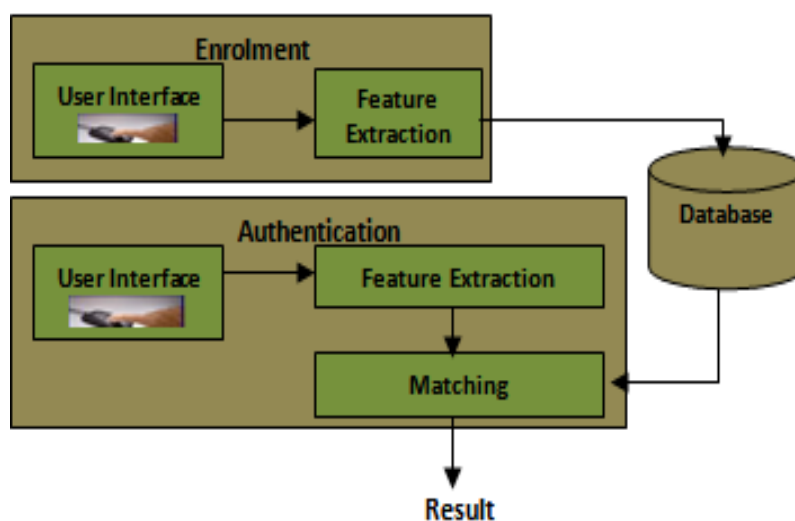


Figure:- 1 Architecture of Proposed based Fingerprint based Attendance Management System

BLOCK DIAGRAM DISCRIPTION

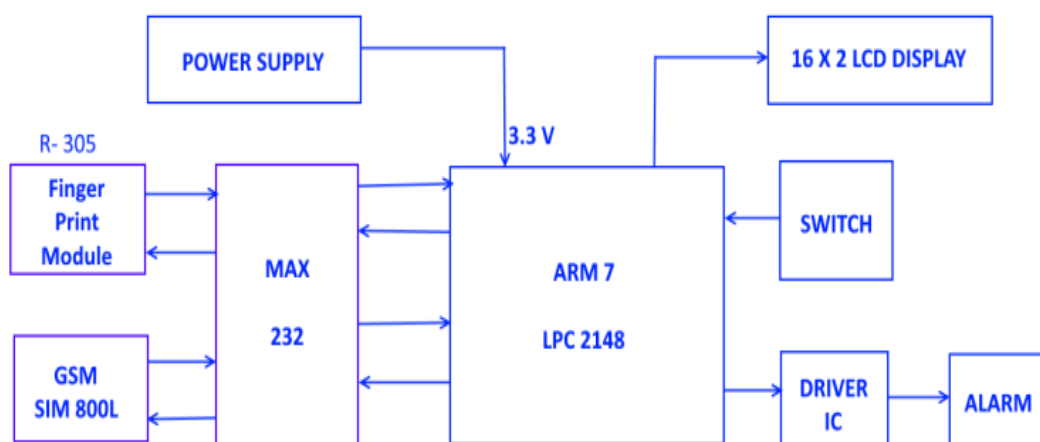


Figure 2: General block diagram

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 prewitt 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 module but not at a time. For that we are using Relay for switching between the GSM and fingerprint module.[4]There are also commands for holding the fingerprints and for comparing it.

The person whose fingerprint is matched and there will not be any SMS send to those persons. The persons whose fingerprints were not kept were taken and SMS will be sent only to those numbers. 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. With the help of this the parents can be known about their arrival of the Students to the college or school. 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.

A) Liquid Crystal Display Unit (LCD)

Liquid Crystal Displays are created by sandwiching a thin (10-12 micro mm) layer of a liquid crystal fluid between two glass plates. A transparent, electrically

conductive film or back plane is put up on the rear glass sheet. The transparent sections of the conductive film in the shape of the desired characters are coated on the front glass plate. When a voltage is applied between a segment and the back plane, an electric field is created in the region under the segment. This electric field changes the transmission of light through the region under the segment film.

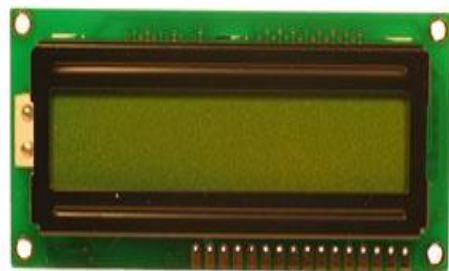


Figure 3: Liquid Crystal Display

B) GSM – An Overview

GSM, Global System for Mobile communications, is today the most successful digital mobile telecommunication system. This second-generation (2G) system provides voice and limited data services and uses digital modulation with improved audio quality.

The different versions of GSM are:

GSM 900 band (850-915MHz up-link frequency and 935-960MHz downlink frequency) GSM 1800 band or digital cellular system (DCS) 1800 band (1710-

1785MHz up-link frequency and 1805-1880MHz downlink frequency. Personal Communication service (PCS) 1900 band (1850-1910MHz up-link frequency and 1930-1990MHz downlink frequency) FF



Figure 4: GSM module

C) Communication of GSM with Microcontroller

The result from the fingerprint module is taken and it is analyzed in the microcontroller. We use “ARM7” 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.

RESULTS



Figure 5: LCD Displaying initial message

When power supply is given to the kit then the LCD displays WELCOME as shown in below fig 5 and after sometime the LCD displays send message as shown in fig 6

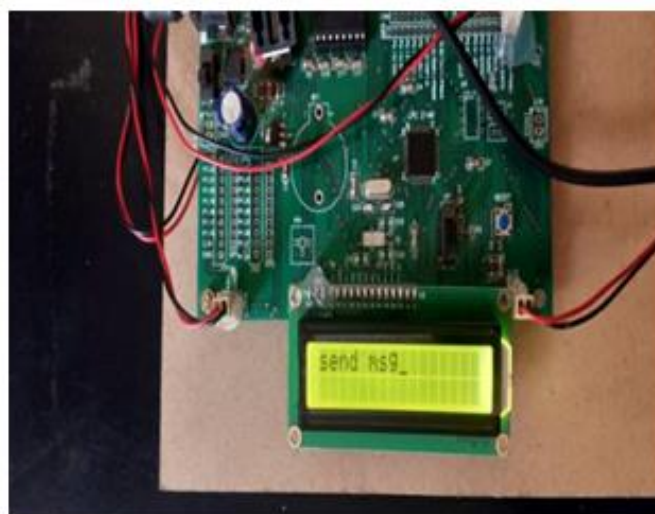


Figure6: LCD information passing mechanism

When the message *<recipient number> is sent from the respective user to sim which is placed in the GSM, then modem is initialized and the same is displayed in the recipient textbox as shown in Figure 7

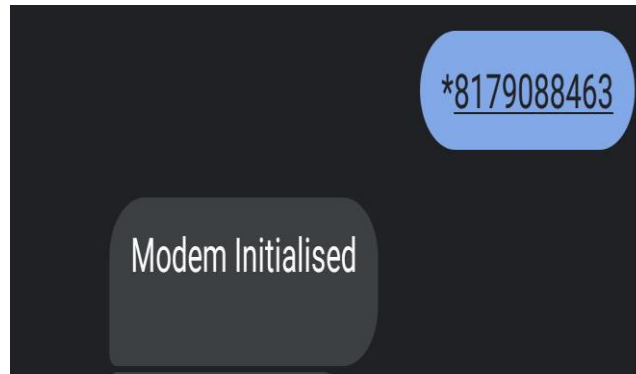


Figure 7: Modem initialized message

A message of place your finger is displayed in the lcd as shown in figure9 while enrolling and identifying.



Figure 8: Enrolling status

When identifying the finger lcd is displayed with id number along with in status in lcd and in text box in the below figures.

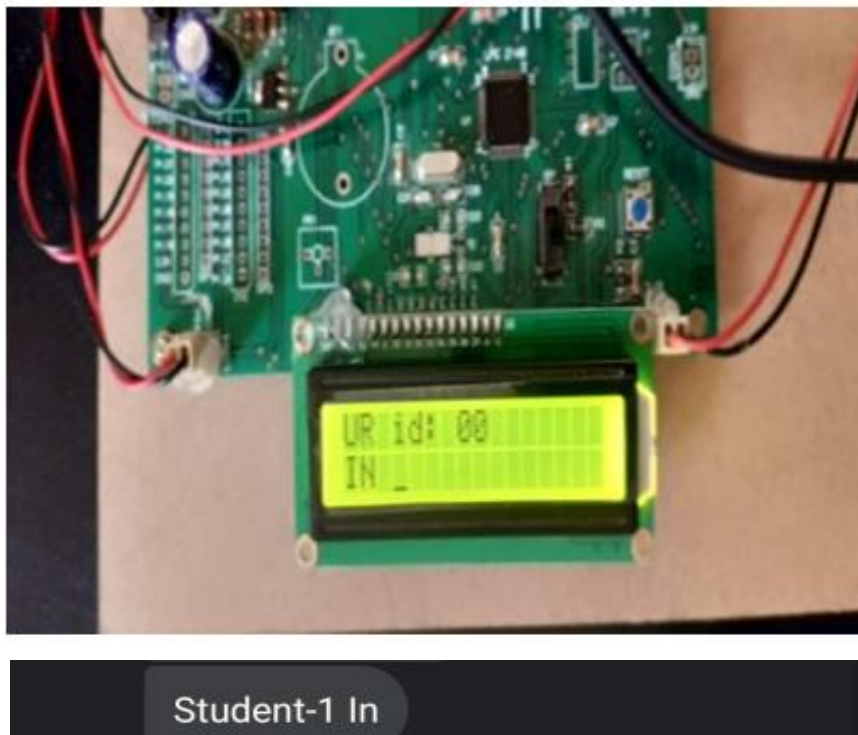


Figure 9: Displaying IN with id

Status of the student is reported on to the server with statistical graph.



Fig 10: Student IN statistics

The second time placing the figure indicates status of outgoing of student in lcd display.



Figure10: Displaying OUT with id

Statistical graph showing out status of student in server



Fig 11: Student Out statistics

When any unauthorized person tries to identify then the buzzer buzzes out and an sms is sent.

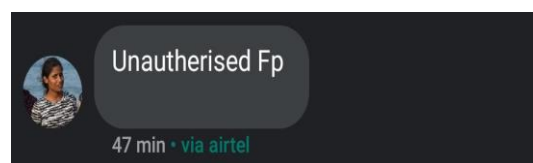


Figure 12: Displaying unauthorized

The below figure shows the complete hardware description of the work

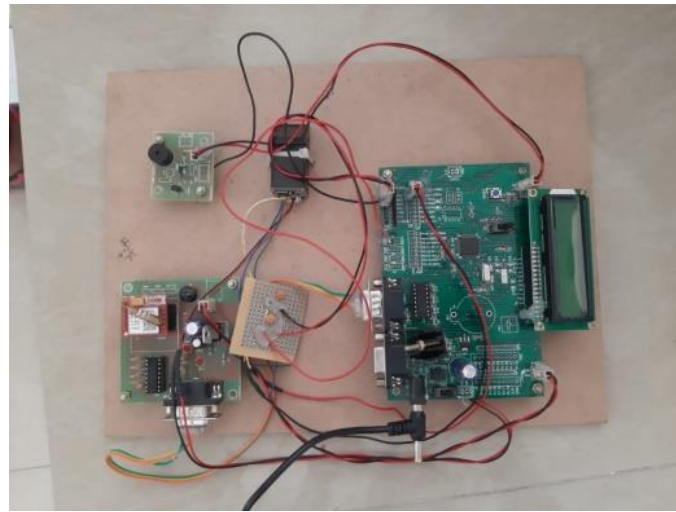


Figure 13: Overall hardware of the work

CONCLUSION

In this paper, we have presented a fingerprint-based attendance management system. The developed system is an embedded system that is part of a fingerprint recognition/authentication system based on minutiae points. The system extract the local characteristic of a fingerprint which is minutiae points in template based. Templates are matched during both registration and verification processes. For improved quality control during the registration or verification process, a matching score was used to determine the success of the operation. The matching score was specified so that only sets of minutiae data that exceed the score will be accepted and data below the score will be rejected. Therefore, Fingerprint Recognition using Minutia

Score Matching method was used for matching the minutia points before attendance is recorded.

The developed system is very helpful in saving valuable time of students and lecturers, paper and generating report at required time. The system can record the clock in and clock out time of students and workers in a very convenient manner using their fingerprint to prevent impersonation and reduce level of absence. Also, it reduces most of the administrative jobs and minimizes human errors, avoids proxy punching, eliminates time-related disputes and helps to update and maintain attendance records.

REFERENCES

- I. Murizah Kassim, Hasbullah Mazlan, Norliza Zaini, Muhammad Khidhir Salleh “Web-based Student Attendance System using RFID Technology” 2012 IEEE
- II. B. Rasagna, Prof. C. Rajendra “SSCM: A Smart System for College Maintenance” International Journal of Advanced Research in Computer Engineering & Technology, May 2012.
- III. LI Jian-po, ZHU Xu-ning, LI Xue, ZHANG Zhi-ming “Wireless Fingerprint Attendance System Based on ZigBee Technology” 2010 IEEE.
- IV. O. Shoewu, O.A. Idowu “Development of Attendance Management System using Biometrics” The Pacific Journal of Science and Technology, May 2012.

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