

THE DESIGN OF EFFICIENT AND SYNERGETIC ATTENDANCE SYSTEM USING FINGERPRINT TECHNIQUES

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ABSTRACT

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 caused a disruption in work, affects productivity, and creates morale problems. Fingerprints are considered to be the best and fastest method for biometric identification. The reason for the popularity of fingerprint verification is that fingerprints satisfy uniqueness, stability, permanency and easily taking. In this paper aims at designing a student attendance system using fingerprint technology in a university environment which could effectively manage attendance of students. 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. Biometrics refers to the automatic identification of a person based on his or her physiological or behavioral characteristics. This system eliminates the need for stationary materials and personnel for the keeping of records.

Keywords: *Fingerprint identification, Attendance System, Wireless communication*

INTRODUCTION

Tracking student attendance in the classroom is by enforcing the students to manually sign the attendance sheet, which is normally passed around the classroom while the lecturer is conducting the lecture. There are numerous disadvantages of using such system. The attendance sheet is passed around the class; some students may accidentally or purposely sign another student's name. Another issue of having the attendance record in a hardcopy form is that a lecturer may lose the attendance sheet. As a consequence of that, lecturer can no longer trace the students overall attendance record throughout the particular semester. In this system students report their attendance via biometric system and parents can receive SMS notification of attendance (Rasagna, Rajendra 2012).

Manually taking attendance and maintaining it for a long time adds to the difficulty of this task as well as wastes a lot of time. Because they have to confirm, particular student has participated particular subject at the relevant

day, if he\she present they should be given a result as a passed or fail and if fail the examination branch should issue another attendance sheet for repeat exam next time. Otherwise if some students could not participate the exam on reasonable fact they must be face to exam next time as fresh candidates and also they must keep records of dropped out students as some violations.

Each time we make an application or admission paper for a course or any other purpose to the university, and all this requires lot of verification and also the form becomes complicated with so many documents attached. Sometimes the staff due to his negligence can make error in verification and can lead to errors. Also students may do many mistakes, the result of all of these things will cause to be regenerate that process from beginning. How about exam admission paper, if it is destroyed, forgotten or loss with other documents especially the student and also others will face to many difficulties. Otherwise lecturers have to go to each candidate and make a sign while they writing to the exam.

For this reason, an efficient system is proposed to solve the problem of manual attendance of an Examination. This system takes attendance electronically with the help of a fingerprint recognition system, and all the records are saved for subsequent operations. There are a lot of expectations that the use of fingerprint recognition will increase which is dependent of some factor involved like small fingerprint capturing devices, fast computing hardware, and awareness on easy to use methods for security (Maltoni, Maio, Jain, Prabhaker, 2003) (Manvjeet Kaur, Mukhwinder Singh, Akshay Girdhar & Sandhu, 2008). Radio Frequency Identification (RFID) is one of the automatic identification technologies more in vogue nowadays Among biometric traits, fingerprint is widely accepted by people because of its uniqueness and immutability (Jain, Ross & Salil Prabhakar, 2004) (Hamid, 2010). Fingerprint recognition systems perform well (that is, they are accurate, fast, and robust), they are publicly acceptable and they are hard to circumvent (Digital Persona, 2010). Figure 1 shows the general architecture of a biometric system

(Shoewu & Idowu, 2012).

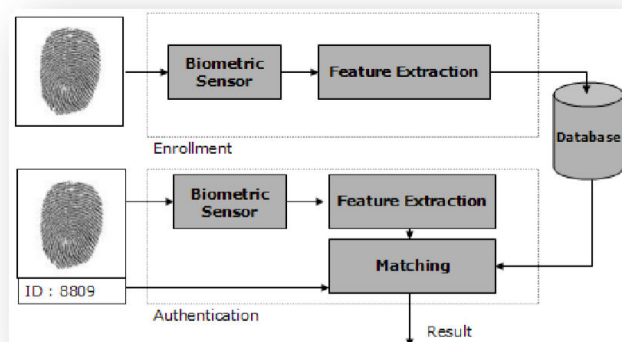


Figure 1: General Biometric System

LITERATURE REVIEW

A number of related works exist in literature on application of different information technology tools to student attendance management problem.

Today, biometric is being spotlighted as the authentication method because of the need for reliable security. Some consider efficient and low cost embedded platforms for authentication whereas some focus on performance for large databases and speed, to recognize a fingerprint. Other studies implement two-server and multi-server topology and cryptography fingerprint recognition systems. Automated Fingerprint Identification System (AFIS), in fingerprint recognition is also helpful to access control system of automobiles (Chaur-Chin Chen, Yaw-Yi, 2003).

In another study, Delaunay Quadrangle method using topology code has been used for authentication. Fingerprint authentications are also used in ATMs (Coventry Johnson &Angeli, 2003). Some fingerprint matching systems are also based on model-based designs. To overcome all the issues and shortcoming with regard to earlier system, we propose a new model which consist many advantages.

In another study, technology methods developed to solve the problem of identity management includes; Possession of physical authorization (such as keycards), Possession of knowledge (password, PIN etc.), and Biometrics (Ratha, Senior & Bulle, 2009).

This system is to South Eastern University of Sri Lanka and the project is a system that takes down students' attendance using Finger print. Every student has to provide his unique finger print. Each barcode represents a unique id of students (Index no or registration no). Students just have to scan their finger using a sensor and the system notes down their attendance each exam dates. System then stores all the students' attendance records and generates list of details.

If some student drop out as problems like violate examination rules that records also will record through this system. By using creative methodologies to everything which can possible, the university can go to a standard position. As this problem especially students and the staff may be face to difficulties at the exam date. So we can use computerized system for this problem and store student information from first year to final year. This will avoid many of difficulties faced by students, supervisors and other exam hall staff with a printed document as an admission paper.

MATERIALS AND METHODS

The student attendance system is a system that takes attendance electronically (using finger print sensor). This system was implemented using C# .Net programming language and SQL server. It involves the interaction with the central database which contains all records of students, supervisors, staff of the faculty or institution as well as records of all exam attendance taken. In implementing this system, certain criteria are considered. These criteria includes: Only eligible students of the faculty can enroll and take attendance. Similarly, no one can take attendance for another.

The records of each attendance taken can be retrieved as well as the summary list attendance for all students, supervisors, staff can be generated and viewed. Furthermore, records of each and every present and absent can be taken as printouts.



Figure 2- Fingerprint Machine



Figure 3-How to keep Finger on sensor

The design requirements are met through the use of a fingerprint reader which captures the fingerprint of users and desirable results are achieved, some of which are discussed in this section.

Water fall model was used to develop the system since the requirement is well defined at the beginning of this study. The waterfall model is a popular model of the systems development life cycle model for software engineering.

To operate this project first we have to operate this project in Admin mode. In this mode we have to enter data into the database of finger print sensor, for this we have to take impressions of fingerprints of that person whom we want to give access to our security system. This can be done once or whenever a new entry has to be added in the system.

Then this project has to be used in “Normal mode or Search mode”. In this mode the system compares the fingerprint input received at its optical plate with the previously stored fingerprint from its flash memory. If the entry matches with the memory then it gives out ok signal along with the identity number of that person. But if the entry does not match with the memory then it gives out error signal.

This system involves no of different phases.

Enrollment Phase

This aspect involves the registration of eligible students, supervisors and staff of the University. In this phase, each student is required to register certain personal information like fingerprint, names, registration no, index no and picture, department, course, sex as well as other academic information when they register in the university and that details can continue their whole university life.

To enroll the fingerprint the finger is to be pressed to the module thrice. All the three times it creates a template. On successful enrolling the device sends a unique ID pertaining to the finger enrolled. This ID can be saved and later used for verification of the finger.

Enrolling Procedure

- Enroll Start (ID) : Issue command to start enrolling over passed ID as parameter.
- Capture Finger : Take snapshot of the finger
- Enroll1 :Create template of the 1st Image
- Remove and press finger again
- Capture Finger,
- Enroll2 :Create template of the 2nd Image
- Remove and press finger again

- Capture Finger,
- Enroll3 : Create template of the 3rd image and merge all 3 templates.

Attendance Phase

There is a platform for taking attendance by all students & staff of the university. The client should have a database, remotely connects to the server for submission and retrieval of records. No unregistered students and staff will be allowed to take attendance. This greatly curbs the problem of buddy punching and impersonation. When students enter to the exam hall they can put their finger print and mark the attendance.

Attendance Report

After capturing the trusted data the system will confirm the person as real one and then every attendance on the exam days of all students and staff can be generated. The attendance of each student and staff on the exam day is stored on the database and can be retrieved. The system was designed to allow the administrator to take the list of attendance report of them daily basis and also that information can be taken to future needs even after a long time if they need.

RESULTS AND DISCUSSIONS

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.

In case of any error in the above procedure, the device sends an error code. so the candidates and staff should access finger print to the sensor in a correct way. Following figure show you precaution to be taken while accessing to the sensor.

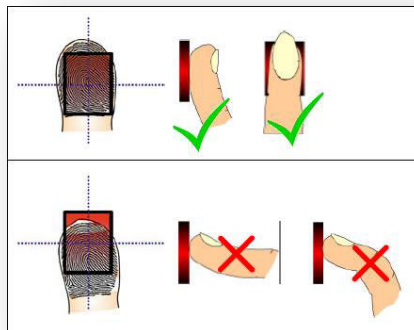


Figure 4- Keep Fingerprint in a correct way

Students Attendance summary functions are the most important and more convenient function in the system. It will provide valuable details which can access whole information of the students with historical data. Supervisor can refer student's history in few second. This is vast improvement produced by the system. Therefore user no need to waste time to check the all personal files. Therefore it minimizes the stress involved in manual computation of attendance and the system is easy to deploy and operate but the system does not eliminate the risk of impersonation (Kizildag, Basa, Celikag, Atasoylu & Mousavi, 2007) (Shoewu, Olaniyi & Lawson, 2011).

Following factors can provide as advantages of the Examination Attendance System.

- **Easiness in modification of data:** The proposed system provides managing of huge data effectively and efficiently for efficient results, storing the details of the students, attendance, staff, offences etc. in such a way that the database can be modified.
- **User friendly:** The proposed system is user friendly because the retrieval and storing of data is fast and data is maintained efficiently. Moreover the graphical user interface is provided in the proposed system, which provides user to deal with the system very easily.
- **Reports are easily generated:** Reports can be easily generated in a proposed system. That helps the managers in a decisions-making activity.
- **Sharing the data is possible:** Data can be shared in proposed system. This means that two or more persons can use the same data in existing system provided that they have right to access that data.
- **No or very few paperwork:** The proposed system either does not require paper work or very few paper works is required. All the data is feted into the computer immediately and pawn receipts and reports can be generated through computers. Since all the data is kept in a database no data of the organization can be destroyed. Moreover work becomes very easy because there is no need to keep data on papers.
- **Support strategic competitive advantage:** Proposed system supports strategic competitive advantages. Since the proposed systems provide easiness in reports generating it will provide strategic advantages among competitors.
- **Computer operator control:** Computer operator control will be there so no errors. Moreover storing and retrieving of information is easy. So work can be done speedily and in time.

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. Most of the firms are using paper base documents to do their routine work and it is more tedious work to handle large number of documents. Other firms that use computers are only use simple office automation applications such as MS Word, MS Excel to store details. The fingerprint is unique to each individual and cannot be shared. As describe throughout this document the main purpose of implementing the Student Attendance System is to provide easy, economic, efficient and accurate software based solution to help in the activities.

In Future, According to the function of system development this system also welcome future improvements. For now this system has created as suitable only for faculty of Arts and Culture this can improve for whole Attendance system of university by connecting other faculties think this is a special requirement more than an improvement.

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