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Smart Location Based Student Attendance Management System Using Fingerprint Recognition

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Abstract: Participation of teacher has been widely used as a method to track students' academic behavior. But conventional approaches tend to be slow and imprecise. In this paper, we have proposed an automatic attendance detection system, where students can use smart phones to present their presences in parallel. The identity of a student is verified in collaboration with a fingerprint and position in real time. There are various forms of presence systems, such as the ERP system, RFID cards, and the biometric assistance system where fingerprints are considered the best and fastest method. In this system, we are monitoring the presence by matching the fingerprints and the position to improve the old method of recording presences. Replacing the tedious traditional form of assistance will save time, minimize administration workload and change paper and pen with digital devices.

Keywords: Geo-fence, Fingerprint matching, GPS location, attendance management system.

I. INTRODUCTION

A. Background:

Assistance is to keep track of the number of students in schools, universities or any organization. It is very important to maintain discipline among the students of an institution and provide quality education in schools and universities, and if someone deviates from the required standards, appropriate action can be taken. The service collection process is heavy and therefore difficult to manage. Furthermore, this process takes a long time. However, it is necessary in schools and universities to maintain attendance. The method followed by the teacher or the teacher is to take participation in the sheet of paper and monitor the presence of students a day, so it is collected and combined as a monthly report. If a student has a frequency below certain specific criteria, this report will be used to decide whether or not a student must be stopped to take part in any examination. In this kind of cases, there should be a more efficient way to keep these records. A popular method is the biometric scanner .Different forms of assistance systems are available, such as the ERP system, the RFID cards, and the biometric assistance system in which the system using the fingerprint can be considered a quick and efficient method. It is safe to use, unique to every person and does not change in someone's life. In this system, fingerprint recognition is used as a solution for the student-based care management system.

B. Motivations:

The traditional way of keeping track of thousands of students is less efficient and time consuming. Thus, the motivation of our system is to reduce human efforts, reduce human error in keeping records and maintain accurate records. Also to reduce the paper work required and to keep parent of student informed about their ward.

C. Goal:

The goal of our system is to achieve better performance as well as robustness by designing a smart location based student attendance management system using fingerprint recognition.

D. Objective and Scope:

The Objective and Scope of system are,

- Teachers can manage attendance using computerized data management so that paperwork can be eliminated.
- Attendance will mark with no proxy within range of classroom; using geo fencing technique the range will be calculated.
- Generate an attendance report which allows teachers to know student is eligible to attend the exams or not. Students as well as parents can track attendance effortlessly.

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II. EXISTING SYSTEM AND DISADVANTAGES

The Existing system describes,

- **Manual attendance System:** It is the ordinary technique of bringing assistance simply by naming students' names in class or by signing on paper. This system is inefficient because it can go wrong due to the manual work required and the maintenance of sheets of paper.

- **RFID based attendance System:** The assistance system based on radiofrequency identification (RFID) is one of the solutions to solve this problem, but it takes a long time and is insecure. As specified above, the RFID will be used to detect assistance and maintain it automatically. This system uses a type of contactless reader and the cards used are passive. The disadvantage of this type of system is that anyone can bring one card from another to mark the presence of another

- **Bluetooth Based Attendance System:** This is the attendance management system that uses low-power Bluetooth. For communication with the Android application, this system uses the low-energy Bluetooth signal. Data is collected using sensors and stored according to dates. The teacher can register the presence quickly and the analysis becomes easy.

- **Bar Code Scanner Based Student Attendance System (SAS):** The purpose of this document is to replace the manual assistance system with barcode scanner technology. This system is more efficient and effective than other systems available for managing and recording assistance. Bar code technology has proved to be cheaper than RFID and biometric technologies. The systems mentioned above take time and are not safe. In the proposed project, an intelligent location-based assistance management system was designed using fingerprint recognition, which consumes less time, is safe and simple to implement.

Disadvantages:

- Time consuming process.
- Anyone can bring one card from another to mark false attendance.
- Less security.
- Lots of paper work

III.PROPOSED SYSTEM

The Proposed System is a smart location based Attendance system used for storing the attendance records of schools or colleges. Fingerprint is given as input to the system to mark the attendance; simultaneously the location of user is noted. This Fingerprint is matched with the stored data in database which then goes to application server. Then the location of student and teacher is compared to check whether student is physically present in class or not . After this all functionality are carried out such as monthly report generation, view report, send mail to parent about their ward's low attendance , defaulter list and many more.

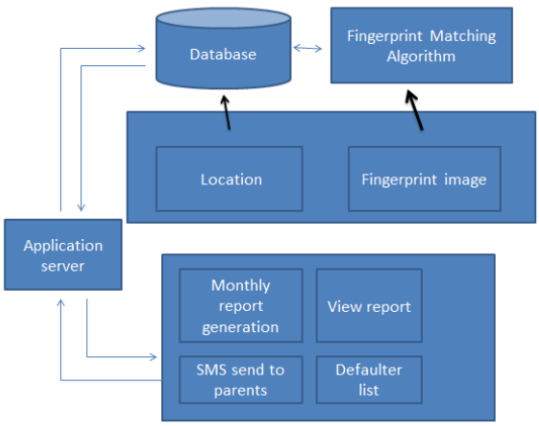

Fig.System Architecture

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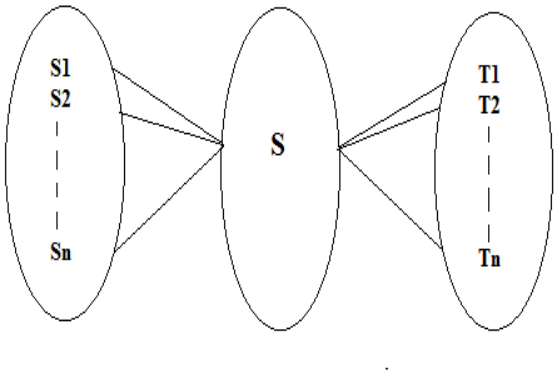
IV. MATHEMATICAL MODELING

A] Mapping Diagram



Where,

S_1, S_2... S_n = No. of Students
S = System (Attendance Monitoring System)
T_1, T_2... T_n = No. of Teachers/Professors/Lecturers

B] Set Theory

The following terms shows in detail working of project.
$S=\{s, e, X, Y, P, \phi\}$
Where,
s = Start of the program.

1. Register to system:
Student/Teacher provides own details.

2. Authentication:
$A=\{a_1,a_2\ldots..a_n\}$
Where,
A= No. of Student/Teacher attributes.(e.g username, password, emailed etc.)

3. Login to system.
To perform functionality Student/Teacher Login to system.

X = Input of the program
X = {Rk, L, F}
Where,
Rk = Random Key
L = Location
F = Fingerprint

P=Process of the program,

4. Generate Random Key
Using Random Function Teacher Generate Random Key.
5. Geo-fence-Distance calculation algorithm
Check Student and Teacher Location area.
6. Take Fingerprint Image
Minutae based Fingerprint matching Algorithm

Y = Output of the program.
Y = {AM}
Where,
AM=Attendance Marked

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The output of program is Mark the Attendance of student if and only if Match the Fingerprint, Location and Random key.

e = End of the program.

ϕ = Failures and Success conditions.

Failures:

1. Huge database can lead to more time consumption to get the information.
2. Hardware failure.
3. Software failure.

Success:

1. Search the required information from available in Datasets.
2. User gets result very fast according to their needs.

V. ALGORITHM

Fingerprint extraction consists of three main steps, and they are
Pre-processing
Minutiae extraction
Post-processing
Minutiae matching

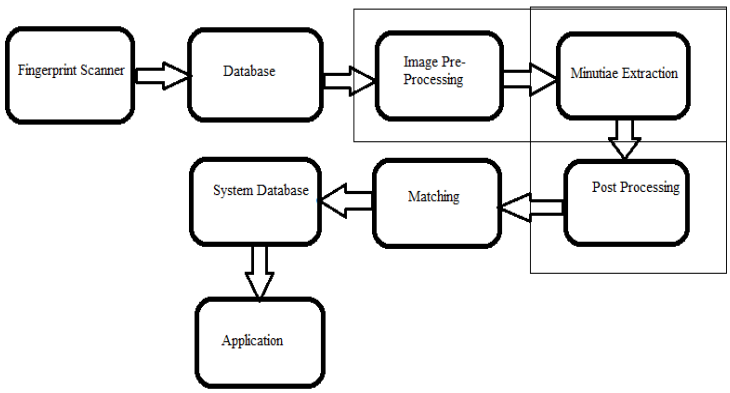

Fig: process of fingerprint recognition

Pre-Processing: It enhances the quality and produces an Image in which minutiae can be detected correctly

Minutiae extraction: This step involves refining of the thinned image, detecting the minutiae points and then extracting features from image.

Post-processing: This step is used to remove the several false minutiae which can cause due to Scars, sweat or dirt. Minutiae matching, this is the last step that involves matching the template image with the input image. Template image is collected during enrolment and saved in the database. During recognition phase, the input image is compared against template image.

This phase decides whether the two images are from the same finger or not.

VI. RESULT

The aim of this paper is to implement a smart system for attendance monitoring using technologies like geo-location, FRS (Fingerprint Recognition system), etc. The system provide a well formatted automated attendance system which reduces paperwork and human Errors in keeping them. This integration of technologies can also be used in other applications, particularly when dealing with a need for simple control accessibility.

CONCLUSION

This project concerns the elimination of the disadvantages of the available system detected in the initial analysis. Systems keep students' attendance efficient and keep parents informed about their child. The system will eliminate the

perforation of classmates (the student will unable to mark the dummy attendance).Fingerprint Attendance System is a profitable and simplified system that prefers the fingerprint as identification of an individual, since it is unique to each individual and cannot be shared or used incorrectly. Our system replace the tedious traditional form of assistance will save time, minimize administration workload and change paper and pen with digital devices.

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