A Survey on Students' Attendance Management System

Pramod Bide, Harshal Bendale, Mohammed Murtuza Bhaiji, Siddhant Das

Abstract— Managing the attendance in various universities or any other educational institutions has been facing problems or some sort of shortcomings. The complexity and need of new improved methods for managing attendance needs to be understood for developing a near perfect management system for attendance. This paper mainly focuses on study of different approaches and techniques made to establish the system for recording and managing the attendance. Some suggested/implemented techniques use different set of hardware to perform and input the students' biometric verification and other technologies (for instance RFID) in to the system. The outcome of this paper is; it provides a study on the techniques to transform the students' data into a format suitable to carry out selection of information for desired result done or suggested by others.

Index Terms— Student Attendance, RFID, Biometric verification, Attendance management System.

I. INTRODUCTION

We observe that there isn't any standardized system for managing the attendance. There are different approaches made by various institutions as per their need. Traditional system heavily relies on manual work of entry for the records. This creates a problem of many mistakes while manual work. Also, it is very time consuming and may not be the best and full proof system. Previously, various techniques have been proposed to overcome such problems. Most of these techniques are based on the use of biometric means, various sensors and online portal for attendance records management to gather the information of the students' presence.

II. RELATED WORKS

A. Computerized Attendance System

In 2006, Nucleus Research [1] proposed the use of a computerized attendance system, which can eliminate human involvement, human data entry mistake, repetitive work. This system was proposed to encourage greater productivity, eradication of paper costs and digital reports when demanded by user. In this system, the faculty would only have to take attendance manually which would then be computerized by the system. However, this may sometime, lead the inaccuracy while data entry. To do so, a simple desktop application was developed by Jain Et Al.

[2] which contained the list of all registered students would be displayed when the faculty start the application. The attendance registration is done by click a check box next to the name of the students that are present, and then a mark their presence. But in this also, human contribution for attendance tracking is needed.

B. Biometrics

To put it in simple terms, biometrics is an analysis and measurement of Human characteristics for individuals' identification. After these measurements are taken, they're used to authenticate the user. This is achieved by comparing the stored sample with the input provided earlier.

Biometrics can be easily segregated into two main categories:

1. Phenotypic or Behavioral - The use of pronunciation above is an example of phenotypic or behavioral identification. Phenotypic traits are ones that we develop or acquire over time through our own individual experiences. Further examples of these besides voice recognition would be such things as signature verification or gait examination.
2. Genotypic (genetic) or Physical – Genotypic identification is the use of individual genetic traits to identify a person. This would include such things as fingerprint analysis, facial recognition and vein patter analysis.

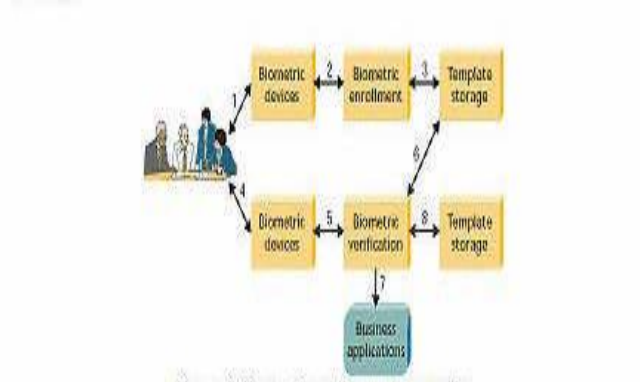

Figure 1. How a biometric system works.
(1) Capture the chosen biometric; (2) process the biometric and extract and enroll the biometric template; (3) store the template in a local repository, a central repository, or a portable token such as a smart card; (4) live-scan the chosen biometric; (5) process the biometric and extract the biometric template; (6) match the scanned biometric against stored templates; (7) provide a matching score to business applications; (8) record a secure audit trail with respect to system use.

Figure taken from [2] "A Practical Guide to Biometric Security Technology" by Simon Liu and Mark Silverman [3]

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C. RFID based Attendance System

Radio Frequency Identification (RFID) is an automatic identification method, relying on storing and remotely retrieve data using devices called RFID tags or transponders. This system has the ability to send alerts to the student's parents or guardian automatically. This technology is implemented so that the student registers at the gate by touching RFID hardware with their unique RFID tag and data to the servers which are setup in the institute. This server is responsible for attendance data and in few cases sends direct SMS to the parents on the absence of the respective student for the required lecture or program. The main problem in this system is that no verification of the student is being performed/conducted. As a result, proxy attendance maybe marked any other person.

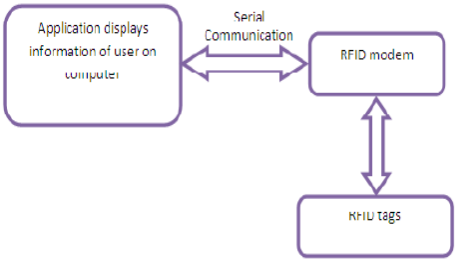

Figure taken from [4]

D. Bluetooth based Attendance System

Bluetooth technology was suggested by Vishal Bhalla et al. in 2001 which could take attendance by this system. In this project, attendance was performed by making use of instructor's mobile phone. A simple, intuitive software application was developed which enables it to query student's mobile phone via Bluetooth connection. This connection is then used to send the student's mobile phone unique Media Access Control (MAC) address to respective instructor for the confirmation of student's presence for the program. Smart Bluetooth chip is developed and configured which worked with the Android application using this Bluetooth wireless technology. This chips are distributed amongst the students which are unique to each student. This chip sends the data to the receiver. It transmit the unique serial number or identification number of the student whenever he/she enters the lecture room. This data is entered into the student database. But this proposed system also has its own shortcomings. To establish this system, each student's phone is mandatory for attendance. Proxy attendance can be observed if his/her phone is given to his/her friend to mark the attendance. Also, if the student forgets his/her phone the attendance cannot be marked even when the student is present for the lecture.

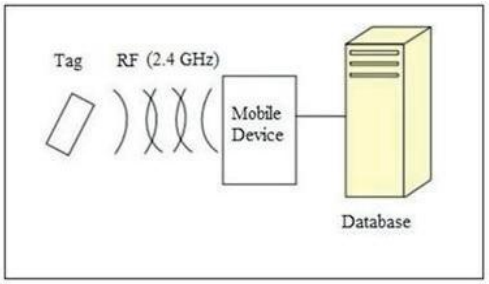

Figure taken from [5].

III. CONCLUSION

We have considered four different types of attendance system which can be potentially implemented. After going through the working and specifics of each one we have surmised the following-

The biometric system has high accuracy and is very secure but often has a very large setup cost and varying long term stability and is prone to external factors that can lead to errors and misreading.

The Bluetooth system has high accuracy but also has a high setup cost but doesn't have ease of use as compared to other systems. RFID has good accuracy but falters in 2 important areas i.e. ease of use and potential proxy attendance and if the RFID tracking chip goes missing then it can take a long time to diagnose whether it's the RFID reader that is at fault or is it the missing RFID tag that's the root of the problem.

The computerized system is manual and has to be done by the teachers but has high accuracy, low setup and maintenance cost, and is very stable thereby giving it the edge.

IV. PERFORMANCE REVIEW TABLE

Characteristics	Fingerprints	Hand Geometry	Retina	Iris	Face	Signature	Voice	Bluetooth	RFID	Computerized Attendance System
Ease of Use	High	High	Low	Medium	Medium	High	High	Medium	Medium	High
Error Incidence	Dryness, dirt, age	Hand Injury, age	Glasses	Lighting	Lighting, age, glasses, hair	Changing signature	Noise, colds	Out of range, Bluetooth application not starting	No verification, Potential proxy attendance	Low
Accuracy	High	High	Very High	Very High	High	High	High	High	High	Very High
Cost	High	High	High	High	High	High	High	High	High	Low maintenance cost
Long Term Stability	High	Medium	high	high	Medium	Medium	Medium	High	Medium	High

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