

Student Attendance Tracking System Using Portable Biometric Device

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Abstract—This paper presents a portable classroom attendance system based on fingerprint biometric that allows to monitor student attendance. It can be used to detect fraudulent thumb prints thus eliminating proxy attendance. The main aim of our system is to address the challenges of misplaced and/or damaged attendance register sheets in Educational Institutions This system provides an effective class attendance tracking method that prevents attendance marking impersonation among students, and eases students' attendance record maintenance. Also this system is used to notify parents about the attendance status of the students. This system can replace the existing manual method to a more systematic and reliable one.

Index Terms—*biometric, fingerprint, online, attendance*

I. INTRODUCTION

The concept of attendance exists in different places such as educational institutions, organizations, hospitals, etc. during the start and end of the day to mark a person's presence or absence. Attendance is a symbolic representation that can be a yardstick to the higher authority to assess their staffs' or students' commitment towards their work. Attendance rate is important because students are more likely to succeed in academics when they attend classes regularly. It's laborious to build the skills and capabilities of students if a large number of students are absent frequently. Students who are not in school on a regular basis are more likely to face problems academically. Even in the current era, the educational institutions record attendance manually in attendance registers by calling out the names of the students. This results in a waste of time and effort. Also there are many fraudulent issues that occur with the use of a register. In educational institutions, the teacher/lecturer marks the attendance of the student's one after the other.

But the major drawback in this system is that students tend to answer the attendance for their friends who are not present for that day. These fraudulent issues may become increasingly frequent if the class strength is high.

These problems can be overcome by a solution that is proposed where a system that will record the attendance automatically is used. This paper presents a finger print based biometric system which records the attendance automatically. This system consists of a fingerprint sensor that is used to detect an individual's identification. In educational institutions, the student needs to place his/her finger on the fingerprint sensor in order to obtain their attendance. The captured fingerprint is recorded and then it is checked whether the obtained fingerprint of the student matches the record fingerprint each time, after which the student gets the attendance. By using of this system, we overcome the issues such as proxy attendance and misplaced registers. Therefore no student can give attendance for their friends in their absence.

In recent years, the use of biometric technologies as authentication systems has been gaining more prominence. This is the result of the alarming rate of security compromise that has been recently identified with the traditional authentication methods such as passwords and Personal Identification Numbers (Pins). The Establishment of a reliable security against unauthorized access to information systems through pins and passwords are becoming less effective as pins and passwords are combinations of characters which can be stolen from the authority or guessed by impostors. Biometrics is an electronic system of identifying or verifying a unique individual's identity by the usage of some measurable biological characteristics such as physical or behavioral attributes. These biological characteristics may include one of the fingerprint patterns, voice patterns, facial appearance, and iris recognition. Thus, to adopt biometric technologies to identify or verify any individual's identity, the biometric template of the person that is stored, is compared to the current pattern obtained by a biometric device.

Therefore, the biometric system is a pattern recognition system that operationally acquires biometric data of an individual, extracts a set of features from the data acquired and compares the feature sets against the template set in the database of the system for an individual's unique recognition.

II. RELATED WORKS

International Research Journal of Engineering and Technology (IRJET) ie., Fingerprint Based Attendance Systems - A Review authored by Hitesh Walia and Neelu Jain [1]. This review incorporates the problems of attendance systems presently in use, their advantages, disadvantages and comparison based upon important parameters.

International journal of scientific & technology research volume 4 ie., Students' Attendance Management System Based on RFID and Fingerprint Reader authored by Moth Moth Myint Thein and Chaw Myat Nwe and Hla Myo Tun [2]. This system was developed to provide a faster, more secure, convenient method of user verification and personal identification.

Scientific Research Journal (SCIRJ).Ie., Improving the Security of MANETs Oriented Military Intelligence using Biometric Authentication Technologies authored by Julius N Obidinnu , Ayei E Ibor and S O O Duke [3].This paper identifies user authentication as a key issue in strengthening security concerns in MANETs.

International Journal of Current Engineering and Technologyie., Secured Lip Biometric Based Authentication System authored by DussaSushma and S.Sujana [4]. The proposed system is to develop an authentication system based on lip gestures. Lip password verification is an important research topic in the area of biometric authentication.

IEEE transactions on circuits and systems for video technologyie., An Introduction to Biometric Recognition authored by Anil k Jain, Arun Ross and SalilPrabhakar [5].In this paper, we give a brief overview of the field of biometrics and summarize some of its advantages, disadvantages, strengths, limitations, and related privacy concerns.

Biometrics Verification: a Literature Surveyauthored by A H Mir and S Rubab [6].Biometric verification refers to an automatic verification of a person based on some specific biometric features derived from his/her physiological and/or behavioral characteristics.

Biometric Recognition: A Literature Review authored by C B Tatepamulwar V.P. Pawar H.S. Fadewarr [7].Biometric as the science of recognizing an individual based on his or her physical or behavioral traits, it is beginning to gain acceptance as a legitimate method for determining an individual identity.

A survey of biometric technology based on hand shape. This paper presents a survey of the technology used in hand shape-based biometric system.

III. SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

In designing this project, we require both software and hardware implementations. In the block diagram there is device of the portable attendance system. Arduino Mega ADK is connected along with the SD card,TFT Touch Shield (LCD colour), RTC (real time clock), fingerprint scanner (ZFM20) and the 5volt rechargeable battery and SD card is integrated with Arduino to store authenticated finger ID. In the software Implementation, Arduino compiler IDE is used to compile the code.

- Processor : Pentium 4 +
- RAM : 2GB
- Hard Disk : 5GB free space for s/w installation and Workspace
- Speed : 1.8 GHz+
- Biometric Scanner
- Arduino as IOT
- 5volts rechargeable battery
- SD card integration with Arduino to store authenticated finger id.

SOFTWARE REQUIREMENTS

The software component is composed of a 64-bit system type of Microsoft (MS) Windows XP Home Premium Operating System (OS) edition installed on the development system, and MS Visual Studio Ultimate 2013 Integrated Development Environment (IDE) where the application software of the system was coded, and tested.

- Operating System : Windows XP or Higher versions
- Language : Embedded C,C#
- Framework : .NET 4.0
- Front End : ASP.NET WinForms
- Back End : MS SQL Server 2005.

IV.METHODOLOGY

In the educational institutions, the students' attendance will be monitored in a simple way by just using an attendance sheet in registers. But this process won't be convenient as it takes a long time for the lecturer to mark attendance of all the students and there can be chances of impersonation like proxy attendance. However, this manual system would be difficult to maintain and could be outdated in a business and other organizations. The attendance register cannot be that easily maintained as there will be only one saved copy of it, which might get lost due to some circumstances.

So to avoid such of situations, we need an efficient and reliable system which can mark attendance of the students based on their presence. Fingerprint authentication is one of the best biometric authentications that can be used for this purpose. Fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Hence we propose a system where biometric is used for authenticating an individual. Based on registered fingerprints of the students the system records their attendance details. It provides an interactive GUI to record and maintain the students' attendance.

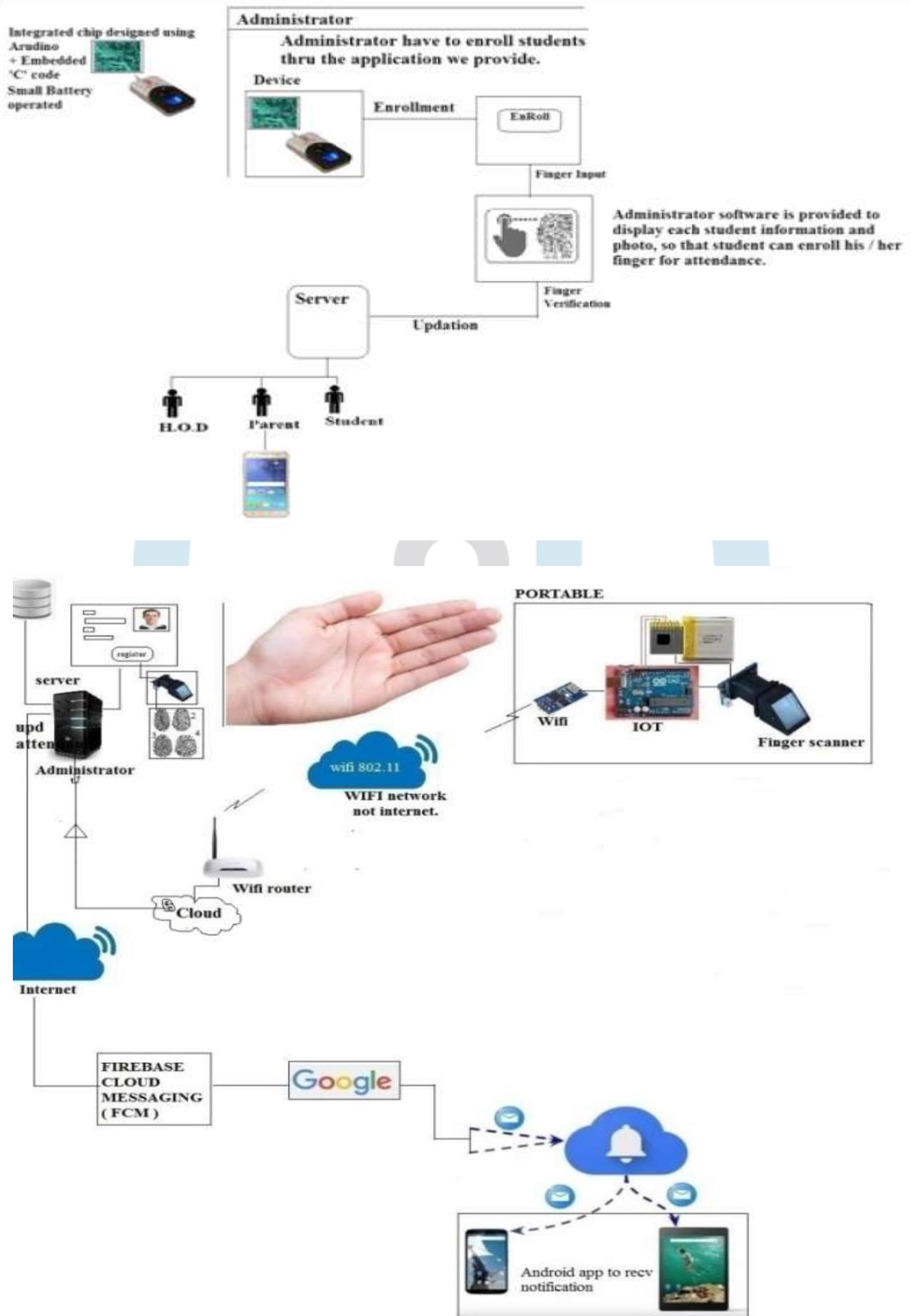


Fig : system architecture

We propose the idea of a portable biometric device with integrated chip designed using Arduino and embedded C code. The device is small and battery operated. The application provides an interface to display individual student information, along with their photograph for identity. The admin manages all the data required such as course details, semester details, lecturers, subjects, time table and class details. The students' fingerprints are registered under the supervision of the admin through the application provided. The portable biometric device is used to scan students' fingerprint in every class for every subject. The usage of the device is authorized to the faculty handling the respective subject, thus providing security.

The data is retrieved from the server to the device at the time of the attendance using cloud. After the attendance process, the attendance will be sent to the cloud and stored in a comma separated file. From there the data will be sent to the server.

At the server end, during registration the student's details along with their photo will be saved in the server. While taking the attendance when the biometric device is booted, the student's and the lecturer's ID will be retrieved from the server and later it will be updated back to server through the WIFI connection.

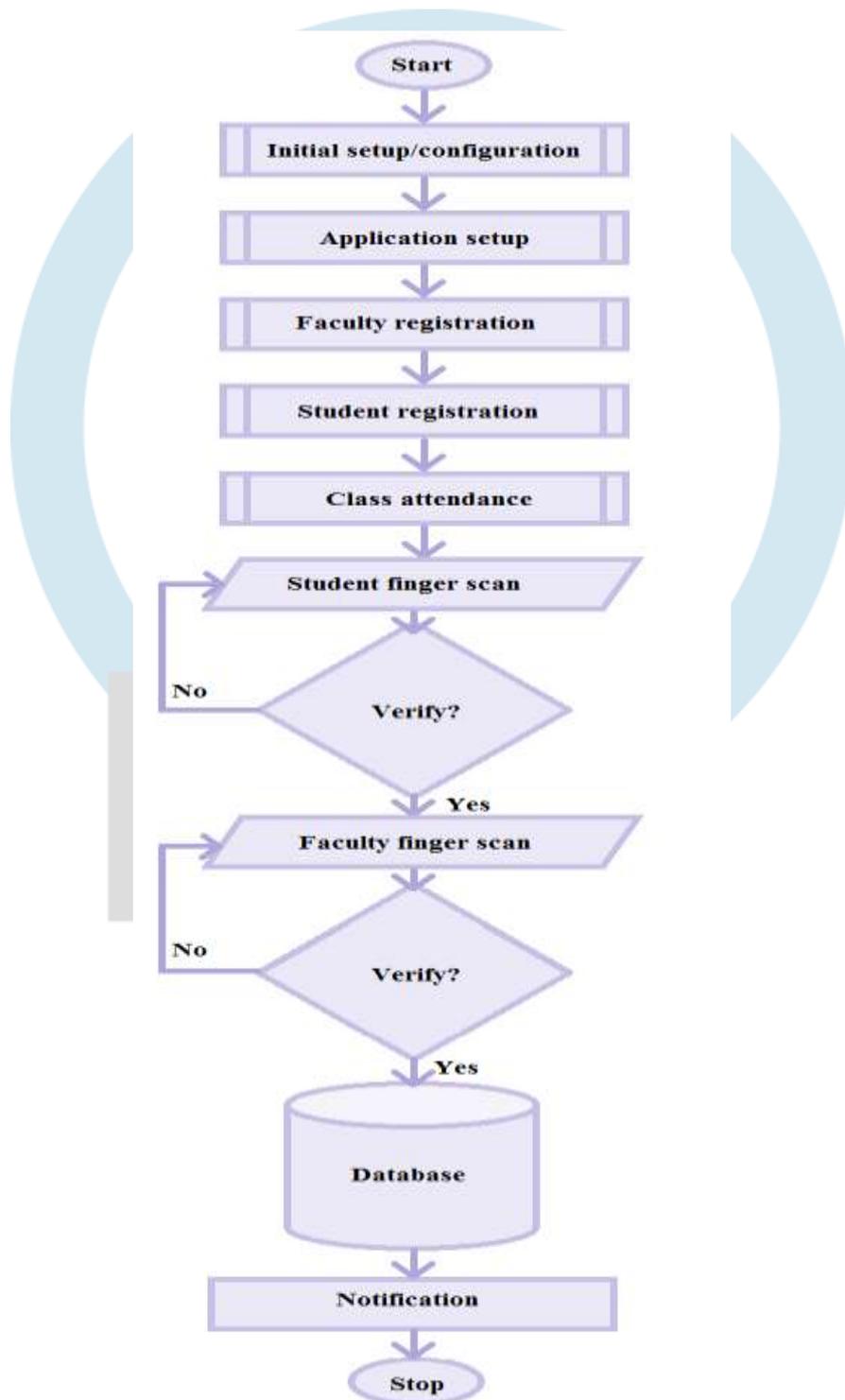
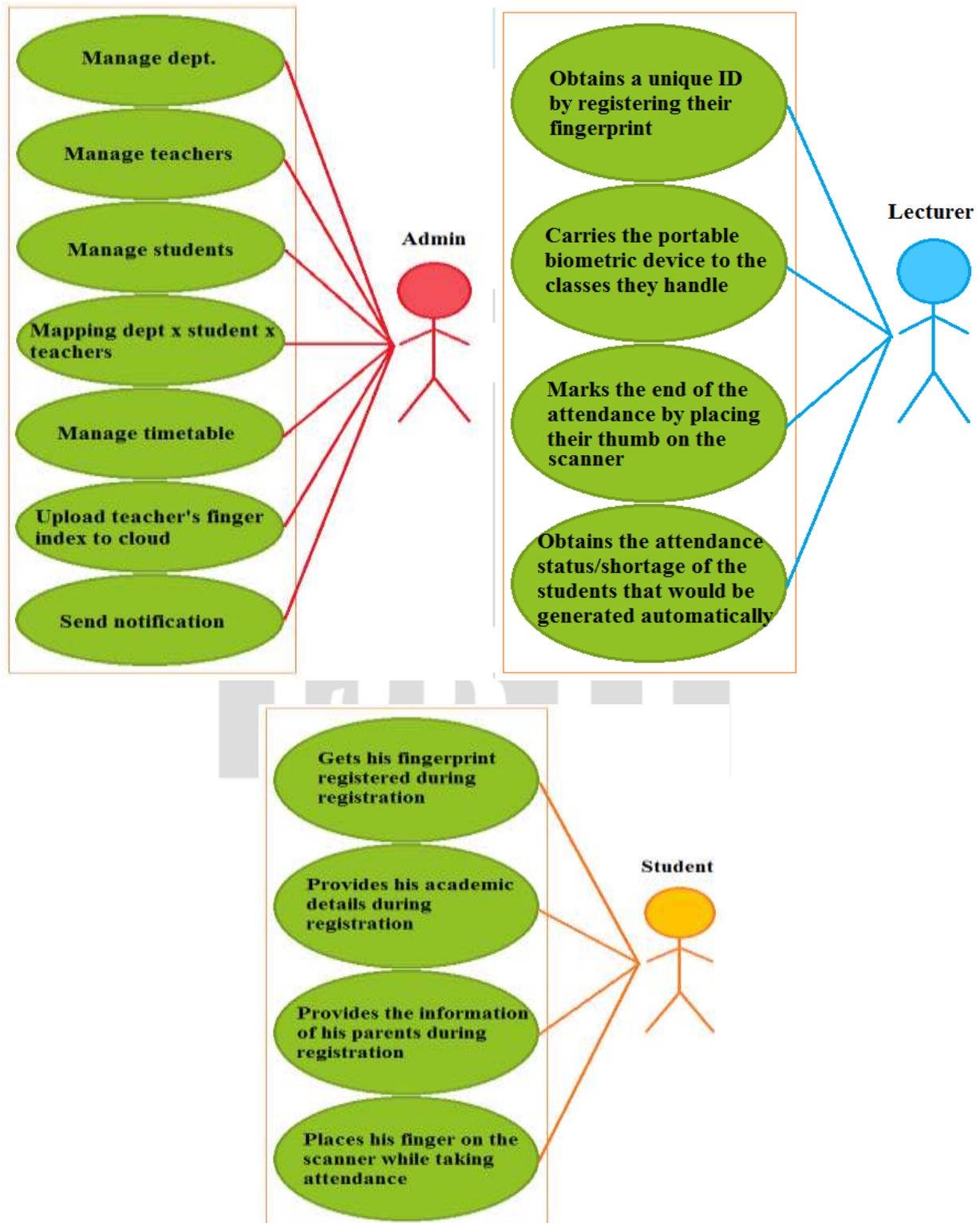


Fig: System design flowchart

The entered biometric details will be transferred to the system (server) directly through WIFI and the attendance of the respective class is updated. If a student is absent for a class, push notifications (FCM i.e. Fire Based Cloud Messaging) are sent to the parent's mobile through the application (mobile app) provided. The application also facilitates to calculate data analytics based on the recorded information. In case of shortage of attendance, our application will send an alert message to the parents. Proxy attendance is not possible as the fingerprint of a student cannot be replicated by their friends and in the absence of a lecturer. The proposed method is more accurate and helps to maintain multiple copies for administrative purpose with minimal effort and processing.

Fig : Use case



V. CONCLUSION

Biometric plays a significant role in preventing the impersonation like fraud detection and to verify individuals' identity. A study on biometric confirms that the biometric data can be set and affirms the identification of the aspirant. Enlarging the benefit of biometrics will raise the ability to identify the misrepresentation of the students in the class. In terms of performance and efficiency, this project provides a favorable sign of the approach compared with the traditional method of marking the attendance manually.

This paper presents the design and development of portable attendance system which is based on fingerprint identification. This mechanism also helps in handling the attendance status of the students like calculating the shortage of attendance automatically. It eases the lecturer's work of keeping track the students' attendance and also it helps in issues such as, denying the possibilities of cheating in recording the attendance.

VI. FUTURE ENHANCEMENT

- The Automated attendance tracking system can also be implemented in several ways by replacing the fingerprint scanning device with iris scanning.
- The implemented attendance tracking method can be adopted for employees' attendance tracking in various public and private sectors. This will prevent high level of impersonation in attendance tracking among their workforce and increase productivity
- For security reasons, we can use detection & recognition system. To identify culprits on bus stations, railway stations and other public places, we can use this system. This will be helping hand to the police.
- In this system, we will use GSM module. Suppose if culprit is detected, then detected signal can be transmitted using GSM module to the central control room of police station. With the help of ISDN number of GSM, culprit surviving area will be recognized.
- This prototype can be used in online exam verification instead of hall tickets and QR codes, if the issue of dummy images is resolved.
- Performance improvement- Image processing algorithms can be used to increase the accuracy and makes attendance monitoring more efficient.

VII. ACKNOWLEDGMENT

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