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Research Article

Automated Attendance Monitoring System using Android Platform

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Abstract

In today's world, a paper based approach is followed for marking attendance, where the students sign on the attendance sheets. This data is then manually entered into the system. Managing the attendance of the students during lectures is a difficult task and it becomes more difficult during the report generation phase. This is because the process of marking attendance and maintaining the data is not fully automated and manual computation produces errors and also wastes a lot of time. For this reason, the development of Attendance Monitoring System (AMS) using android platform is proposed.

Keywords: *Attendance Monitoring System (AMS), android platform, marking attendance on one click, user authentication, database, report generation, sending SMS.*

1. Introduction

In almost every institution and organization, attendance monitoring is a very important process. The current method involves the use of sheets of paper or books in taking students attendance. This method could easily allow for impersonation and the attendance sheet could be lost or damaged. Taking attendance is thus time consuming using this traditional approach and hence there is a need of an automated and a reliable system.

The Attendance monitoring system will provide the needed solution. The system consists of two apk files, one for the teacher and one for the student respectively, which are installed on their android devices. The AMS will be used to mark the attendance of the students and will also be used to generate reports of all the students and thus will enable the faculty members to keep track of student's record.

Rather than signing on the attendance sheets, the student will mark the attendance by just a single click on his device. Also, the teacher has the facility to generate reports on a single click. There is a facility to generate report of one or more than one student.

The paper discusses related works in the problem domain; highlights the general overview of the proposed system; details design considerations of the system, both at the hardware and software level; discusses the operation and how the system was tested in conformity to system design and functional objectives; concludes the observations made.

2. Related Works

Different methods and principles have been applied to effectively monitor the attendance of the students. A system providing an improvised electronic card and card reader serially interfaced to the digital computer system was proposed, which is an embedded computer based attendance management system (Shoewu, O. O. M. Olaniyi, and Lawson et al, 2011).

A wireless attendance management system used the iris of the individual for authentication (Kadry, S. and M. Smaili et al, 2010). All processes like capturing the image of iris recognition, extracting minutiae, storing and matching used an off-line iris recognition management system.

Authentication of the individuals for attendance management has also been carried out with the help of passwords. A system that uses passwords for authentication was designed and implemented (Cheng, K., L. Xiang, T. Hirota, and K. Ushijimaa et al, 2005), but, this type of system allows for impersonation since the password can be shared or tampered with. Passwords can be forgotten at times thereby preventing the user from accessing the system.

Attendance monitoring systems are also developed using biometric system as a mode of authentication and marking the attendance of the students. Authors in (Shoewu, O. and O.A. Idowu et al, 2012) designed and implemented a system that uses fingerprints to mark the attendance and generate the reports at the end of the semester.

RFID system has also been used to develop an attendance and monitoring system. RFID system basically consists of two components: the first one consists of tags and readers, and the second is a computer software or application. The main function of the reader is to provide the means of

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communicating with the tags and enabling data transfer. The two forms used for establishing communication between hardware and software are: Start Listening and Stop Listening. Each time the system receives a request from the hardware, it connects to the database using an SQL connection, checks the data to verify whether or not an access granted. At the same time, the application stores all log info in order to provide later on monitoring while the user has the opportunity to track all the requests. All this is done based on detailed queries created within the application during the development phase (A. Kassem, M. Hamad, Z. Chalhoub and S. El Dahdaah et al, 2010).

3. System Overview

The proposed system provides solution to lecture attendance problems through the use of AMS that is interfaced to the server. The students and teacher will have to install the respective apk files developed for them on their android devices. At first, the student enters his/ her details in the system through the application. The student also enters his/her parent's details. Every student is given a unique student id and they have their password. The student enters this Id and other personal details (Name, Department, Division, and Semester etc). The student then log's on into his account.

The teacher, on his/her device, fills the details. The faculty members too, are assigned unique faculty id. They too have to enter their details and all the data is recorded in the database. After this, the teacher, activates the application that is on the server and only when the application is active, the student can mark the attendance by one click. The teacher can then generate reports by a single click. The teacher will also have the access to the list of students attending the lecture and can even modify the list if required.

Reports can be generated as and when required. Facility is provided to generate weekly as well as monthly reports. At the end of the month, SMS's can be sent to the parents/guardians of the students, thus informing them about their wards attendance.

4. System Design

The Attendance Monitoring System being a client-server approach, and follows a specific hardware and software architecture. The main challenge here is integrating both the hardware and software components to work together.

4.1 Software Architecture

The software architecture consists of: the database, the application program and the server.

4.1.1 Database

The database consists of a number of tables, which stores records implemented in phpmyadmin- MySQL. MySQL is easy, fast and efficient and can store a large number of records and requires a little configuration.

4.1.2 Application Program

The application program is developed with Android programming language using Eclipse framework. The application program provides user interface to both the faculty members as well as the students. Programming in Android is simple, user friendly and android offers an excellent data connectivity.

4.1.3 Server

The server is deployed on the personal computer using apache-Tomcat7. Tomcat7 is free, robust and easy to deploy.

4.2 Hardware Architecture

The basic requirement of the AMS is an android device, which will run the application, with the help of which the student's will mark their attendance. The other requirement is a personal computer on the server side, which will store the database.

5. Methodology and Flowchart

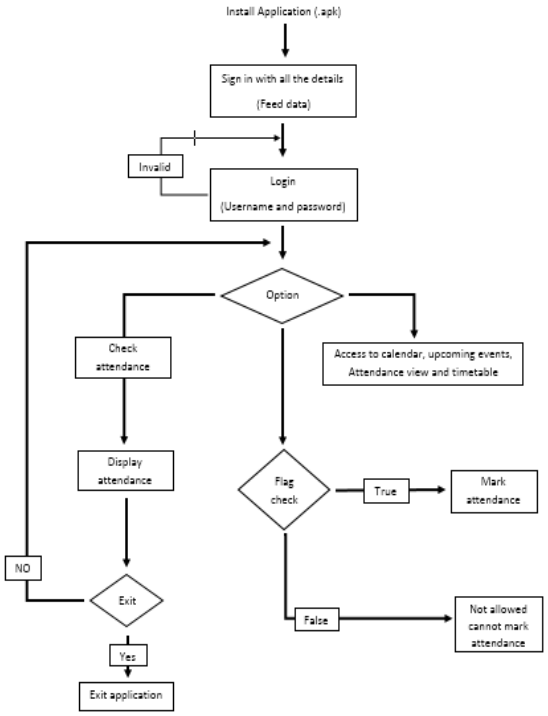
User authentication is one of the major factor in AMS. Every user is authenticated based on his/her unique user identification number. This unique identification number is the number present on the ID cards of the faculty members and the students.

Both the faculty members and the students register themselves by signing in into the system. All their personal details are recorded during this process. After signing in, they again have to log into the system. This is done in order to ensure that only valid users access the system.

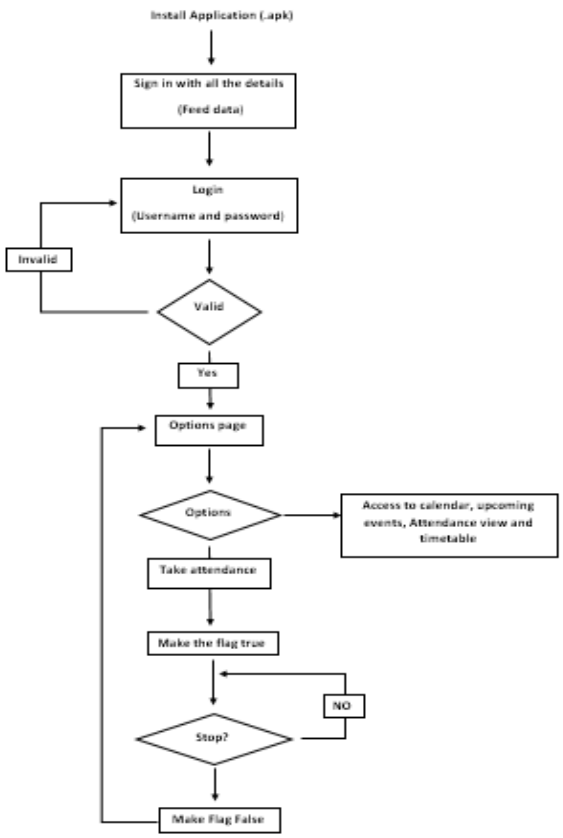
A flag is set to a default value of false in the system. This flag can be altered only by the teachers and only when the flag is true, the students can mark their attendance. During the marking phase, the teacher of the concerned subject, activates the application by triggering it from his/her device and in turn changing the value of the flag to true. The students can now mark the attendance for that particular lecture by a single click. The teacher then deactivates the app after sometime (usually after a minute) by again changing the value to false. The teacher is given facility to generate reports as soon as the students are done marking their attendance. The teacher can mark the attendance of a particular student if at all any student cannot mark the attendance due to some technical issues. Similarly, the teacher can delete the attendance of the students.

The next phase here is report generation. The code for generating reports is written using JSP. Only the admin, the concerned staff or faculty member is given the authority to access this page. He/she can search for a particular student in the database and can generate reports monthly or weekly. Also, periodic SMS is sent to the student's parents by the admin. This feature is enabled by connecting the system to an SMS gateway.

Following figure explains the flowchart of the student's side:

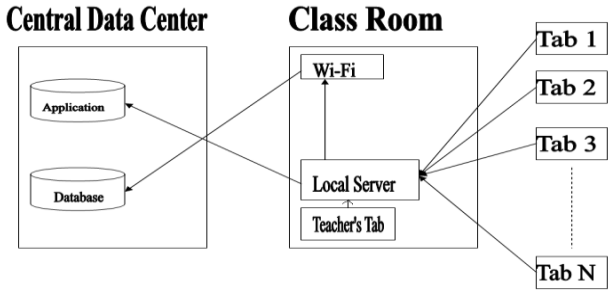


Following figure explains the flowchart of the teacher's side:



The students will first have to install the apk file on their android devices. In the next step, they will have to enter their personal details and then login into the system using their id and password. They will be then directed to a page that displays a few options like checking attendance, marking attendance and checking out the upcoming events. The flag is then checked if it is true and only then the students can mark their attendance.

The teachers will have to install the apk on their device. In the next step, personal details will be recorded and then they will have to login into the system using their id and password. They will then be directed to an options page, similar to the students. The major difference being the page of taking attendance of the students, wherein the teachers will have the facility to set the flag value to true. After taking the attendance, they will have to set the value of flag to false. Following will be the architecture of our system:



The architecture can be divided into two components; the CENTRAL DATA CENTER and the CLASSROOM. A Wi-Fi connection is needed in every class. Here TAB 1 to TAB N represents the tablets of the students. Marking of the attendance will be controlled by the teacher.

Teachers tab will be connected to the Local Server. At a particular time during the lecture, the teacher will trigger a request to start the application through his/her tab. The request here is made to the local server. This request is then forwarded to the Central Data Center and the AMS application is activated.

Once the application gets activated, the students can access the application. They can mark their attendance with the help of a single click. Thus their attendance for that lecture will be marked. All this process is carried out on the local server. This data is then sent to the CENTRAL DATA CENTER, where records are maintained.

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Conclusions

In this paper, we proposed a new system for monitoring attendance of the students using android platform. The results showed improvements in accuracy as compared to using user-based paper-based approach. Moreover the proposed technique provides an easy way for generating reports.

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