Review on Academia Hub: Android Application for Student Attendance System

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Abstract*: Until today, most lecturers in universities are found still using the conventional methods of taking students' attendance either by calling out the student names or by passing around an attendance sheet for students to sign confirming their presence. In addition to the time-consuming issue, such method is also at higher risk of having students cheating about their attendance, especially in a large classroom. Therefore, a method of taking attendance by employing an application running on the Android platform is proposed in this paper. This application, once installed can be used to download the students list from a designated web server. Based on the downloaded list of students, the device will then act like a scanner to scan each of the student cards one by one to confirm and verify the student's presence. The device's camera will be used as a sensor that will read the barcode printed on the students' cards. The updated attendance list is then uploaded to an online database and can also be saved as a file to be transferred to a PC later on. This system will help to eliminate the current problems, while also promoting a paperless environment at the same time. Since this application can be deployed on lecturers' own existing Android devices, no additional hardware cost is required.*

Keywords: Attendance System, Android Application, Online Attendance System

I. INTRODUCTION

In most educational institutions, participation of students in learning process is regarded as a vital exercise for allowing knowledge transfer. This signifies the importance of having students to attend the scheduled lectures and classes. Conventional methods for recording student's attendance are still adopted by most colleges. One common method is by having students to manually sign the attendance sheet, which is typically passed around the classroom while a lecturer is giving the lecture. This approach could undoubtedly allow the students to cheat about their attendance, where a student may sign for an absent student. Besides, such attendance sheet could easily be misplaced or lost.

A stricter approach especially to prevent students cheating about their attendance is additionally tedious, where a lecturer calls out the individual names from the students list and validate the presence of every single student. Such manual methods of taking students attendance have been proven to be difficult and time consuming. Thus, there is a need for a semi-automated system that would eliminate all of these troubles. Therefore, it is our objectives to develop a portable attendance system equipped with an online database, especially to prevent data loss as well as to promote paperless and a greener environment. Besides that, the application will help to reduce time being wasted, leading to a higher learning productivity in class. There are a few paperless attendance systems that have been developed but such systems need to be equipped with either a computer or RFID reader, resulting in additional cost for hardware and its maintenance. With that in mind, we have aimed to address this issue by having a system with minimal hardware requirement and at the same time, enhancing the mobility aspect of the existing attendance systems.

II. LITERATURE REVIEW

1.Paper Title:-Automated attendance system

Author:-*smith et al.*

Year:-2020

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Summary:-this paper, published in the *journal of systems*, discusses an RFID-based attendance system that automates student tracking. The study highlights how the use of RFID tagging algorithms improves the accuracy and efficiency of attendance monitoring by eliminating manual processes.

2. Paper Title:-Blockchain for attendance tracking
Author:-*Johnson& lee*
Year:-2019
Summary:-published in the *international journal,* this paper explores the application of blockchain technology for securing attendance records. The authors emphasize that blockchain consensus algorithms ensure data integrity and privacy, providing a tamper-proof system suitable for educational institutions.

3. Paper Title:-Mobile application for attendance management
Author:-*Patel et al.*
Year:-2021
Summary:-this study, appearing in the *mobile tech journal,*analyzes a mobile application designed to streamline attendance management. It focuses on easy integration with learning management systems (LMS) and explains how mobile app backend algorithms facilitate real-time data access and reporting.

4. Paper Title:-Facial recognition attendance system
Author:-*Garcia&Kim*
Year:-2023
Summary:-in their paper published in *ai & education*, the authors investigate a real-time attendance system using facial recognition. The study demonstrates the effectiveness of convolutional neural networks (CNN's) in identifying students accurately, offering a modern and automated approach to attendance tracking.

5. Paper Title:-Comparative study of attendance methods
Author:-*brown & white*
Year:-2023
Summary:-this paper, from the *educational review,* provides a comparative analysis of various attendance tracking methods. The authors discuss the strengths and limitations of different systems without focusing on a specific algorithm, giving educators insights into selecting suitable solutions for their needs.

6. Paper Title:-IOT-based attendance system
Author:-Wong et al.
Year:-2020
Summary:- this paper proposes an IOT-based solution for classroom attendance. the authors explain how IOT sensor data aggregation algorithms can automatically collect attendance information, reducing errors and minimizing teacher intervention.

7. Paper Title:-smart classroom attendance system
Author:-Zhang et al.
Year:-2015
Summary:-it describe an intelligent attendance system that leverages machine learning classification algorithms. the study shows how the system enhances student engagement by providing real-time feedback and reducing errors in attendance tracking.
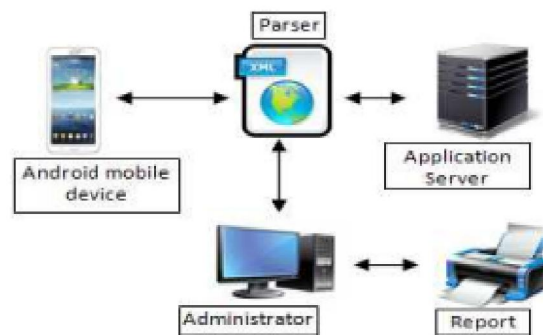
Fig. Attendance System Architecture

As the technology advanced, there are many features that are introduced to the smartphones. Therefore, the researchers in fully utilized the features that are provided by the smartphones. An Android application for mobile platform utilizing GPS was developed to track employees. Identification of the employees was based on the fingerprint sensor and voice recognition to replace the manual identification tagging using electronic cards. An administrator system was connected to the Android smartphones through the application server, as shown in above Figure Apart from monitoring, the administrator can generate report by retrieving the employees' record kept in the application server. Using the same approach researchers in automated the students' attendance recorded using voice recognition. The records were updated and maintained in SQLite database so that the administrator can generate reports on the absentees. Then, an email notification sent to the respective parents, thus creating communication bonding between faculty members and parents. In apart from the fingerprint scanner, Wi-Fi technology was used for the authentication and attendance monitoring in workplaces. A Java-based mobile application was developed to authenticate the bio-metric fingerprint. In addition, the employees' smart identification (ID) card were connected to the Wi-Fi zone to ensure their presence. The system can also calculate the employees' working hours through time counter. Table I summarizes the previous works on mobile application and attendance tracking systems that had been developed. The findings are also compared for the pros on the advantages of the work and the cons for the arguments to the studies. By that, the best method to develop the project on the mobile application can be emphasized.

III. PROBLEM DEFINATION

Student Attendance system is one of the most important and challenging tasks in the modern world. As there are many traditional ways and paper work which are very time consuming and difficult to analysis by the class teacher and principal sometime a it can lead to the side-effects which can further decision making regarding regularly absent students. Our goal is to build such a attendance system which run on android application as well as web application to take attendance and show attendance report to teachers and faculty model which will help the teacher to find summary report of attendance there is graphically report for better understanding.

SYSTEM ARCHITECTURE

Interfaces:

There is a single type of interface as such supported by our system namely

User Interfaces:

The product will exist on a real-life system. The Interface will be a simple and easy to use interface. The user needs to give input of the attendance which they are looking for after that the report will be predicted according to the input entered the result box will display the result of the fired query.

Hardware Interfaces:

The system has minimal Hardware interfaces. A normal android phone, personal desktop or a laptop will be a good choice to run the system. It is recommended for the system to have higher ram and processing power in order to compute and predict quickly.

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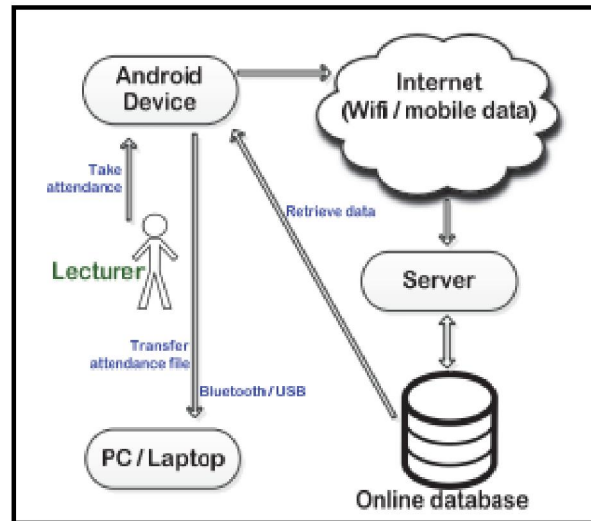
Software Interfaces:

To apply for this system there is need to Android Studio, XAMPP, MySQL, Browser, Editor etc.

The online database plays an important role in the system as without it, the user authentication will fail along with the data extraction process. The database is composed of a number of tables, which are used to store different groups of records required to managed the student attendance data. Basically, there are four relational tables specifically named as; 'groups', 'lecturer', 'courses' and 'students'. The 'lecturer' table stores the staff's information such as the staff username, password and name, while 'courses' table stores the details of available courses. As shown in Figure 2, the primary key of 'courses' and 'lecturer' table are inserted into 'groups' table as foreign key. The same goes for 'students' table, the foreign key refers to the id from 'groups'. Figure 2. Table's relation diagram The online web server can be deployed on a computer, which is connected to the Internet.

System Analysis and Design

This section presents the sequence of activities performed towards the completion of the system. The development work of the system follows the normal software development lifecycle, where prior to the real implementation work, detailed designs of the system were completed first. These are described in the following sub-section

System Requirements: The system requirements for Academia Hub: Android Application for Student Attendance System are as follows:

Software requirements –
- Operating System: Any OS
- Technology: PHP and Android
- Database: MySQL
- Server: XAMPP Server
- Editor: Notepad ++

Hardware requirements –
- Processor: AMD Ryzen 5 5500U with Radeon Graphics
- RAM: 2GB or more
- Internal Storage: 8GB or more (minimal local storage required)
- Operating System: Android 7.0 or higher

System Design: The Android based Attendance Management System is designed based on the client-server framework. By referring to the system architectural diagram, the system consists of an online server with database and the Android-based application and its hardware part as the client.

Software Architecture

The online database plays an important role in the system as without it, the user authentication will fail along with the data extraction process. The database is composed of a number of tables, which are used to store different groups of records required to manage the student attendance data. Basically there are four relational tables specifically named as; 'groups', 'lecturer', 'courses' and 'students'. The 'lecturer' table stores the staff's information such as the staff username, password and name, while 'courses' table stores the details of available courses. the primary key of 'courses' and 'lecturer' table are inserted into 'groups' table as foreign key. The same goes for 'students' table, the foreign key refers to the id from 'groups'. The online web server can be deployed on a computer, which is connected to the Internet. To allow public access, the server should be configured with a public IP address. This server will be receiving requests from the client applications that are running on the Android devices, which also require Internet access, especially when downloading list of students from the server and when uploading updated attendance records.
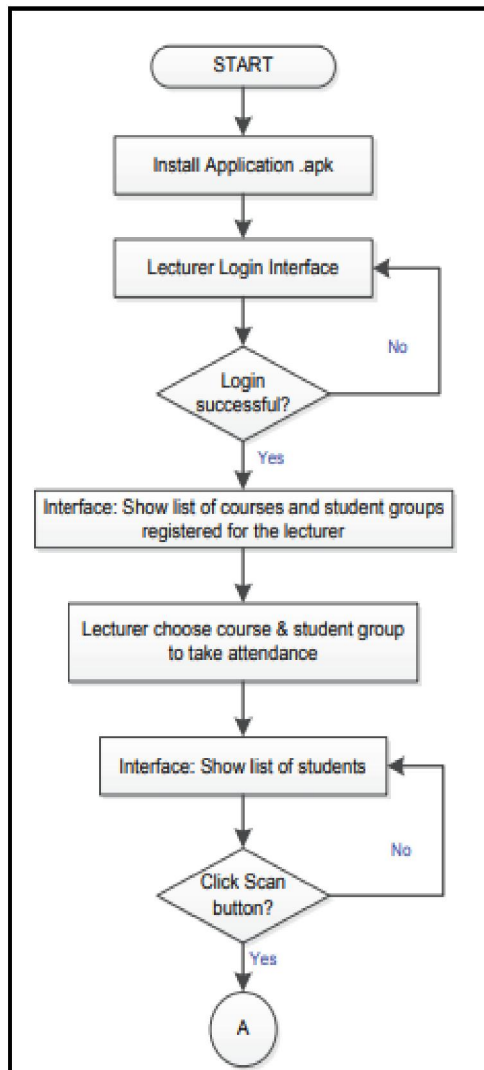

Fig. Workflow

User Navigation Design: According to the flow chart (refer to Figure 3), the application needs to be installed first on the user's Android based device. Once launched, the application will take the user to the login page. Upon a successful login authentication, the user is taken to a page to choose their registered teaching course and class (student group) from the drop-down list. Once all required inputs are filled in, a list of students' names for the respective class will be downloaded into the device. Every time a class starts and the lecturer is ready to record students' attendance, a start button should be clicked to activate the scanner application. The scanner application will be opened and ready to use the phone's camera to detect and capture the barcode, printed on the student's card (see Figure 4). The captured student ID (from the barcode) will be matched with the student IDs from the student list. A matching student ID will then be marked with the current timestamp as the attendance validation. This scanning process will keep repeating, in which case the camera will scan and validate barcode from each and every student's cards one by one until there are no more cards left to scan. Lastly, the updated student's attendance list can then be uploaded to the server or saved as a file to be transferred to a PC.

Hardware Architecture: The basic requirement to deploy the system is a computer to run the online database server and a device with camera that supports Android 2.2 or higher versions for running the client application. Another optional requirement is a personal computer to retrieve the attendance list file.

System Implementation: The development work for this project consists of two parts, which are the development of the online database server and the Android application itself. For development of the Android application, the design works involve designing the Graphical User Interface (GUI) required for displaying information, capturing user inputs and integration with Zxing barcode scanner especially to support barcode scanning process. This attendance management system uses student's unique identification number, which is captured from the scanned barcode for attendance validation purpose. The barcode scanning process is supported by the ZXing library, IEEE Conference on Systems, Process and Control, Pune, India 120 which is integrated into the application. To create and manage the online database, basic SQL knowledge is needed. The online server application being employed is the XAMPP server, which includes MySQL database as one of the components. As for the client-side, SQLite library is used to manage a local database running on the Android device; i.e. used to store the downloaded and updated student list.

IV. RESULT AND DISCUSSION

By following the design proposed in the previous section, the server-side and the client-side applications were successfully implemented. Having a system to capture and store students' attendance records online promotes a paperless attendance record and a greener environment. The portability and mobility aspect of the application is also emphasized in this current system since each lecturer only requires an Android device to run the application.

Flow of activities on Android: Snapshots of the Graphical User Interface (GUI) The following snapshots illustrate the attendance – recording process based on the flowchart as default front interface once the application is launched. Figure 7 shows the login form where the user (lecturer) needs to enter their username and password. Upon a successful login process, the lecturer will be taken to the next interface where the lecturer's name is displayed along with a list of their respective courses and groups (class). Figure 9 shows the successfully downloaded students' name list from the online database.

The integrated third-party barcode scanner initialization when the 'scan' button is clicked. The camera view is shown, ready to capture the barcode (printed on the student card). the updated students' name list which have been time stamped for attendance validation.

V. CONCLUSION

This paper presents the development of student attendance system using an Android based mobile application. The traditional method of taking attendance can be replaced by the proposed attendance system application. The proposed application can increase the efficiency of managing student attendance records. The proposed attendance system is suggested to further improve by using more accurate signing such as fingerprinting, face recognition and others suitable technology. In recording student attendance, conventional methods are still adopted in some institutions, where the

instructors call out the student names one by one or by taking signature from each student to determine their presence. Nowadays, better methods are also employed, i.e. by relying on a system to record the attendance of students in semi-auto manner, e.g. RFID or biometrics-based systems.By eliminating manual paperwork and introducing mobile technology, the application reduces errors, saves time, and promotes transparency. It also enhances communication by allowing reports to be shared via email, SMS, and file formats like Excel or PDF. The system's dual platform (mobile and web) ensures accessibility and convenience for users across different devices. Such systems are absolutely excellent as a solution to existing problems, but one obvious drawback is the additional cost of hardware and maintenance. Hence, it was our target to develop an attendance system that will require minimal hardware cost, setup and maintenance. i.e. by having the application to run on the instructor's existing Android mobile device. Besides that, to prevent data loss, an online database will be used especially to store the recorded student's attendance. The system was successfully developed by following the client-server framework. A complete design of the system was created first, followed by the actual implementation of the system both on the server and Android device. The development was finalized with the system testing on the overall system

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