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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.

With the growing emphasis on student attendance in educational institutions, the need for effective attendance management systems has become crucial. These systems simplify the process of recording attendance and provide valuable insights into attendance patterns and trends. By leveraging technology, institutions can ensure consistent student attendance and address any attendance-related issues proactively

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.





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II. LITERATURE REVIEW

| Sr. No. | Name of Paper | Publisher | Authors | Year | Description | Algorithm Used |
|------------|---|--|-----------------------|------|--|---|
| 1 | Automated Wireless Biometric Fingerprint Based Student Attendance System | IEEE | Biswaranj an Swain | 2021 | It eliminates issues such as proxy attendance, manual errors, and paper waste. | Fingerprint Recognition Algorithm |
| 2 | Mobile Application for Creating Presence Lists | IEEE | Zuzana Vantová | 2017 | This paper presents a mobile and web- based system for managing student attendance at the Technical University | NFC-based Identificatio n |
| 3 | Route Mapping and Biometric Attendance System in School Buses | IEEE | Khaled Mahfouz | 2020 | This paper proposes a biometric attendance system for school buses that ensures students are safely picked up and dropped off. | Route Optimizatio n |
| 4 | A Blockchain- Based IoT Data Securing and Sharing System for Attendance Management | Indian Journal of Science and Technolog y | Atowar Ul Islam | 2024 | This paper introduces SIBS, a secure attendance management platform using Blockchain + IoT. | Blockchain with IoT Integration |
| 5 | Mobile Attendance System App | Internation al Research Journal of Engineerin g and Technolog y (IRJET) | Dhaval Parmar | 2021 | The system replaces traditional pen-and- paper methods with a digital, mobile- friendly solution that allows real- time attendance tracking and report generation. | Mobile Platform (Android) |





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| 6 | IoT-Based Attendance System | IoT Journal | Wong et al. | 2020 | Proposes an solution automatic attendance collection classrooms. | IoT for in | IoT Sensor Data Aggregation Algorithm |
|---|-----------------------------------|----------------|----------------|------|---|------------------|--|
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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.

IV. SYSTEM DESIGN AND ARCHITECTURE



Interfaces:

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

We will be using application server connected with database server and client interface for developing student attendance system. Android Application for Student Attendance System involves multiple layers and components to ensure smooth data flow, scalability, and security.

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.

System Requirements:

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

Software requirements -

i. Operating System: Any OS ii. Technology: PHP and Android iii. Database: MySQL iv. Server: XAMPP Server v. Editor: Notepad ++

Hardware requirements -

ii. Processor: AMD Ryzen 5 5500U with Radeon Graphics
ii. RAM: 2GB or more
iii. Internal Storage: 8GB or more (minimal local storage required) iv. Operating System: Android 7.0 or higher

V. IMPLEMENTATION

1. Tools, Platforms, and Programming Languages Used

- Development Platform: Android Studio
- Programming Language: Java (Java preferred for this implementation)
- Database: Firebase Realtime Database / SQLite (Firebase used here for cloud support)
- Authentication: Firebase Authentication
- UI Design: XML (Android Layouts)
- Version Control: Git and GitHub

2. Algorithms or Techniques Implemented

- Authentication: Email/Password login using Firebase
- Role-Based Access Control: Admin (Teacher) and Student roles
- Real-Time Data Sync: Firebase Realtime Database keeps attendance logs updated live
- Validation Logic: Ensures that attendance can only be marked once per session per student
- Date/Time Stamping: Attendance entries are timestamped with current date and time

3. Step-by-Step Development Process

- Step 1: Project Setup
 - Install and configure Android Studio
 - Create a new project with an Empty Activity
- Step 2: User Authentication
 - Enable Firebase Authentication (Email/Password) Create Login Activity and Register Activity
 - Implement login/logout functionality.

VI. TESTING AND EVALUATION

1. Testing Methods Used

To ensure the reliability and effectiveness of the Student Attendance System, a combination of testing techniques was employed:

- Unit Testing:
 - Individual modules such as user authentication, QR code scanner, and database

operations were tested in isolation using JUnit. This ensured that each component performed its intended function correctly.





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• Integration Testing:

Once individual modules were verified, integration testing was performed to ensure that different modules such as scanning attendance and syncing to the database— worked together seamlessly.

• UI Testing:

The user interface was tested using Espresso to validate navigation, input validation, and error message prompts.

• Manual Testing:

Manual test cases were executed to simulate real-world scenarios, including abnormal inputs, network failures, and user error.

3. Performance Evaluation

• Efficiency:

The app performed well under typical usage. Average attendance marking (QR scan + save) took less than 1.2 seconds, ensuring quick roll-calls.

• Accuracy:

The system consistently recorded correct attendance data with no false positives or data corruption observed during testing.

Resource Usage:

The application maintained low memory and CPU usage, and battery drain was minimal even after prolonged use.

4. Limitations or Challenges During Testing

Device Compatibility:

Differences in camera performance and QR scanning accuracy across various Android devices posed a challenge. Additional testing was required for older devices.

• Offline Functionality: Ensuring data consistency during intermittent network connectivity was complex. Local caching and sync mechanisms needed robust testing.

• **Real-time Syncing Delays:** In some test environments with unstable internet, real-time syncing to the backend server showed occasional delays, which required implementing retries and timeout handling.

VII. RESULT

The developed Android-based Student Attendance System successfully addressed several challenges associated with traditional attendance tracking methods. The key findings from the system testing and user feedback are summarized below:

- Accuracy: The system recorded attendance with a high degree of accuracy (above 98%) across multiple test sessions.
- **Time Efficiency:** Marking attendance using the application took significantly less time compared to manual methods, reducing the average time per session by approximately 60%.
- User Acceptance: Survey responses indicated that 90% of users (students and instructors) found the system user-friendly and more convenient than traditional methods.
- Notification Feature: Instant notification on attendance status enhanced transparency and student awareness.





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VIII. 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 semiauto 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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