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DEVELOPMENT OF AN ANDROID-BASED ATTENDANCE MONITORING SYSTEM

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ABSTRACT

The traditional method of taking attendance is not only time consuming but insecure and unreliable, therefore, technology was introduced to attendance management. This research developed an android based attendance management system using ReactNative framework for the frontend and Node JS for the backend. Questionnaires were administered to twenty-five Engineering lecturers and students of a higher institution in Nigeria to determine users' perception of the developed system based on acceptability and level of satisfaction. Results show that the developed android-based attendance management system is acceptable by the users and they are satisfied with the features incorporated in the system. It is however recommended that future work employ machine learning techniques for attendance management systems' design.

Keywords: Attendance, Android, Biometric, Technology and Authentication

1. INTRODUCTION

Class attendance is one of the most important factors that help students to complete their understanding and to improve their knowledge and skills (Lukkarinen, Koivukangas, &Seppala, 2018). In the traditional classroom setting, the existing system or manual way of checking attendance is a roll call done by the teacher where students normally raise their hands or answer "Present!" when called for class attendance. Another way of checking attendance is by asking students to write their names and signatures in attendance sheets. The traditional process takes much time, and lead to inaccuracies in attendance records, making it difficult to track student attendance and engagement. and many efforts are spent by the staff of the department to complete the attendance rates for each student. Hence, various innovative technologies and processes were introduced to eliminate the burden of checking class attendance manually (Mohammad 2018).

Some approaches to automatic attendance management include: Radio Frequency Identification (RFID), QR codes, bar codes and biometric techniques, biometric approach offers the greatest amount of authentication (Kaur et al., 2019). Biometric systems rely on specific data about unique biological traits in order to work effectively and it involves running data through algorithms for a particular result, usually related to a positive identification of a user or other individual. Some techniques employed in developing biometric systems are: fingerprint (NorshidahKatiran 2018), iris, palm, voice and face recognition. Face Recognition is an approach in which a person is authenticated using a camera or any image capturing device (Mayank 2021). An individual's face can be verified by means of comparing selected features to image files from a face database. Face recognition has been used in many projects and systems around the world. With the use of android phones, teachers can easily check class attendance and monitor attendance records while students can easily view their attendance details (Mendoca, 2017).

This research developed an android based attendance management system using face recognition. An Android-based attendance monitoring system has the potential to improve the accuracy and efficiency of attendance tracking in educational institutions (Nagpal et al., 2018; Raza et al., 2019). By using mobile devices, such as smartphones or tablets, students can easily sign in and out of classes, and teachers can quickly and easily view attendance records. In addition,

Android-based systems allow for real-time monitoring and tracking of attendance, reducing the likelihood of errors or inconsistencies (Chandrashekar, 2016, Mallikarjun & Suresh, 2019).

2. RELATED WORKS

Barcode and QR code technologies, Radio Frequency Identification (RFID) (Sospeter and Kaijage 2017), NFC (Alvi 2017), Bluetooth (Vishal 2017) are approaches used by previous researches to develop attendance management systems. The limitation of the approaches is their inability to detect fake attendance, hence the introduction of fingerprint approach to attendance management NorshidahKatiran (2018), Bayoumi et al. (2015) and Rao and Satoa (2013) proposed an employee attendance management system using fingerprint recognition. In the research, users were required to scan their fingerprint to record attendance at every check in and check out. Minutiae-based matching combined with alignment-based greedy matching was used to recognize scanned fingerprint in the proposed attendance system. Shoewu and Idowu (2012) designed and implemented a system that uses fingerprints to mark the attendance and generate the reports at the end of the semester. The limitation of this approach is that it is time-consuming and therefore unsuitable for a larger class.
Mendonca et al. (2015) designed an online attendance system which reduces the duration of the entire attendance checking process. It provide an easier and faster way of attendance by replacing the traditional process wherein the teachers has to roll call every student name in class and mark the attendance when the student responded. Islam et al. (2017) proposed an attendance system which uses smart phones. Using the system installed on the smartphones, teachers can easily check attendance and attendance records are saved on the phone SQLite database as well as in the MySQL database simultaneously. In addition to attendance checking, the system is capable of calculating attendance percentage, print attendance records, and send email and SMS to the guardian to keep them updated about their child's attendance at the school.
Somasundaram, Kannan, & Sriram (2016) designed and implemented attendance management system using mobile devices. The android based system was developed using VB.NET and SQL Server. The system has the ability to maintain and calculate student attendance as well as provides a report generation module. The system consists of five modules namely: admin module, registration module, student module and SMS and Android module. Android module allows students to send messages to the system to inform teachers the reason for their leave/absence, parents can also receive SMS about their ward's attendance in school.
Kumbhar et al., (2014) developed an attendance management system using Android devices. During attendance checking, the teacher needs to activate the application on the server and when the application is active, the student can mark the attendance with just one click. Teachers can generate attendance reports weekly as well as monthly. At the end of each month, SMS are sent to parents/guardians of the students, thus informing them about their attendance. Hameed (2017) designed and implemented a smart student attendance system based on Android operating system. The attendance system has three parts: the admin account that can login to the system and edit the database, the instructor account, which logs to the system to mark student attendance and the reporter who logs to the system to check attendance records and reports all tasks. Soewito, et al. (2015) improved android based attendance management systems by developing an employee attendance system on Android smartphone using fingerprint and GPS integrated with payment system.
To further improve the quality of attendance management systems, face recognition was introduced (Mayank 2021). Nithya (2015) developed an attendance system that used face recognition using personal component analysis (PCA) algorithm to identify a person. Using the face recognition module, individual student's face is recognized, and attendance is recorded to the database automatically. In addition, student attendance details are sent to the school staff and the parent using e-mail. Arun et al. (2014), also utilized face detection and recognition for attendance management. The system consists of a camera that captures the images of the classroom and sends it to the image module for enhancement. Varadharajan et al. (2016) developed an attendance management system using facial recognition. Once faces are detected and recognized, the student is marked present. If the student is marked absent, a message is sent to the parent.

3. METHODOLOGY

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The architectural framework for the Android based Attendance Monitoring System (AAMS) consists of two main components: the back-end and frontend. The backend consists of: file system, database and web server as shown in Figure 1.

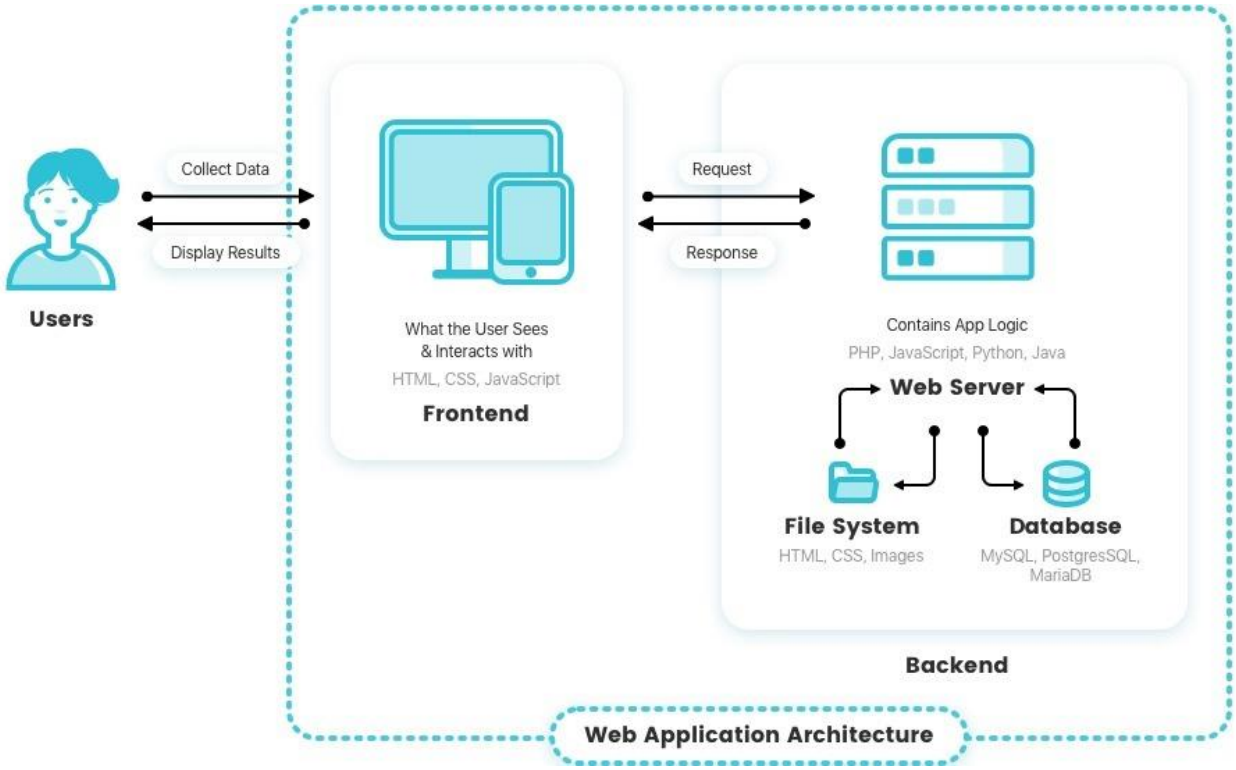

Figure 1: Architectural Framework of the Android based Attendance Monitoring System

i. **Frontend:** The frontend was developed using hypertext markup language (HTML), CSS, and JavaScript to create the visual elements and user interactions of the application.

ii. **Backend**: The backend handles all the functionality and logic which precedes the communication between the Frontend (User interface) and the database. The database stored information about students, teachers and attendance records using SQLite database. The web server used is NodeJS and it connects to the database and provides an interface for retrieving and updating attendance data.

4. RESULT AND DISCUSSION

Figure 2 shows the screenshot of the homepage where users can easily navigate the application by logining in and choosing user type which can either be admin, tutor or student. Figure 3 shows the faculty selection page, where users can select the faculty they belong out of the available faculties. Figure 4 shows the screenshot of the interface where the admin can add class and select department, level, course, course code and the tutor for the class. Figure 5 is the attendance monitoring page showing the number of times a student is present and the number of times the student is absent in class.

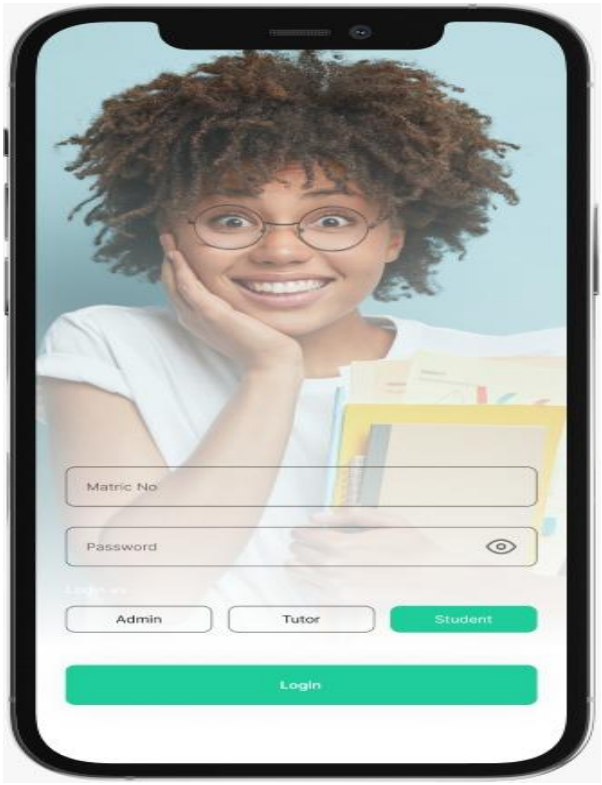

Figure 2: Homepage of the developed Android based attendance management system

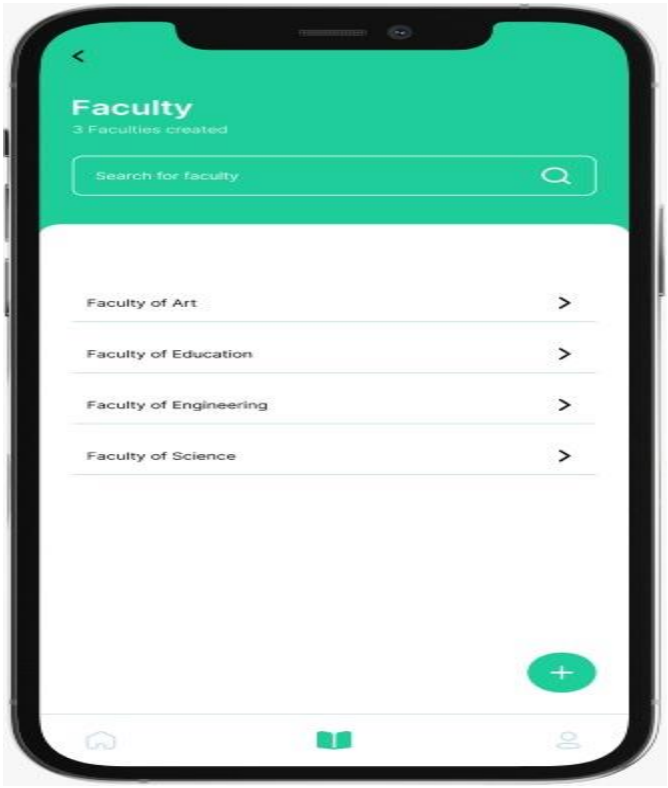

Figure 3: Faculty Selection Page

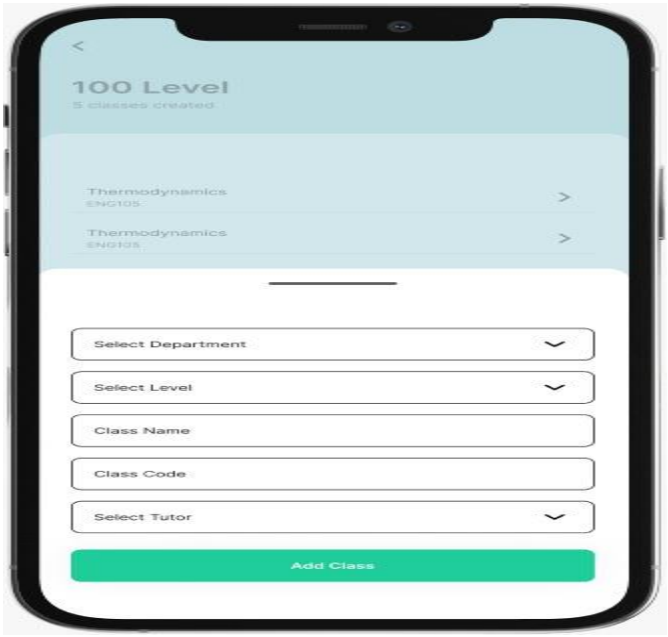

Figure 4: Add new class page

Figure 5: Attendance Monitoring Page

4.1 RESULTS DISCUSSION

During the requirements analysis phase, a survey was done to determine the various challenges/problems that Engineering faculty members of a higher institution in Nigeria are faced with when checking and monitoring class attendance. Questionnaires were administered to twenty-five (25) staff and students of the faculty and the information gathered was used to determine users' perception of the developed system based on acceptability and level of satisfaction. Table 1 displays the results obtained from users' perception of paper-based attendance management. The ranking was based on the level of severity with range (1-5) with 5 being the most severe, 4 means severe, 3 is averagely severe, 2 is less severe and 1 is the least severe. The average responses in Table 1 shows that majority of respondents agreed that manual way of

checking attendance is time consuming, computation of attendance grade involves a lot of effort while it is inefficient for record storage.

Table 1: Ranking of the Common Problems with paper-based attendance management

S/N	**Problems/Challenges**	**Total number of responses(25)**	**Average responses (Rank 1-5)**
1	Checking of attendance is time consuming.	25	5
2	Monitoring attendance is tedious task	15	3
3	Computation of attendance grade involves a lot of effort.	20	4
4	Attendance records being misplaced or lost.	10	2
5	Attendance record is not that accurate	15	3
6	Inefficient use of resources for manual recording and storage	25	5

Table 2 shows the level of acceptability of the developed system in terms of usability, functionality, reliability and portability with the highest rating. The ranking is based on the level of acceptability of the system with 5 being the highly acceptable, 4 means acceptable, 3 is averagely acceptable, 2 means less acceptable and 1 is the least acceptable. Results in Table 2 show that the developed system is acceptable.

Table 2: Level of Acceptability of Developed Application.

S/N	**Software quality**	**Total number of responses (25)**	**Average Acceptability rating (1-5)**
1	Usability	20	4
2	Functionality	20	4
3	Portability	25	5
4	Reliability	15	3

Table 3 displays the level of acceptability of the features of the developed application with 5 being highly satisfied, 4 means satisfied, 3 is averagely satisfied, 2 means less satisfied and 1 is the least satisfied. Results in Table 3 shows that the users of the developed system are satisfied.

Table 3: Level of Satisfaction of the Features of the Developed Application.

S/N	**Features**	**Total number of responses (25)**	**Average Ratings(1-5)**
1	Checking and Monitoring Class Attendance	20	4

2	Automatic Attendance Grade Computation	20	4
3	Security of Attendance Data	15	3
4	Ease of Use	25	5

5. CONCLUSION

This work developed an android-based attendance management system using HTML and CSS in designing the front end and SQLite database with NodeJS was used for the backend. Questionnaires were administered to twenty five Engineering lecturers and students of a higher institution in Nigeria to measure the limitations of the paper-based attendance management and the level of acceptability and satisfaction of users of the developed system. Results from user's responses show that the manual way of checking attendance is time consuming and the developed system is proven to be acceptable by the users and respondents were satisfied with the features incorporated in the system. However, future research should consider the use of machine learning models for developing attendance management systems.
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6. REFERENCES

Alvi, A., Ali, M. A., & Siddiqui, M. J. (2017). Attendance management system based on NFC technology. Journal of Ambient Intelligence and Humanized Computing, 8(2), 225-234.

Chandrashekar, H. (2016). Android based Attendance Management System. International Journal of Engineering and Advanced Technology, 5(2), 901-903.

Islam, M., Hasan, K., Billah, M., & Uddin, M. (2017). Development of smartphone-based student attendance system. Paper presented at the IEEE Region 10 Humanitarian Technology Conference (R10-HTC), Dhaka, Bangladesh. doi: 10.1109/R10- HTC.2017.8288945

Hameed, M. (2017). Android-based smart student attendance system. International Research Journal of Engineering and Technology, 4(12), 1669-1672.

Kaur, A., Singh, K., & Singh, P. (2019). Attendance Monitoring System Using QR Code. International Journal of Advanced Research in Computer Science and Software Engineering, 9(6), 1-7.

Kaur, J., & Singh, A. (2019). A study of android split screen view. International Journal of Mobile Computing, 7(3), 35-40.

Lukkarinen, A., Koivukangas, P., &Seppala, T. (2018) . Relationship between Class Attendance and student performance. *Paper presented in 2nd International Conference on Higher Education Advances, Valencia, Spain.*doi: doi:10.1016/j.sbspro.2019.07.051

Mallikarjun, S., & Suresh, B. (2019). A Study on Android Based Attendance Management System. International Journal of Engineering and Advanced Technology, 8(4), 752-755.

Mayank G, Nithya, D. (2021). Automated class attendance system based on face recognition using personal component (PCA) algorithm. International Journal of Engineering Research and Technology, 4(12), 551-554.

Mendonca, B. J., D'Mello, G., D'souza, R., & More, J. (2017). Automated attendance using android devices. International Journal of Applied Information Systems, 8(6), 21-26.

Mohammad SU, Allayear SM, Das NC, Talukder FA (2018). A Location Based Time and Attendance System. *International Journal of Computer Theory and Engineering*. Feb; 6(1):36–8.

Nagpal, R., Kaur, G., & Singh, A. (2018). Attendance Management System Using QR Code. International Journal of Engineering Research and Applications, 8(6), 1-6.

NorshidahKatiran, Helmy Abdul Wahab, and Jamal Rasyid Abdul Rahman, Dz (2018). Development of Attendance System using Biometric Fingerprint Identification,dz ˛rd Engineering Conference on Advancement in Mechanical and Manufacturing for Sustainable Environment.

Raza, M., Khan, S., & Shafique, S. (2019). Attendance Management System Using QR Code. International Journal of Engineering Research and Technology, 8(6), 1-7.

Somasundaram, V., Kannan, M., &Sriram, V. (2016). Mobile based attendance management system. Indian Journal of Science and Technology, 9(35), 1-4.

Sospeter J and Kaijage S. (2017). Requirement Analysis and Design of RFID and Mobile Application based Attendance Management System: A Case Study of Ordinary Level Schools. Communications on Applied Electronics (CAE), 2(6):17–22.

Varadharajan, E., Dharani, R., Jeevitha, S., Kavinmathi, B., &Hemalatha, S. (2016). Automatic attendance management system using face detection. Paper presented in 2016 Online International Conference on Green Engineering and Technologies (ICGET), Coimbatore, India. doi: 10.1109/GET.2016.791675.

Vishal Bhalla, TapodhanSingla, AnkitGahlot, Vijay Gupta, (2017) "Bluetooth Based Attendance Management System", in *International Journal of Innovations in Engineering and Technology (IJIET).*