

Android-Based Attendance System

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Abstract---The credibility and validity of attendance system in various institutions of the economy have always been a major issue. The conventional method of marking attendance is not reliable as colleagues or friends can sign for each other. The instructor has to take a roll call of the students present in class to validate the attendance. This is time-consuming and may not be reliable. Hence, a new approach using android studio. An Integrated Development Environment (IDE) is used for developing android applications with firebase as its database. In this paper, the attendance problem is solved by developing an android attendance system which facial recognition with Global Positioning System (GPS) has integrated into it. The solution was implemented and tested on an android device. With this approach, it is impossible for any student not present in class to be marked present. The lecturer can also generate a report of the class attendance which can be exported in excel format for further processing.

Keywords---Android, Attendance, Institution, Student, University.

I. INTRODUCTION

ATTEendance has always been an integral part of every sector of the economy and human endeavor such higher institutions of learning, hospitals, social events, corporate organizations and many other areas [1-3]. Taking a look at the hospital system, attendance is very important especially for the out-patient clinics. Regular attendance is taken to keep track of the patients who were in for their sessions. Some patients, who were not in for their sessions, gave the excuse of schedule mix-up, others claimed they forgot and a lot of other excuses. A system had to be in place to ensure that patients were in for their sessions in time or schedule a different appointment if not available. The conventional method employed was to schedule appointments for patients on their visit to the hospital. This method was not effective at all, so other means of reaching patients had to be created. Patients not coming in at scheduled time often led to waste of resources. GSM automated system was created in order to monitor the attendance of patients and to send reminders at scheduled intervals. This system worked out well because the attendance of patients improved drastically [4]. Different organizations have different policies as regards work ethics. Organizations have a specific number of hours to be spent at the work place, which is used as a yardstick for efficiency. The attendance system is used as a measure of efficiency of the staff. The manual method of signing in and out was not working out as employees could be signing in and out

for each other. The electronic system was introduced to ensure the validity of the attendance. Using attendance as a measure of efficiency is still very questionable because an employee may spend several hours at work and still not be as efficient and productive as one who spends lesser hours[5]. Attendance is of crucial importance in institutions, most especially universities which is the focus of this paper. It is a common belief that students who are regular in class have higher chances of passing their course work than those who are not regular in class [3]. However, this may not be completely true as some of those students who are not regular still make good grades. The attendance system is a way of monitoring the students character performance as regards lecture attendance of the students and being dutiful. Different universities have different minimum requirements in terms of percentages to attain in order to qualify for examinations. Some schools still make use of the manual method, that is, paper and pen while others make use of some form of electronic means to capture attendance. The manual method has never been effective. It can be easily altered and the validity of the attendance is questionable. The lecturer goes as far as calling out the name of each student to ensure the validity of the attendance. This is very stressful and time consuming [3, 6]. The time spent on roll-call can be better spent on interactive sessions or explaining the course work further. For social events likewise, attendance has found importance and it has evolved over time. As it is the norm, you manually send out invitations and take note of the number of invitations that have been sent out, then you plan your event. Presently, it is really different, it is now done online. Those who are interested in attending a particular event go to the site which already has a limit of available seats to register. An invitation is automatically generated and sent to the electronic mail (e-mail) of the recipient. When the limit is reached, registration closes. This method has proven to be very efficient and less stressful. With this method, only those who get the invitation will be able to attend the function, thereby minimizing gatecrashing [7].

II. RELATED WORK

Attendance has been in existence for as long as the human race has been. The ancient method was to manually count the people, one after the other. It was later improved upon and a new system was developed. This involved writing down names and other details in a book upon arrival. This particular method

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was not reliable because the information can easily be altered. Individuals can decide to put down names of people who never came or even fake names. The validity of the gathered information became a huge challenge. This has encouraged researchers in this field of study to improve the attendance system. One prominent method that has been deployed by several researcher is Radio Frequency Identification (RFID) [8-12]. In this method, attendance is captured by flashing Identification (ID) cards at the RFID reader some centimeters away. This attendance capturing approach is still a very slow process as each student's ID card has to be swiped over the card reader for attendance capture. However, the authenticity is also questionable as students can swipe ID cards for one another. Further, Bluetooth technology has also been deployed in order to improve on attendance capturing [13, 14]. Authors in [13] employs Bluetooth smart chip to manage and monitor student attendance. The application configuration saves time compared to RFID approach, but does not curb impersonation as another student can help his/her friend(s) to keep tag(s). This challenge was curbed by Khaled et al., (2018) and Dwi et al., (2019) in their works [15, 16]. Biometrics is another method that has gained researchers' attention to improve on attendance because of its individual uniqueness [11, 17-19]. Other methods that has been considered are android application package, web-based approach, barcode-based approach, face recognition, iris recognition, etc. [20-28]. However, none of these studies curbs the issue of abscondment after being captured. Hence, in this present study, the authors combined geographical location and facial recognition technology to capture students' attendance for lecture. This method does not only help monitor student performance in terms of attendance in class, it can also be used to confirm lecturers' locations when taking attendance. In this method, lecturer does not need to dedicate another time for sorting or calculating the percentage of lectures attended by each student as the system does that and lastly, students can easily monitor their attendance performance in each course making attendance process transparent.

III. METHODOLOGY

The Android Attendance System is a software-based project which follows a specific Software Development Life Cycle (SDLC). The SDLC represents the different phases that a developer will go through in developing the application. The models of SDLC adopted in this work is the water fall model [29] which consists of six stages shown in Fig 1.

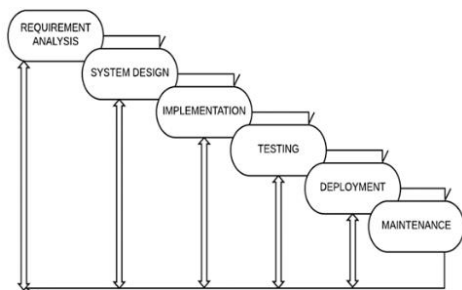


Fig 1: Block Diagram of the Waterfall Model of the Attendance System

A. Requirement Analysis

This is the most important stage. It is at this stage that the client and developers reach an agreement on the features of the application. It is the description of the features of the intended application.

1. Hardware Requirement

This work requires an actual physical platform for the Android Attendance System (AAS) to be built and specification. These are a personal computer with RAM of not less than 3 GB with a minimum speed of 1.8GHz and a HDD (Hard Disk Drive) of a minimum storage space of 20GB.

2. Software Requirements

To develop the attendance system, there are a number of computer software programs and programming requirements needed to implement the proposed system. Some of those requirements are as follows:

- To develop the attendance system, there are a number of computer software programs and programming requirements needed to implement the proposed system. Some of those requirements are as follows:
- Java Development Kit (JDK) to write the program for the application;
- Android Software Development Kit (SDK) to develop applications for the android platform. It has an Integrated Development Environment (IDE) included in it. The IDE is the interface for programming;
- Android studio to implement the system;
- Java programming language; and
- Amazon 'recognition' Application Programming Interface (API).

3. Functional Requirements

Functional requirements describe the functions the system is meant to accomplish. The users should be able to login according to their authorization levels such that:

- Students: create account, register courses, take attendance;
- Lecturer: create account, register courses, create timetable, initiate attendance, generate attendance report; and
- Mobile application: initiate facial recognition, initiate Global Positioning System (GPS), mark attendance present/absent.

B. System Design

Here, information that has been gathered from the requirement analysis are evaluated and an implementation plan is put in place. It has to do with choosing the right algorithm, software architecture, logical diagram design and data structure architecture.

1. Database

The database used in this application is firebase. Firebase offers services such as cloud storage, database, authentication, cloud messaging, hosting, real-time database and a lot more. The real-time database is employed in this work. It provides

application developers with an API which allows the application data to be synchronized across clients and stored on firebase's cloud service.

2. Mode of Operation

The mode of operation shows how the different components of the attendance system are connected together. It also shows the different flow charts and use case diagrams used such as Unified Modelling Language (UML), Sequence Diagram, Class Diagram. These diagrams of the android attendance system are created using lucid chart as shown in Figures 2, 3, 4 and 5.

Unified Modelling Language (UML) use case diagrams are visual representations of the interactions that occur between the system and the users. It describes the sequence of events for easy understanding [30]. The use case diagram in Fig 2 describes the sequence of events that occurs during attendance capture. When the lecturer opens the application, the app begins to send the geo-location of the student and the lecturer to the database, in this case, firebase. The lecturer can view the current geo-locations of the students but the students cannot. The locations of the students are stored temporarily but updated every two minutes. The lecturer can observe the students in his geo-location.

When it is time to take attendance, the lecturer clicks on Take Attendance, this displays a dialogue box that the lecturer uses to view the activities of the students currently taking their attendance. On the student's app, when the lecturer clicks on Take Attendance, this is the point at which the student is

required to scan his face. The scanned face is compared with the face the student registered, which is already stored in database. If a student is registering a different face, the lecturer is alerted on his end of the application and such student attendance will not be marked. The marked attendance is recorded in firebase and can be exported as an excel sheet whenever the lecturer wants



Fig 2: Use Case Diagram for Attendance Capture

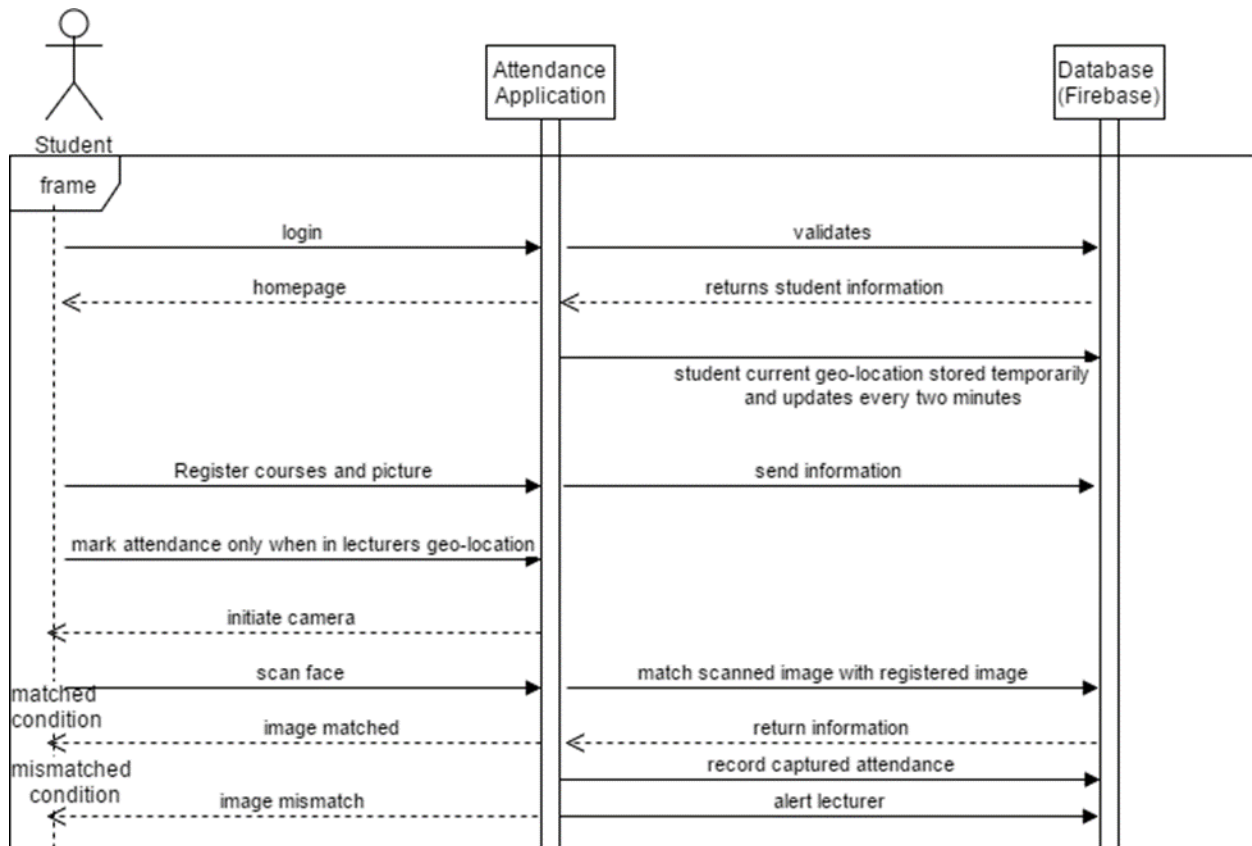


Fig 3: Sequence Diagram of the Attendance System from the Student's App

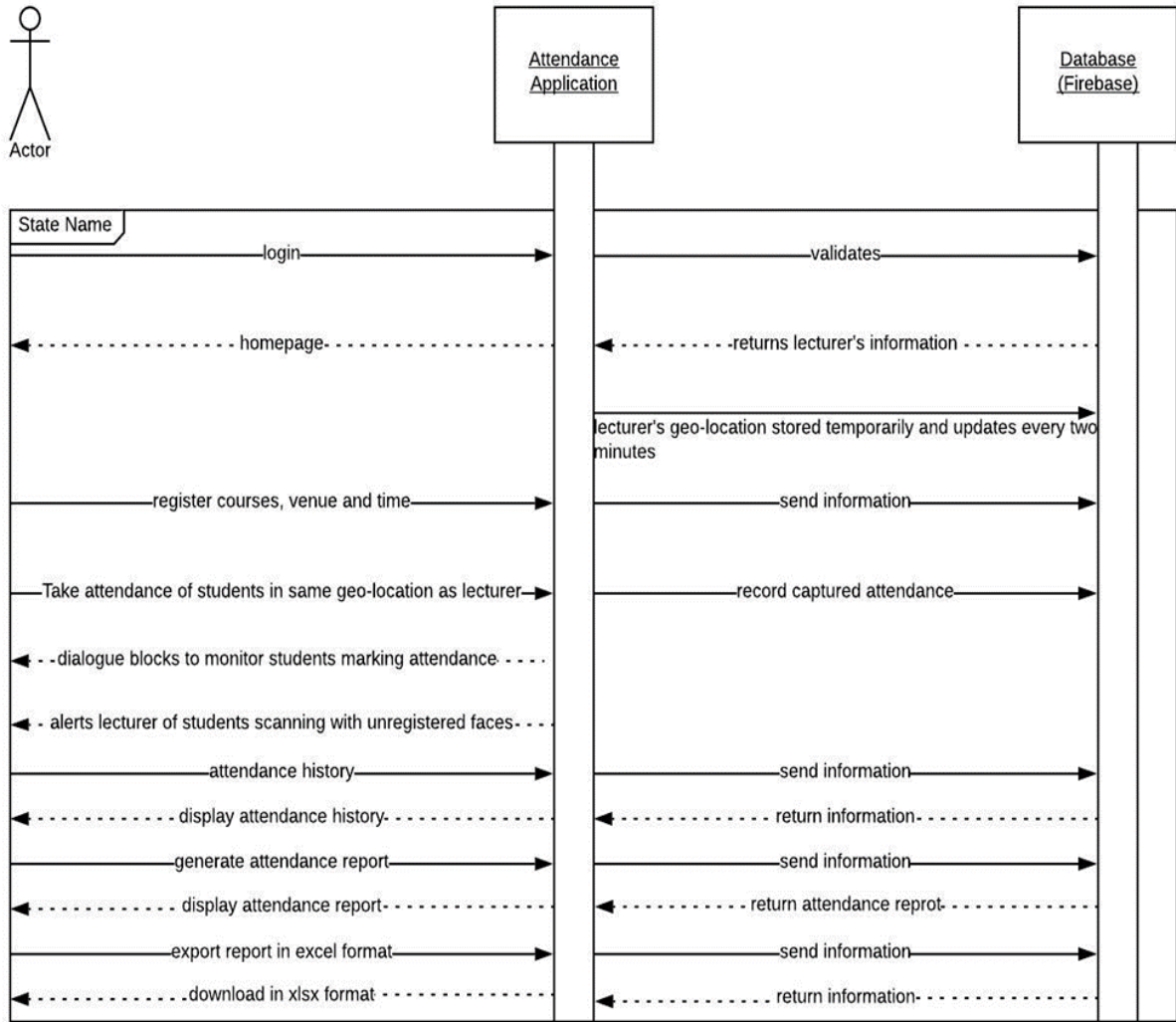


Fig 4: Sequence Diagram of the Attendance System from the Lecturer's End of the App

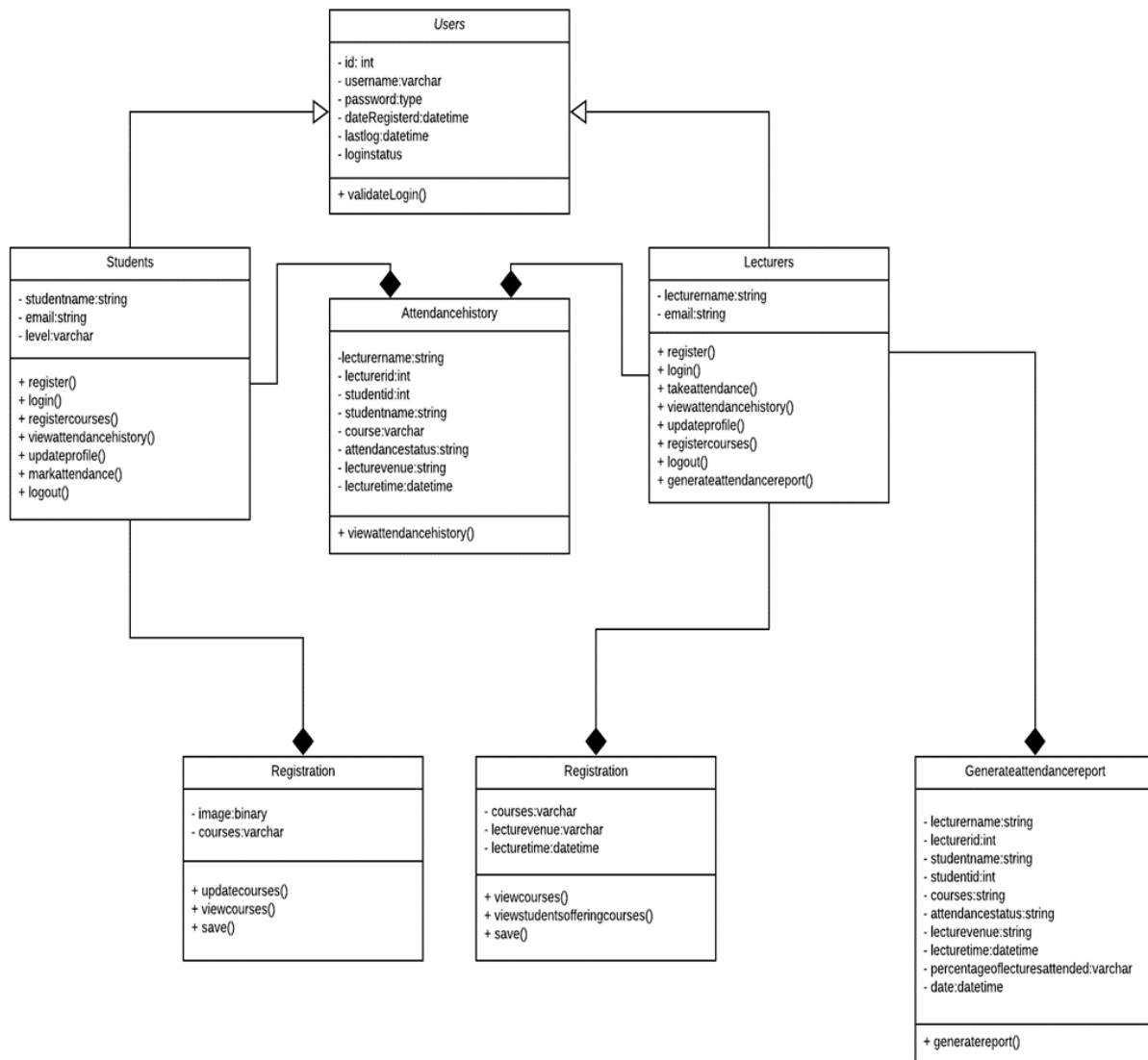


Fig 5: Class Diagram of the Attendance System

C. Figures

This is the stage of the software development life cycle where all the intended functionalities are executed. It shows the various interfaces and their related functions as outlined in the previous sections

1. Interfaces and Modules

The application is basically two: one at the lecturer’s end and the other at the student’s end. At the lecturer’s end of the application, he/she is able to create account, register courses, create timetable, initiate attendance and generate report. The student, at his own end, is able to create account, register courses and mark his attendance upon initiation by the lecturer.

2. Login Page and Account Creation

The login page, as shown in Figure 6, has two fields namely: “Email” and “Password”. It has two tabs namely: “Login” and “Create Account”. On clicking on the “Create Account” icon, it takes the user to the registration page. The user is required to

fill the fields in the form as shown in Figure 7 to become a registered user.



Fig 6: Login Page



Fig 7: Registration Page

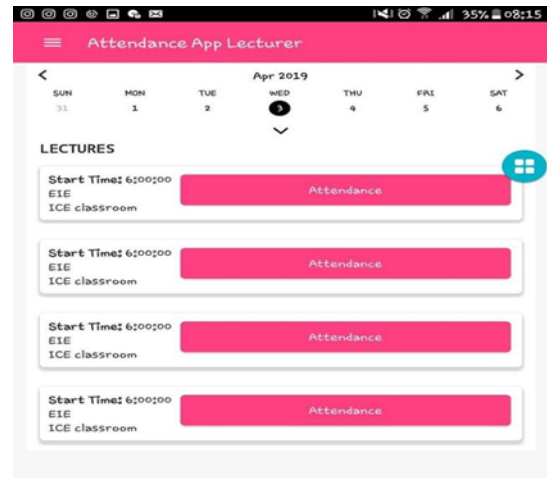


Fig 10: Lecturer to Initiate Attendance

3. Lecture's Application

The lecturer, at his end of the application, is able to perform some activities such as register the courses he is teaching, schedule the lecture time table, view any illegal activities such as impersonation and generation of report. Figures 8 to 14 show the interfaces which the lecturer interacts with while using the application.

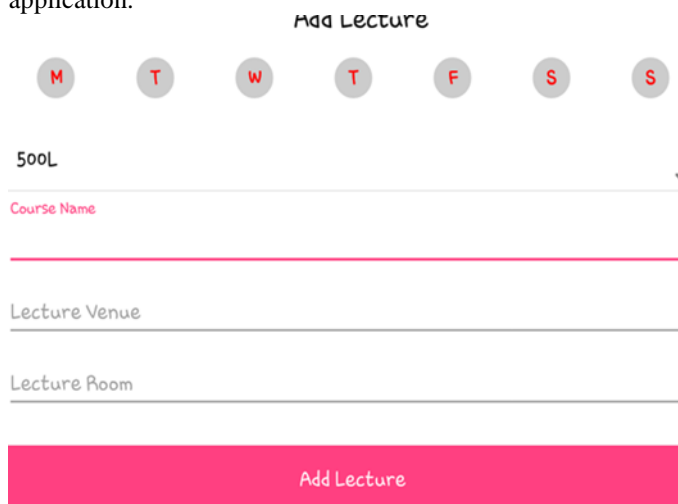


Fig 8: Timetable Scheduling

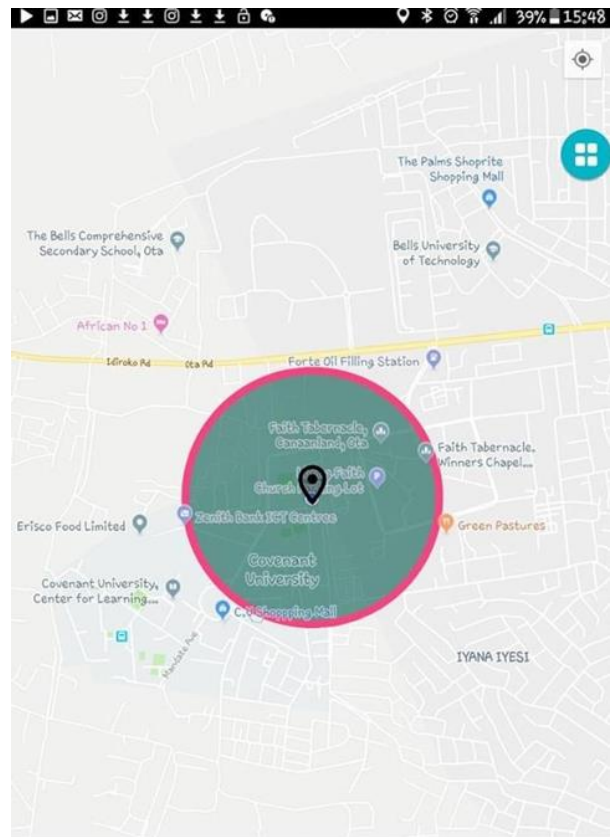


Fig 11: GPS Showing Lecturer's Location

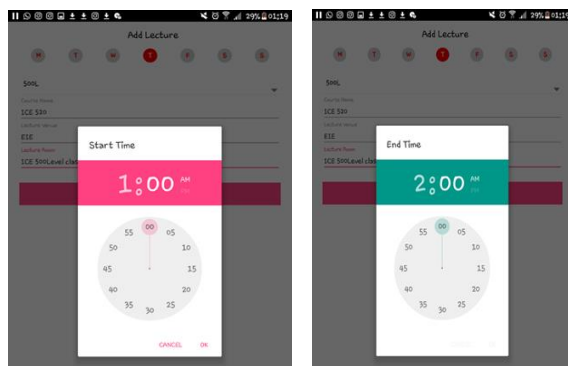


Fig 9: Setting the Lecture Time and Duration



Fig 12: Facial Recognition by Student

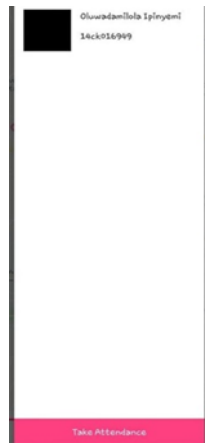


Fig 13: Lecturer to take Attendance

	A	B	C	D
1	Name	Email	Matric No	Profile picture
2	Oluwadamilola	oluwadamilola:14ck016949		https://firebasest
3				
4				
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Fig 14: Attendance Stored Locally On Lecturer's Device

IV. CONCLUSION

This application has been able to solve the issue of the reliability and validity of the prevalent attendance system. With this system, only students present in class can mark attendance without the lecturer having to doubt the validity of the attendance. This work can further be improved integrating a complaint mechanism into the system in case of errors or technical issues that may occur while students are capturing their attendance or in situations where students miss class for valid reasons. Another improvement would probably be the development of a web version of the application.

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