

# Student Attendance Tracking Management

**Manikrao Mulge**

Department of Computer Science Engineering Guru Nanak Dev Engineering College, Bidar India

**Padmanjali A Hagargi**

Department of Computer Science Engineering, Guru Nanak Dev Engineering College, Bidar India

**Dayanand Jamkhandi**

Department of Information Science Engineering Guru Nanak Dev Engineering College, Bidar India

**Rajshekar Gaithodei**

Department of Computer Science Engineering, Guru Nanak Dev Engineering College, Bidar India

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## ABSTRACT

Tracking student attendance is essential for keeping tabs on their performance in the classroom and during their studies. It becomes a significant issue since the university administration upholds the rule that a student may only take the exam if his or her attendance is greater than or equivalent to a certain percentage (60 percent, 70 percent, 80 percent, etc.). According to the conventional method of keeping track of attendance, each time a class is attended, students must physically sign the attendance sheet. Noticing and marking a student's name on the attendance sheet takes too much time. Additionally, it can happen that some students will fully or unintentionally mark another student's name as a proxy. The paper attendance record could disappear. Using smartphone technology similar to Android our developed mobile application will make it simple for the course instructor to take attendance, save it to the phone and to the server, verify the percentage, and print out a paper copy. This system can mark attendance, mark intruders' admission, calculate attendance percentages, send emails, and send SMS to the guardian to keep them informed about their child's attendance at the institute using the stored information. The established system allows for internet access at any time and from any location, which can be incredibly helpful for the course instructor in managing their students' attendance.

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## 1. INTRODUCTION

The management of student attendance is a crucial component of student administration in high school, college, and universities. The standard method of

monitoring student attendance in a classroom involves requiring the students to physically mark the attendance sheet that circulates in the room while the course instructor is giving the lecture. For instance, a teacher of a course with a large class can

note that the hassle of passing around the attendance sheet and the actual recording of attendance by students are oppressive and undoubtedly take time away from them teaching and receiving full attention from the students. This project's main goal is to introduce the use of smartphones in the attendance system.

All teachers have smartphones these days, which makes it easy for them to take attendance and process information as needed. The key advantages of this system are that teachers can obtain computed percentages, print physical copies with attendance statistics, keep data in phone databases as well as remote server databases, ensuring that the information won't ever be lost, and use the data as needed.

### **1.1 Attendance Control**

Managing students' and admin presence and absence in a school or other institution is known as attendance management or a management firm with offices. The modern world employs a variety of biometric attendance management technologies. Applications to machines. There is an urgent requirement for an efficient approach for managing attendance so that their participation records are effectively managed. Particularly in the case of the lecture, which contains numerous participants. Consequently, numerous systems to improve the so far, suggestions for managing student attendance have been made.

### **1.2 Authentication**

Authentication is the process of confirming if a person, thing, or assertion is who or

what it claims to be. By determining whether a user's data matches that in a database of authorised users or in a data authentication server, authentication enables access control for systems. Specifying access rights to resources connected to information security, computer security, and access control in particular is the role of authorization. Formally speaking, "to authorise" means to set an access policy.

### **1.3 Flutter**

Developing a mobile application is typically a challenging and hard task. There are many frameworks available for the creation of mobile applications. Swift and Objective-C are the basis for the native frameworks that are provided by iOS and Android, respectively. To build an application that works with both OSs, we must employ two different frameworks and two different coding languages. There are mobile frameworks that support both OSs that can help with this challenge.

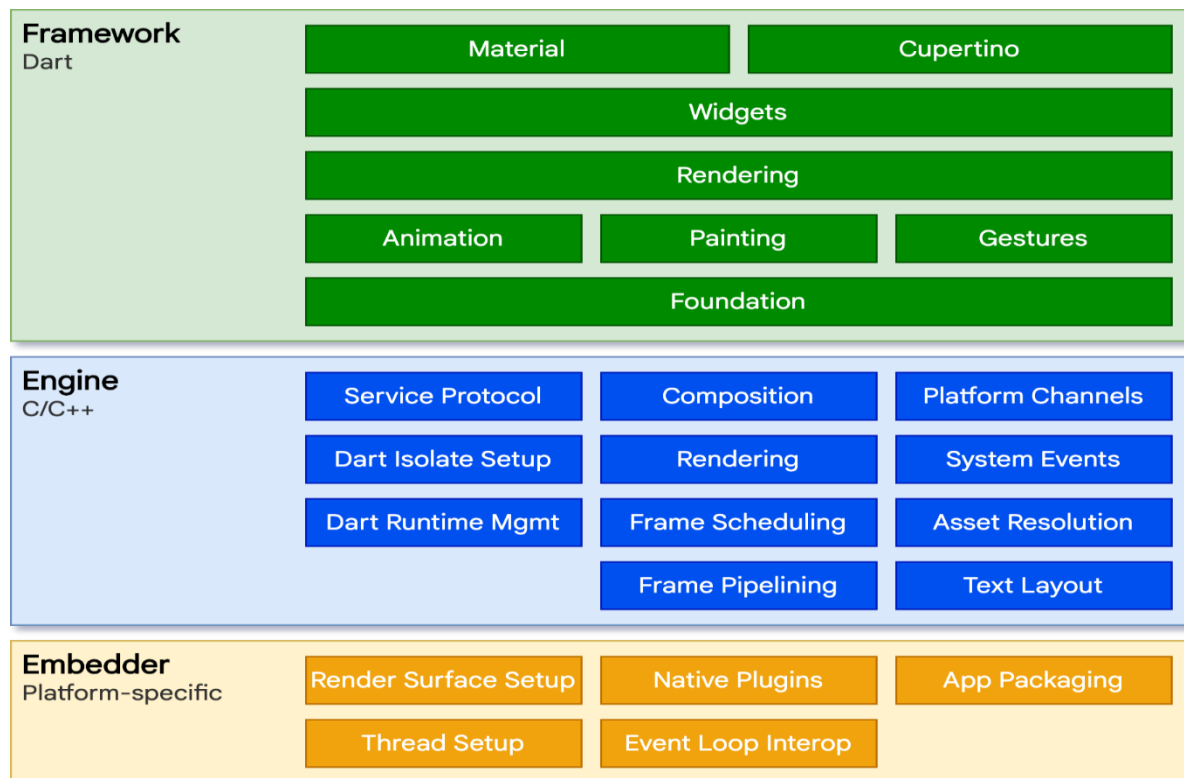
These frameworks range from simple HTML-based hybrid mobile application frameworks (which use HTML for the user interface and JavaScript for the application functionality) to complex language-specific frameworks (which do the heavy lifting of converting code to native code). These frameworks always have a lot of downsides, with their poor performance being one of the most important, regardless of how simple or complicated they are.

### **1.4 Dart**

Google developed the high-level, all-purpose programming language known as Dart. The new programming language first appeared in 2011, but it wasn't made widely

available until June 2017. The Flutter is gaining more popularity than it did at the time when it started using darts. Dart is a dynamic, class-based, object-oriented programming language that has closure and lexical scope. In terms of syntax, it is extremely similar to Java, C, and JavaScript. If you are familiar with any of these programming languages, learning Dart won't be difficult for you.

Dart is an open-source programming language that is frequently used to create Internet of Things (IOT) apps, modern web applications, desktop applications, and mobile applications. It also supports a few more advanced concepts, such as type interfaces, mixins, abstract classes, and refiled generics. It is a compiled language that can be used with one of two compilation techniques.



The platform's core component, the Flutter engine, which is mostly created in C++, offers the primitives needed to enable all Flutter apps. The engine rasterizes composited sceneries each time a new frame needs to be painted. Along with graphics (through Skia), text layout, file and network I/O, accessibility support, plugin architecture, a runtime for Dart, and a compilation toolchain, it provides a low-level implementation of the fundamental Flutter API.

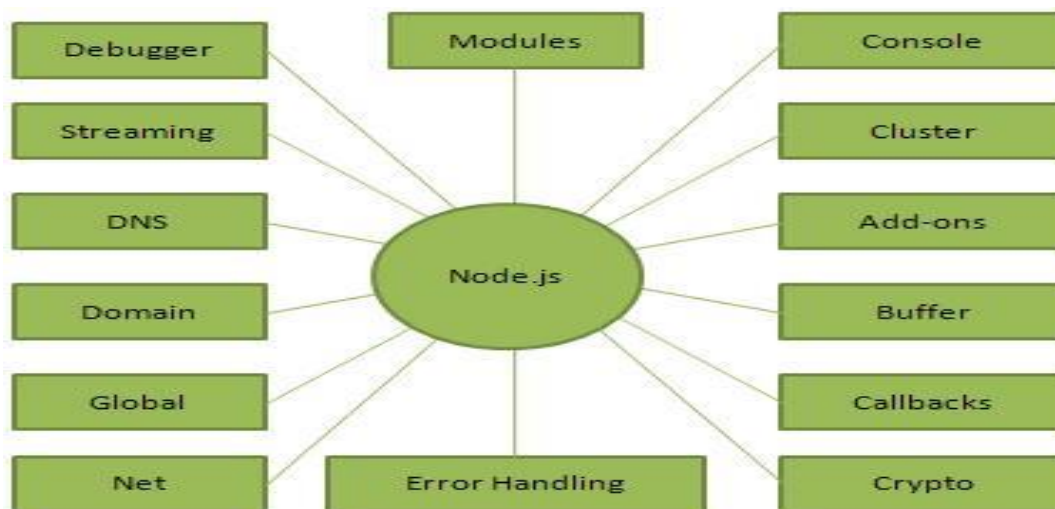
Through the use of dart: ui, which transforms the underlying C++ code into classes that Dart can utilise, the engine is made available to the Flutter framework. This library exposes the most fundamental primitives, such as classes for managing input, graphics, and text rendering subsystems.

### 1.5 Node.js

Networking and server-side applications are made using the Node.js open source,

cross-platform runtime environment. The Node.js runtime allows JavaScript-based Node.js applications to be developed and executed on Linux, OS X, and Windows platforms. A large library of various

JavaScript modules is also available in Node.js, substantially speeding up the process of developing web applications that use this framework. A schematic showing several significant Node.js components



### 1.6 Express.js

ExpressJS is a web application framework that has a simple API and allows you to build webpages, web applications, and back ends. When utilising ExpressJS, you don't need to worry about low-level protocols, processes, etc. Express provides a simple user interface for developing our programmes. It provides us with the tools we require to make our app. Because npm provides a variety of modules that may be directly incorporated into Express, it is versatile.

Npm is the name of the node package manager. The npm Registry is a publicly accessible collection of open-source code packages for Node.js, front-end web applications, mobile applications, robots, routers, and several other needs of the JavaScript community. Using npm, we can have access to all of these packages and locally install them.

### 1.7 Mongo DB

The MongoDB course discusses both basic and complex SQL concepts. Our MongoDB training may help both experts and beginners. In MongoDB, SQL is absent. It is a document-oriented database that was created in C++ and is open-source and cross-platform.

## 2. LITERATURE SURVEY

With the assessment that attendance administration is overlooked by the current educational organisation administration framework, focusing only on record administration, training design, course administration, and so on, scholars chipped away at the change in order to improve the attendance tracking framework. They established an attendance administration framework using VisualStudio.NET and Oracle. A special finger impression device that is used as part of a special finger

impression attendance system was described by Mohamed et al.

By placing their finger on the device's sensor, the kids can check their essence. However, because finger print scanners can't always identify something the first time, this architecture lacks viability.

The NFC-based applications reorganise several human daily activities by simply contacting an object that is NFC-enabled or NFC-coordinated. For instance, VTT Technical Research Centre Finland's Smart Touch is one of the first NFC projects that focuses on the technology; applications in various fields were produced under this project, including mobile payment and ticketing; smart publication; school attendance systems; home use; family unit access control and security; blood glucose metre, etc.

Using a fixed grid AR 400 RFID reader with four circulatory polarised antennae and a handheld Symbol MC9000-G RFID reader independently, a robotized attendance management system was put into place. The system is extremely costly, though.

The attendance system utilises smartphone and GPS technologies. The system takes time because it uses finger print technology and can only generate data through collection. Xlsx or a pdf file an automated system for tracking student attendance was created by Noor et al. Each student in this system has an ID that is assigned a barcode that can be read by a smartphone application, but any student can carry the ID of another student, fooling the attendance system.

## **2.1 Existing System**

We have studied and visited the different websites and the literatures. As per the literature review, the various organizations and individuals have tried to overcome the problems in the traditional attendance system. Some of them are listed below:

### **2.1.1 E – Beat E**

Beat is an electronic beat constable's night patrolling attendance system to avoid manual recording of time & attendance and to save the time by sign-in / sign-off at different beat points while patrolling. XIPHIAS has developed the Electronic Beat. It has features such as Compact, Light-weight, Pocket size, tamper proof. But it has a limitations regarding system specification. It is operable in fixed temp range i.e. 0 to 70° C. Very small memory storage as small as 64kb.it uses the Infra-Red Serial port for data communication which is outdated.

### **2.1.2 Mobile Phone Based Attendance System in J2ME**

This project is based on J2ME technology. Professor enters the attendance to the mobile using keypad. It is a manual process. After saving the absentees or presenters in to the mobile, teacher can edit the attendance list in the mobile. And this attendance details can send to a computer using GPRS. It was developed considering the requirements of that time and has a very little future scope. The system has a limited bounds. It lags behind a lot as when compared to modern day technology such as Windows, Android, iPhone .it also a platform dependent and version specific. It does not support the GPS technology to reduce the fake attendance.

## 2.2 Proposed System



**Fig 1. proposed solution of student attendance system**

Fig. 1 shows the proposed solution of student attendance system where a course teacher takes attendance via Smartphone and then the Smartphone application process the data and teacher can save the data in the web server as well as phone server.

## 3. TECHNICAL IMPLEMENTATION

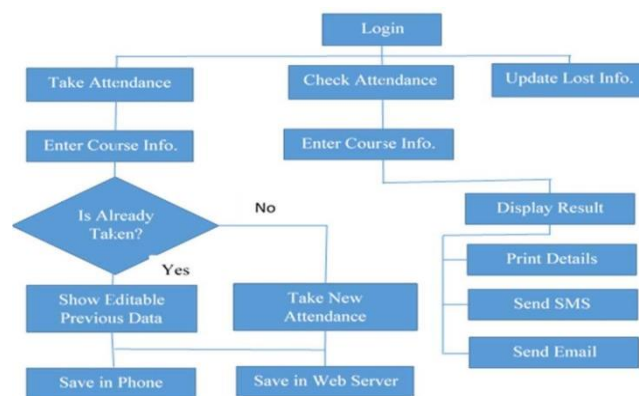
The system execution was completed in light of the framework diagram that was previously displayed.

### 3.1 Mobile Application

The system uses level 19 of the Android API. The application is developed using the Android ADT bundle for the Eclipse IDE. The system uses [www.golapmilonkuet.byethost16.com](http://www.golapmilonkuet.byethost16.com) as the web server database and the internal SQLite database as the phone database. The MySQL database is stored on the server.

### 3.2 My SQL Database and SQL Lite Database

The Student Attendance System for smartphones is specifically linked to the MySQL database. Four main tables were created in our database to house the recorded data. All customer attendance data, including dates and other details, is kept in a table called the attendance table. The application stores the data it has acquired in a database. The teacher table is a different table in the database that is used to keep track of the subtle details about the teachers, including their personal information, such as names, IDs, addresses, email, telephone numbers, and so forth. The course info table contains information about the courses, such as the course code, the scheduled class scene, and the start and end times. The student data table contains all of the students' detailed information. The attendance database keeps track of the investigated student's attendance information in the interim. Regular functions include a set of pre-defined SQL queries that allow for simple information adds, refreshes, and recoveries for both phone and web servers.



**Fig. 2. Road map of graphical user interface smartphone-based student attendance system.**

### 3.3 Graphical User Interface (GUI)

A course instructor may access the application user interface by logging into the framework through a login page and entering the necessary data. This type of validation is crucial in order to prevent unauthorized access. The technology is completely accessible to the course instructor. The framework's data can be modified and altered by the course instructor. Fig. 6 depicts the road map for a graphical user interface.

## 4. TESTING

The purpose of testing is to identify errors. Finding every error or vulnerability in a piece of work is the practice of testing.

You can use it to test the operation of particular parts, subassemblies, assemblies, and/or finished goods. It is the process of testing software to make sure it complies with specifications, lives up to user expectations, and does not malfunction in an unfavorable way.

Since software testing is the last check of the specification, design, and code, it is a crucial component of software quality assurance. Pressure for extensive testing is growing due to the cost of software failures and the increasing likelihood of software as a system.

### 4.1 For the Purposes of Testing:

Running a programme with the intention of finding an error is known as testing. A test case that has a good possibility of spotting an error that hasn't been found is ideal.

### Testing Techniques:

The numerous levels of testing methods used at various phases of software

development to make sure the system is error-free are as follows:

### A unit test:

As each model is finished and made executable, it is unit tested. It is only constrained by the requirements of the designer. Unit testing should come after other strategies, such as informed debugging and code inspection.

### Testing of black boxes

This method generates some test cases that fully execute all of the functional requirements of the programme as input conditions. The following flaws were found thanks to this testing:

Incomplete or faulty functions

Mistakes in the user interface

Data structure defects include problems with external database access, performance concerns, and erroneous initialization and termination.

In this examination, only the output is examined for accuracy.

The data flow is not logically examined.

### The White Box test:

By creating flow graphs for each module, test cases are created for its logic, and logical conclusions are tested on each of them.

It was applied to develop test cases for the following circumstances:

Verify that each distinct path has been taken

They must finish all loops while staying inside their operational boundaries

Execute internal data structures and verify that they are accurate.

**Integrity checking**

Software and supporting systems will work together as a whole thanks to integration testing. It tests each module's interface to make sure that it functions properly when integrated. It is typically done by developers, especially at the lower, module-to-module level. Testers must participate at greater depth.

**System evaluation**

Before being given to the user, the entire system is internally tested. The objective is to guarantee user satisfaction and complete client satisfaction with the system. If a company has one, the testing organisation handles it. Production data can be used to generate test data.

It is necessary to schedule tests in order to organise and plan the following:  
Inclusion of corrections and changes.  
The test data that will be used

A common technique is to gradually freeze the code for testing for longer periods of time. The code is frozen for testing for longer periods of time as system testing advances and (hopefully) fewer and fewer flaws are found.

**Acceptance Examination**

UAT (User Acceptance Test) Acceptance testing in a customer's setting is referred to as "beta testing." Requirements' ability to be traced:

Align test cases with the requirements.

There must be at least one test case for each requirement.

Display test cases versus requirements in a matrix.

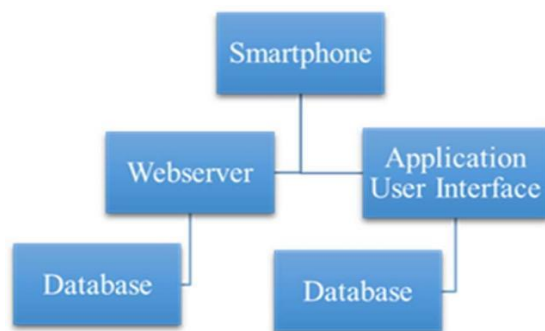
id	Test case	Input description	Expected output	Test status
1	Loading model	Initializing trained model and load it into ON	Loaded model without errors	pass
2	Converting video to frames	Capturing video and converting it into frames	Image frames of captured video stream	pass
3	Recognize hand gesture	Image frame that contains hand object	label	pass



## 5. ANALYSIS AND SYSTEM PLANNING

### 5.1. Problem Analysis

The process of recording admin attendance at PT. XYZ currently still uses a fingerprint machine based attendance system which causes long queues during hours of entry and return from work. The queue occurred because the number of admins numbered 3,000 in one factory location. By utilizing



attendance system application is adopted using a mobile smartphone. Admins can make a presence using their respective smartphones. Admins who have an Android smartphone can download the attendance system application on the Android Play store service and install it on their respective smartphone devices. Before making attendance via smartphone devices, admins must first be connected to the company's local network (intranet network). This was done because the system was designed so that it could only record the presence of smartphones connected to the company's local network to prevent fraud in the form of absence outside the company / factory area.

### 5.2 General Description of System

The system is divided into two parts, the backend and front end applications. In the backend system there is one access right, which is the system admin. Admin has the duty to register admins who want to do attendance using a smartphone and monitor attendance records periodically for further download and submit it to the Human Resources (HR) section to record salary calculations. In the frontend system there is one access right that is the user for the admin. The user is tasked with taking action on the smartphone attendance application in the form of pressing the enter button during work hours and pressing the exit button when work hours go home. Then the system will process and send the presence data to the backend application. The process in the system will be explained in the next steps:

1. The input stage is the admin logging in to the application by entering the Admin ID number (NIP) and password. Next the admin presses the Attendance Enter button at the time of entry and the Exit Absence button at the time of coming home from work.
2. The process stage is the mobile application processes by sending NIP data, passwords and device telephone numbers for validation.
3. The output stage is the successful sending status to the admin in making attendance.

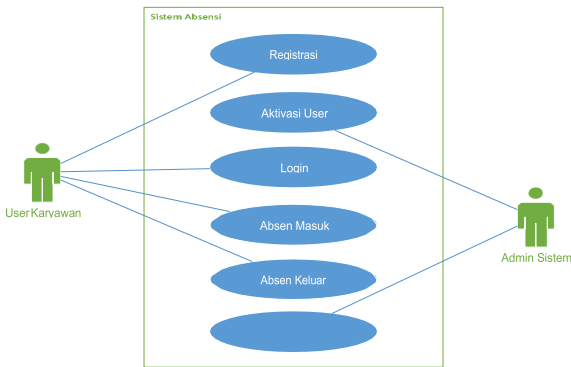
### 5.3 Design of System Architecture

Software architecture in this application uses 3-layer architecture consisting of Data Layer, Business Layer and Presentation Layer. The Data Layer functions to handle the application database, the Business

Layer functions to handle application logic and the validation of the smartphone device's telephone number. While the Presentation Layer functions to handle the appearance of the user interface.

**Fig 3 System Architecture**

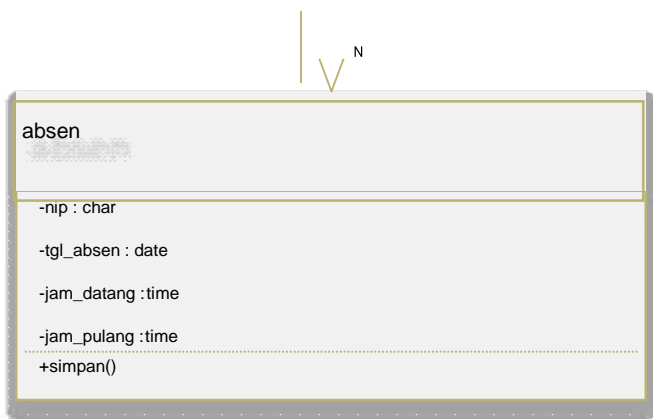
**5.4 Use Case Diagram**



**Fig 4 Use Case System**

**5.5 Class Diagram**

Class diagram is a class that describes the structure and explanation of classes, packages, and objects and relationships with each other such as containment, inheritance, association, and others. Class Diagram for attendance systems based on mobile smartphones can be seen in Figure 6 below.



**Fig 5 Class Diagram**

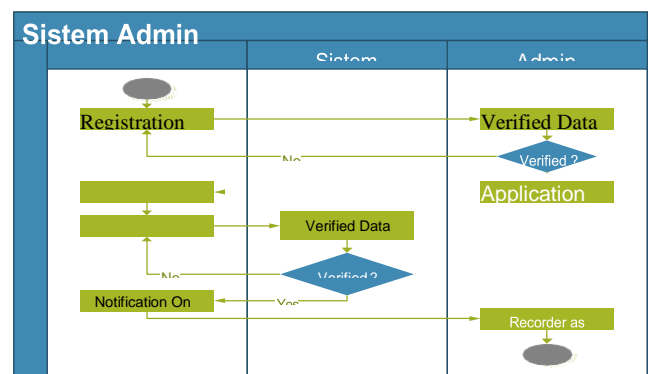
**5.6 Activity Diagram**

Activity diagram is something that illustrates the various activities in the system being designed. Activity Diagram for attendance systems based on mobile smartphones can be seen in Figure 5.

In figure five activity diagrams, there are three parts, which include user, admin and system with six activities that describe the process of employee user registration, data verification, activation of verified accounts, login and absenteeism processes,



verification of absent data processes and absenteeism data recap.



**Fig 6 Activity Diagram**

## 6. EXPERIMENT ANALYSIS AND RESULTS

### 6.1 System Configuration

**6.1.1 Software Requirements Operating System:** Windows, Mac, Linux.

**SDK:** OpenCV, TensorFlow, Keras, Numpy.

### 6.2 Hardware Requirements

**Camera:** Good quality 3MP or more.

**Ram:** Minimum 8GB or higher.

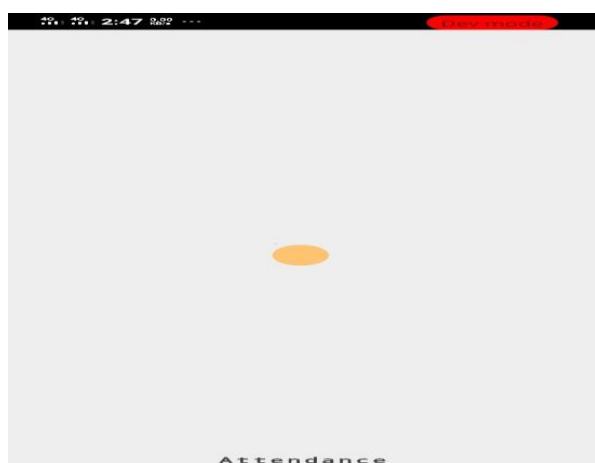


Fig 5.4.1 Screen Shot Loading of Application

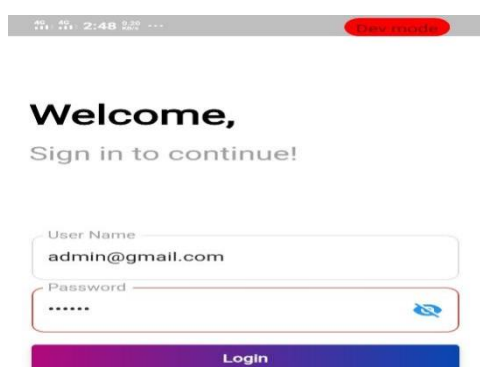


Fig 5.4.3 Screen Shot of Login of Admin

**GPU:** 4GB dedicated or more.

**Processor:** Intel core i5 or higher.

**HDD:** 10GB or more.

**Monitor:** 15" or 17" colour monitor.

**Mouse:** Scroll or Optical Mouse or Touchpad.

**Keyboard:** Standard 110 keys keyboard.

### 6.3 Pseudo Code

### 6.4 Screen Shots and Results

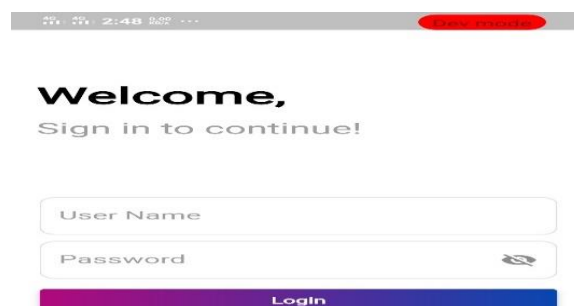


Fig 5.4.2 Screen Shot of Login Page



Fig5.4.4 Screen Shot of Dashboard

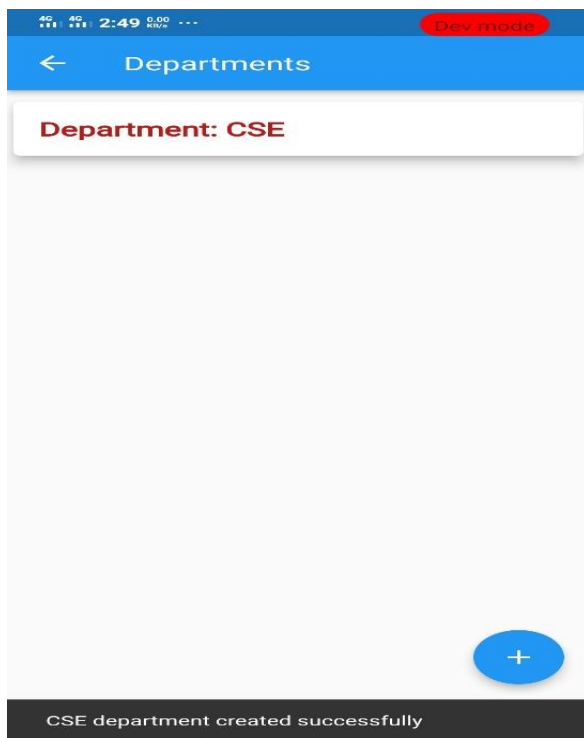


Fig 5.4.5 Screen shot of left Panel

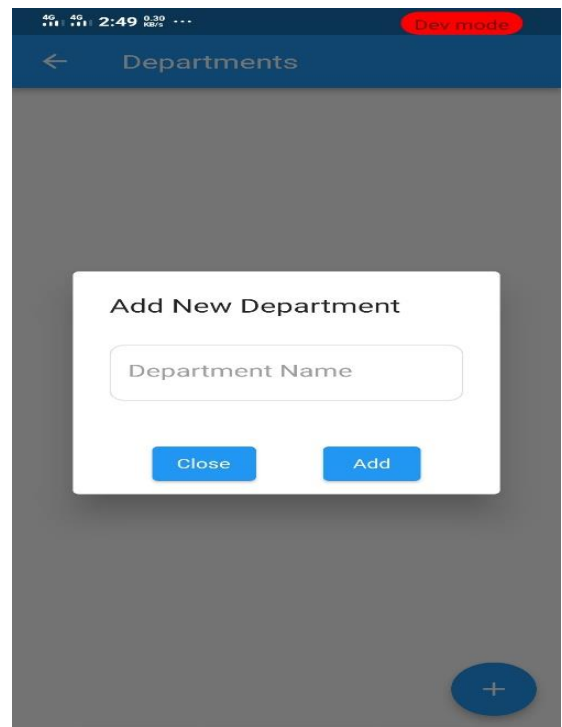


Fig 5.4.6 Screen shot of Add Department

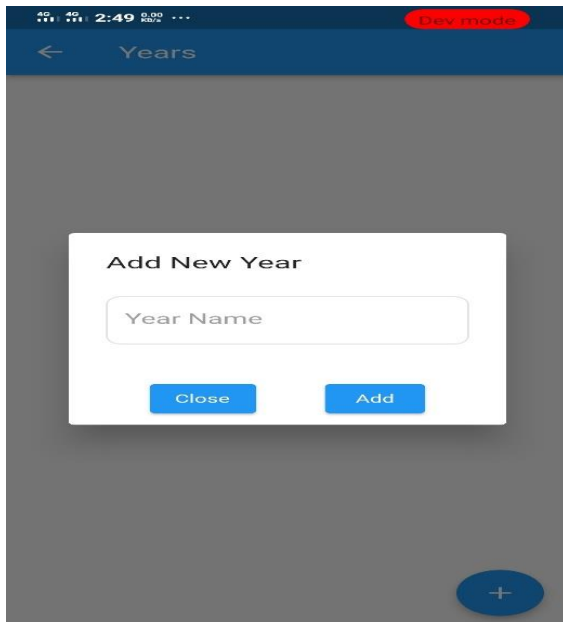


Fig 5.4.7 Screen shot of Department page

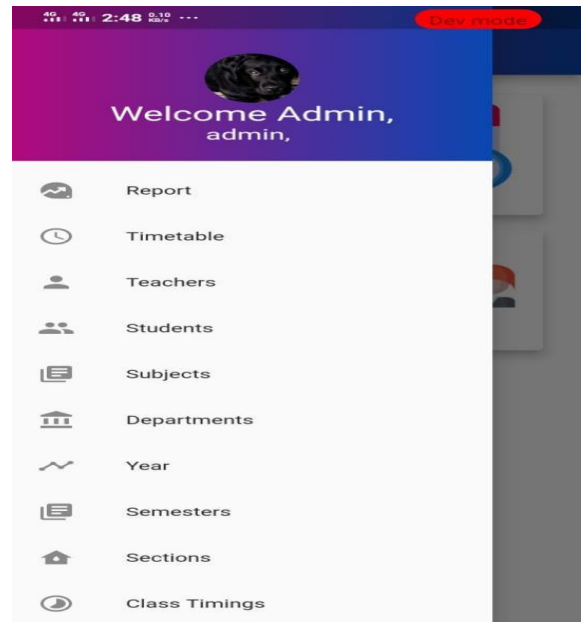


Fig 5.4.8 Screen shot of Add New Year

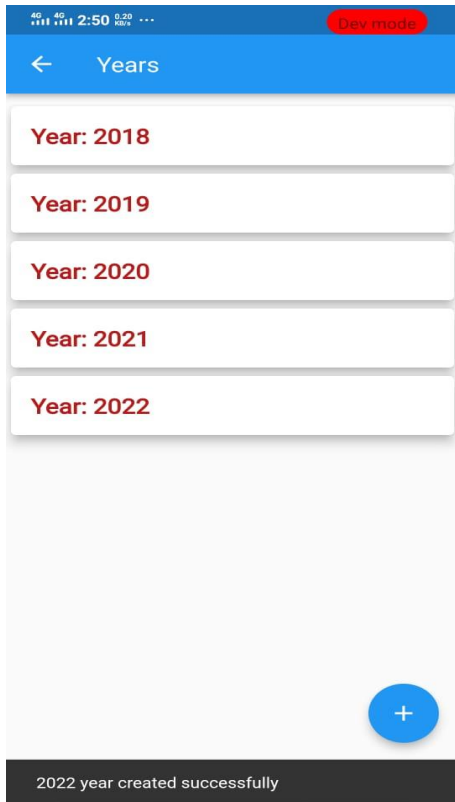


Fig 5.4.9 Screen shot of Years Page

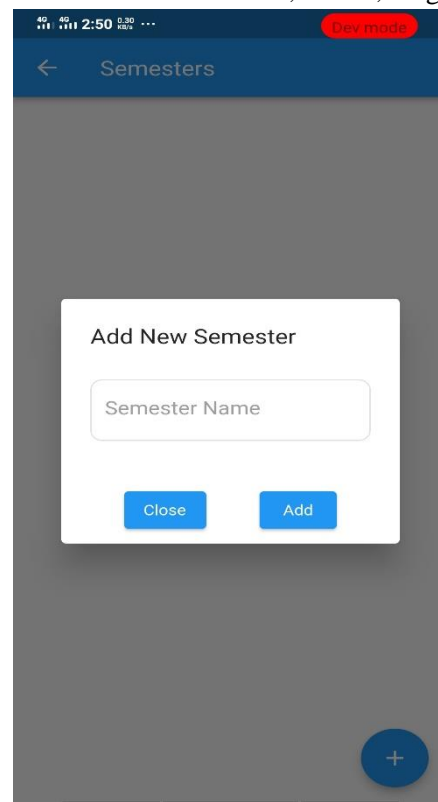


Fig 5.4.10 Screen shot of Add Semester



Fig 5.4.11 Screen shot of Semester page

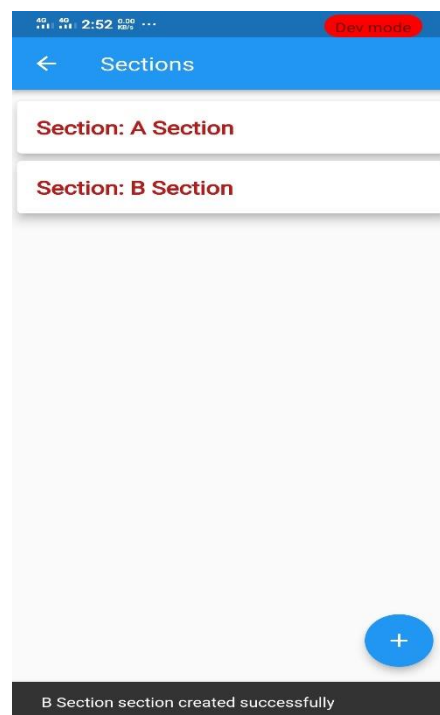


Fig 5.4.12 Screen shot of Added Section page

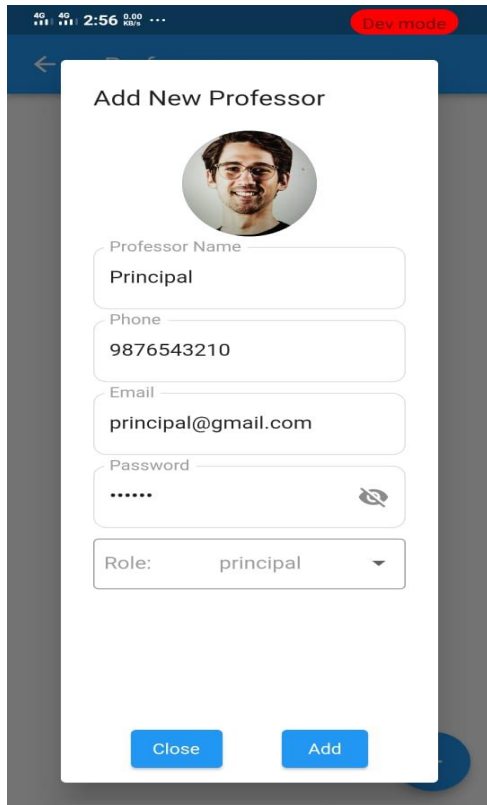


Fig 5.4.13 Screen shot of Adding professor

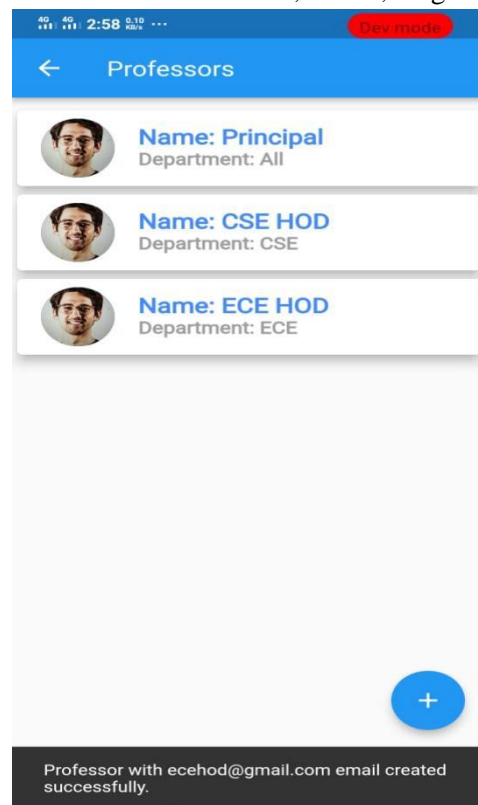


Fig 5.4.14 Screen shot of Professor Page

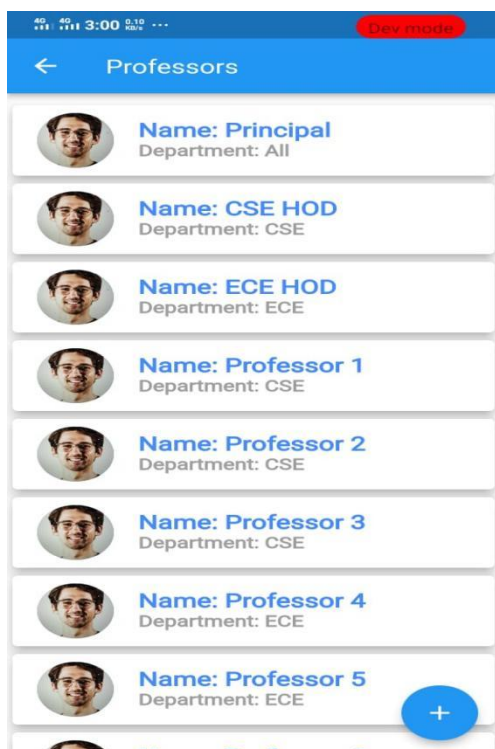


Fig 5.4.15 Screen shot of Professor Page

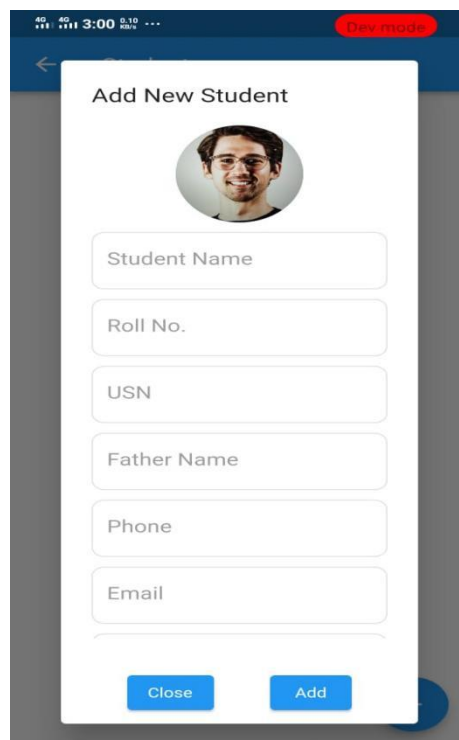


Fig 5.4.16 Screen shot of Add new student

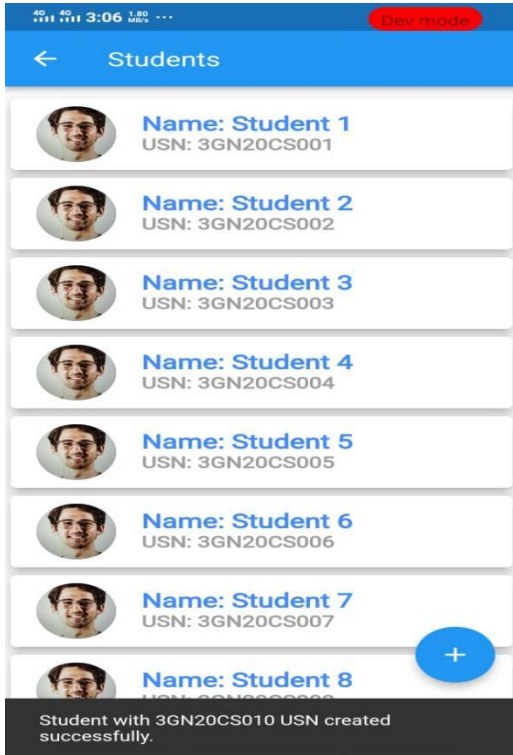


Fig 5.4.17 Screen shot Student Details

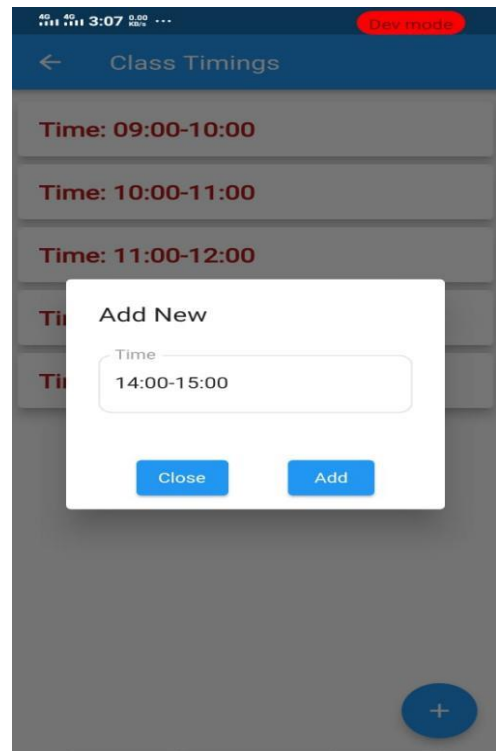


Fig 5.4.18 Screen shot of Add New Class

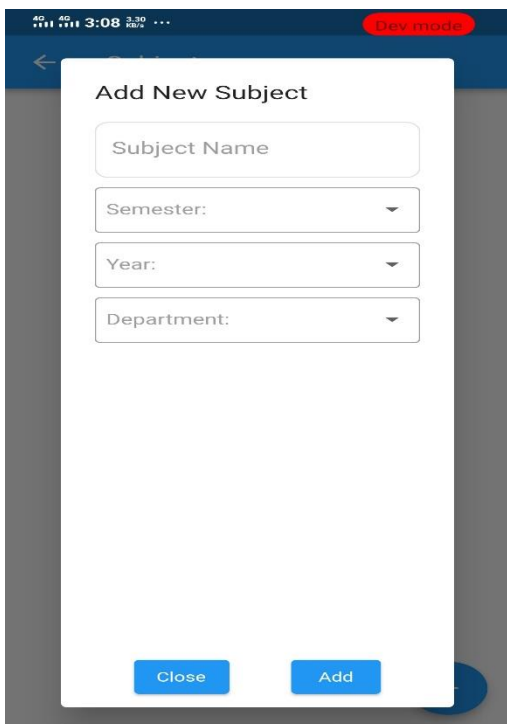


Fig 5.4.19 Screen shot of Add new subject

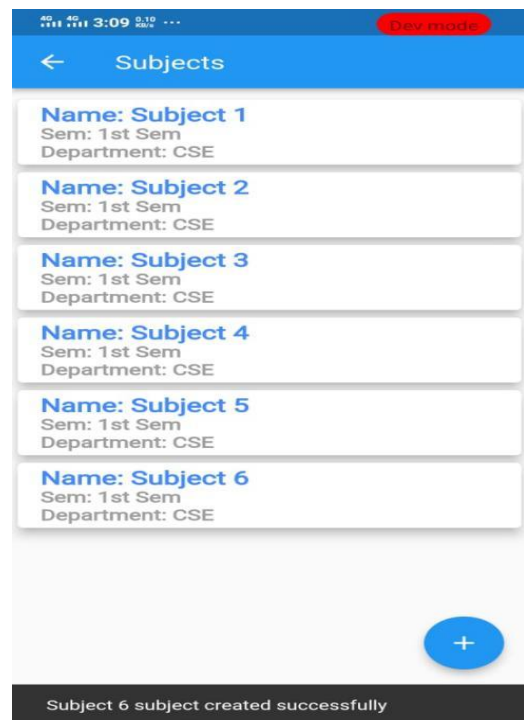


Fig 5.4.20 Screen shot of Subject Detail



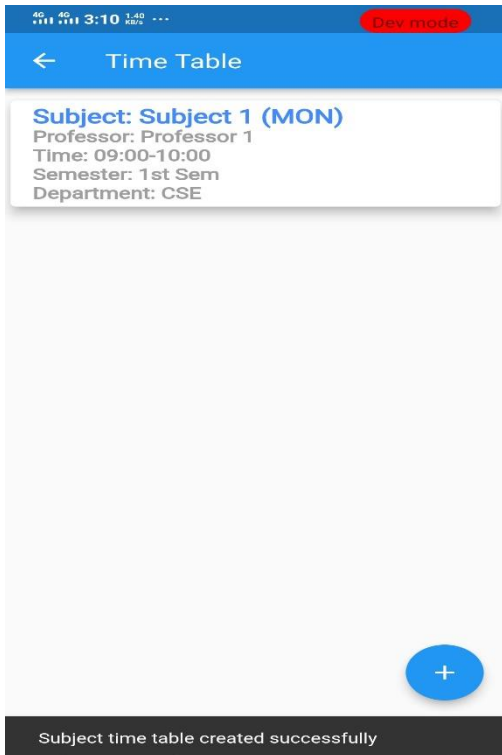


Fig 5.4.21 Screen shot of Time Table



Fig 5.4.22 Screen shot of Detail Time Table

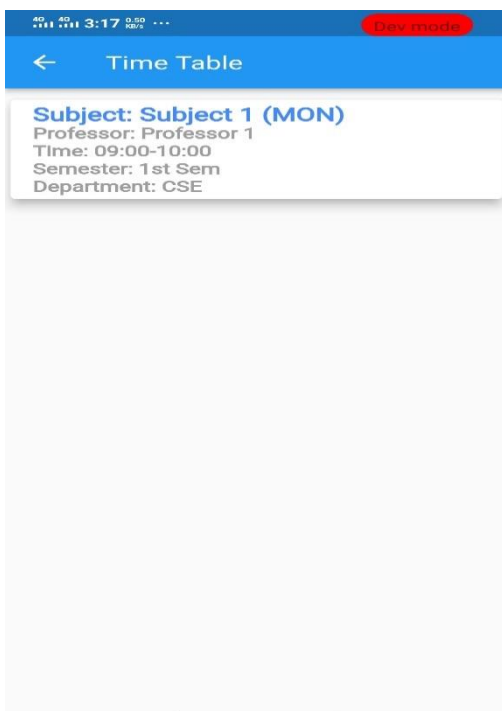


Fig 5.4.23 Screen shot of subject time table

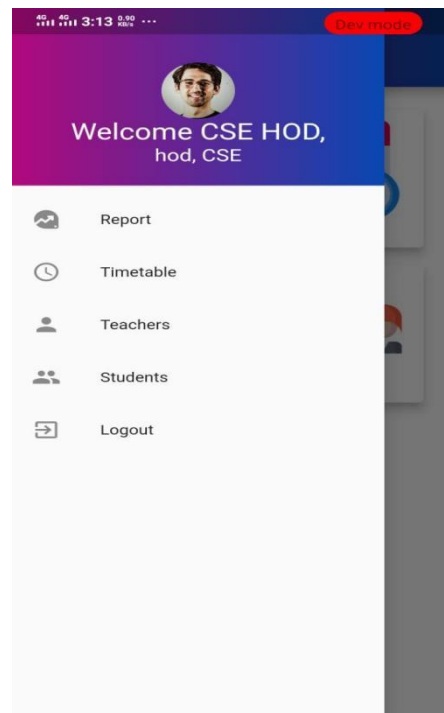


Fig 5.4.24 Screen shot of HOD Login page

## 7. FEATURES OF THE APPLICATION

### 7.1 Taking Attendance and Percentage

### Calculations

Every student's attendance for each course is tracked separately based on their intention to remain in class. Attendance is



recorded as "Present" if the length of time spent in class ties with the allotted period. Students who missed class during a scheduled class period have their attendance recorded as "absent." In the system, there is no possibility of duplicate records. Every student enrolled in a course has their percentages automatically calculated by a mobile application in order to assess their readiness for the exam. The student will suffer if the calculated percentage is lower than the necessary percentage.

## 7.2 Emailing System and Messaging System

When the percentage is low, a warning and data about the percentage are included in an email sent to the student's guardian. This will automatically update the parents of the kids about their child's development. Using a mobile application, short messages (SMS) can be sent. In the event that the student's guardian is unable to check their email, an SMS is sent to them informing them of their child's progress whenever they receive a low percentage.

## 8. CONCLUSION

Smartphone-based Student Attendance System will significantly develop the conventional procedure of student attendance framework in university/college/school surroundings. Smartphone-based Student Attendance System is a computerized information accumulation technology, which leads to more precise data entry. The stored student attendance data are framed and investigate inevitably without any loss of data, compared to a traditional recording method. A course teacher can easily

monitor the attendance of students which may develop the excellence of instruction because the fewer time required to collect and process data. Implementing the system in educational environment helps the user to identify attendance, proxy attendance, calculate percentage etc. SMS and Email messages are sent via the system automatically to inform parents so that they can be notified about their child's progress in the institution.

## 9. REFERENCES

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