An Innovative Smart Android App Solution for Improved University Management

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Abstract— **In this era of technology, it is needed for us to be wittier than technology and upgrade with time, in every university or college it is a rigorous task to take attendance, create timetables, show timetables, and show student marks. Previously register was used to mark attendance then with technology MS excel and other applications came in and made attendance much easier to store but it is not enough now we need more efficiency and more functionality in one place. In this paper we provide an efficient way to solve all this using a web application as well as a mobile application for students to view their attendance and teachers to mark their attendance by face recognition and can check marks, and upload marks, Students can check their attendance by selecting a particular date, and teachers can check attendance for a particular student on which date they are present, and attendance for each student will be marked in that slot for the day, also the teacher can fetch the detail of those students who bunked the classes, each student can look over their marks after logging in and selecting the marks module, the timetable will be updated and mapped with attendance so that face attendance can be mapped with each slot.**

I. INTRODUCTION

The majority of educational institutions estimate student involvement in the learning process as a crucial exercise for promoting information transmission. This emphasizes how crucial it is for students to come to university for the scheduled lectures and classes. Many universities and colleges still adopted the old methods for taking attendance such as passing the attendance sheet for signing the student throughout the lecture, another common method is calling out the name of the students but students can mark the proxy for their friends and students not present in the class in both methods. Both methods are time-consuming. There are also some applications evolved for attendance.

The earliest method of writing down and maintaining student information in a record book, however, technological advancements have led to the creation of numerous software to manage student records. 2012[9], proposed the GPA calculator for diminishing the lecturers' strain but as it is in Excel format, each student calculation must be saved in a separate file, making maintenance difficult. Scheduling a timetable itself is a big problem for large universities because there are various constraints like creating a timetable for a single class, schedule to check the number of subjects, unoccupied faculty of that program, vacant classrooms with a suitable number sheet, and so on. Scheduling and providing a timetable for different programs is hard via old methods or simple apps. There are some applications for creating a timetable but they only provide a timetable and it's hard to maintain also some of them are not free.

Through this project, we aim to solve all the problems of attendance, Record management, and Scheduling or providing timetables. The main goal of this project is to provide an efficient application for students so they see their attendance, records, and timetable easily without wasting their time, app

also reduces the lecturer's workload of marking and maintaining attendance and helps in maintaining the records of the students easily. As we review some applications, which reveal that the cost of hardware is very high. So also tried to solve this problem with a minimum cost used and provide more functionalities.

As there are three modules in our app so it is very efficient for the student to access all the modules which are required in a daily basis like, every student use, I-cloud to check their attendance, and each university has their own website where student can check their marks so in our app they can also check their marks of ETE, MTE, CA, Total, Grade and can fetch their marks and details using System ID as it is a multitasking app so it can be very efficient for user to use all the modules at a time, some time there is a lack of time and teachers are not able to take attendance manually as it takes of much time so in our project student can mark their attendance from camera which is placed at door of each classroom, whenever any student come near to the door it will detect the face and recognize the face using algorithm which is used to train the model with lots of images of students when face is matched it will upload his name, date, time, day along with subject depending upon at which time student is coming for the class, it will mark student attendance slot wise, attendance for subject as per their time slot will be marked, sometimes Student came to the university and leave the university without attending all the classes so in this module teacher can fetch the data of those students who bunked the classes.

II. LITERATURE REVIEW

In 2015 Noor et al. [1], developed an "Android-based attendance management system" to reduce lecturers' cheating, proxies, and workload with low-cost maintenance hardware. Their attendance management system acts as a scanner to the user for proving their presence. They used the camera to scan the barcode pasted on the student ID card that is provided by the university. They used an online based database server to store the data or the pieces of information. but, through this system students can easily cheat and mark their proxies without going to the classes.

Kumbhar et al. [2], proposed an Automated attendance monitoring system through which the students can mark their attendance and the lecturer can easily produce the report. They used the MYSQL server for storing the information and developed their system using the Eclipse framework. Students can mark their attendance only when the lecturer activates the application on the server. Students can mark themselves as present even when they are not in the class. Sometimes the cost of maintenance of the hardware can be high. This system is helpful for lecturers and students but also has some limitations.

Vishal Bhalla et al. [3], developed a Bluetooth-based attendance system for marking attendance using the Bluetooth of mobile phones. The in-charge(lecturer, staff) mobile is

being used to record the attendance. The installed software in the lecturer's mobile activates to check the student's presence in the class through a Bluetooth connection. The Bluetooth connection is between the student's and the lecturer's mobile phones. For this system student's mobile phone is mandatory for marking attendance which means that it is not mandatory for students to be present, just only a mobile phone ought to be present. When a student is absent but gives his phone to his friend then the student is recorded as present.

In 2021 Bangun Munthe et al. [4], purposed research and developed an Online Student Attendance System for educational institutes to support the education system. Their system also features apart from attendance such as providing the study material uploaded by the teachers, academic calendar, grade records, notifications, and online reminders. This application help lecturers maintain the records for ongoing evaluations. Via this system students can see their attendance, and performance and get the materials for study. This system is incredibly beneficial for both lecturers and students but has limitations such as, even if students are not present in class, they can label themselves as present with the help of their friends. So the proxies can be done easily.

In 2014 Selvi et al. [5], developed a Face Recognition based attendance marking system for recording attendance, and detecting the presence of employees using their faces. Their database has a huge number of pictures with different angles and motions. In this project, a camera is required to capture the employee's picture and delivers them to the picture enhancement module. Following this module, the picture enters the face detection and recognition modules, and then the database server records the attendance. The cost of hardware for this system is high.

In 2020 Arjun Raj et al. [6], have proposed the Face based smart attendance system for marking attendance. Python was utilized as the foundational language for this project, along with Raspberry Pi, Open CV, and Dlib. In this system, the LBPH face recognizer was used to identify the individuals in real-time The method for determining who was present and who was not is by comparing the test and training images. Students can verify their attendance through an application that was developed by them using the MIT app inventor. But still, there is the probability of proxy attendance.

Antariksha Bhaduri [7] proposed an approach for university timetable scheduling. As scheduled a timetable is a hard issue because of its different constraints such as matching the class, faculties, program, and students. She used Genetic Artificial Immune Network for scheduling the timetable. In this research, the scheduling of timetables employing Genetic algorithms had been studied. Genetic Artificial Immune Network (GAIN), a hybrid memetic algorithm that she used to further solve the issue, yielded results that she compared to GA (Genetic algorithms) and Genetic Artificial Immune Network (GAIN). Her experimental result showed that the Genetic Artificial Immune Network is the best solution. However, in this paper, she did not mention how can a student see their timetable.

III. METHODOLOGY

In this paper, we propose an application with majorly three modules first is the Attendance module, second is Timetable module and the last one is Grades module. The attendance module works on face recognition ML using python and MYSQL databases to store the data. The Timetable module is only based on Android Studio and MYSQL for its work and the Grades module also works on the same approach.

1) REQUIREMENT

Students have always faced hassle in remembering rooms and class lectures to be attended. To overcome this, we have proposed this paper which will help students to get through this. This will help them get to know which class, what time and which room students have attended their lecture.

In every university, there are some problems like- In managing attendance showing timetables, and other types of features that are required in every university. Like in our university the main problem is we cannot see our timetable properly, we have to match two excel sheets o understand the timetable and while taking attendance it takes a lot of time, so some intelligent device is needed which can do all those tasks automatically.

2) DESIGN

Fig 1 explains the high-level diagram of our app which will explain how our system will work and how modules relate to each other

The whole project consists of three modules(Face Recognition Attendance, Timetable management, and Student marks management). Face Recognition Attendance is the first module of this project in which attendance is dynamically marked. Attendance is taken with the help of face recognition. Face recognition is done using python and the app is having an easy interface to know the attendance of students anytime anywhere. Date-wise attendance is taken i.e., attendance taken will show the date on which attendance is taken and will be marked with the same date.

Name-wise attendance is marked which helps in recognizing the student for whom attendance is taken and will be marked for that respective student only which is quite easy to understand and recognize. Slot-wise attendance is taken as it's very recognizable the attendance taken is on time with the respective time and subject. Insert Timetable is used to insert the timetable of a particular section on a particular day. View Timetable is used to view the timetable so that students are able to see their timetable by giving input like section and day.
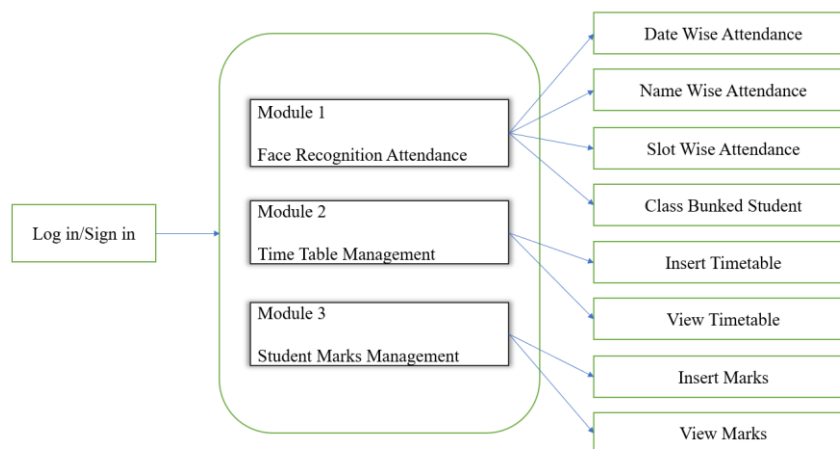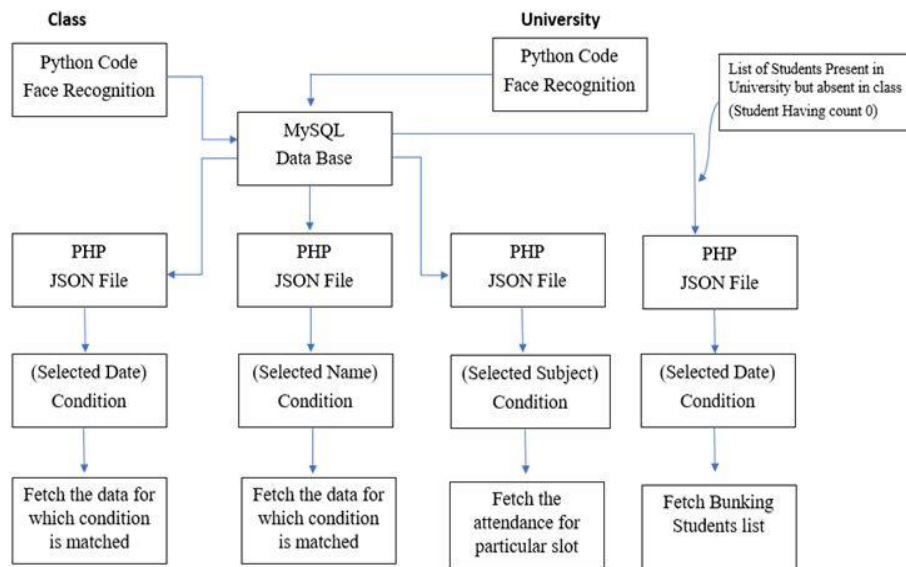
Fig. 1.   High-Level Diagra

Fig. 2.   Low-Level Diagram of Face Attendance Module

Fig.2. Explains the low-level diagram of the Face Attendance module in which each component of the Face attendance module is explained, firstly face will be recognized by python code, and after recognition data(Name, Date, Day, Time) will be uploaded on MySQL database, then MySQL database data will be fetched using PHP(JSON) file, then JSON file will be connected to our android studio file. When teachers click on date-wise attendance then they can fetch attendance according to the date and when users select name-wise attendance then they can fetch attendance using name wise and when they select slot-wise attendance they can fetch attendance by entering the subject name, when students come near to the camera their face will be recognized and their name, time, day, date and subject will be uploaded to the database and all the details will be fetched by the user using

different conditions in the app. In the above figure last module is for those students who bunked the classes we will put one camera at the front gate of the university and other cameras in front gate of the classes when student come camera will recognize the face of students and upload the data in the data base and same when student enter into the class all the data will be uploaded on the data base with all the details like time date day subject etc, so we will fetch the data of those students whose count is 1 means they only entered from the university date but not reached in the class

Fig.3 explains how Timetable is managed in two forms first one is for students and the second one is by teacher /faculty member. Students can log in and view their class schedule.
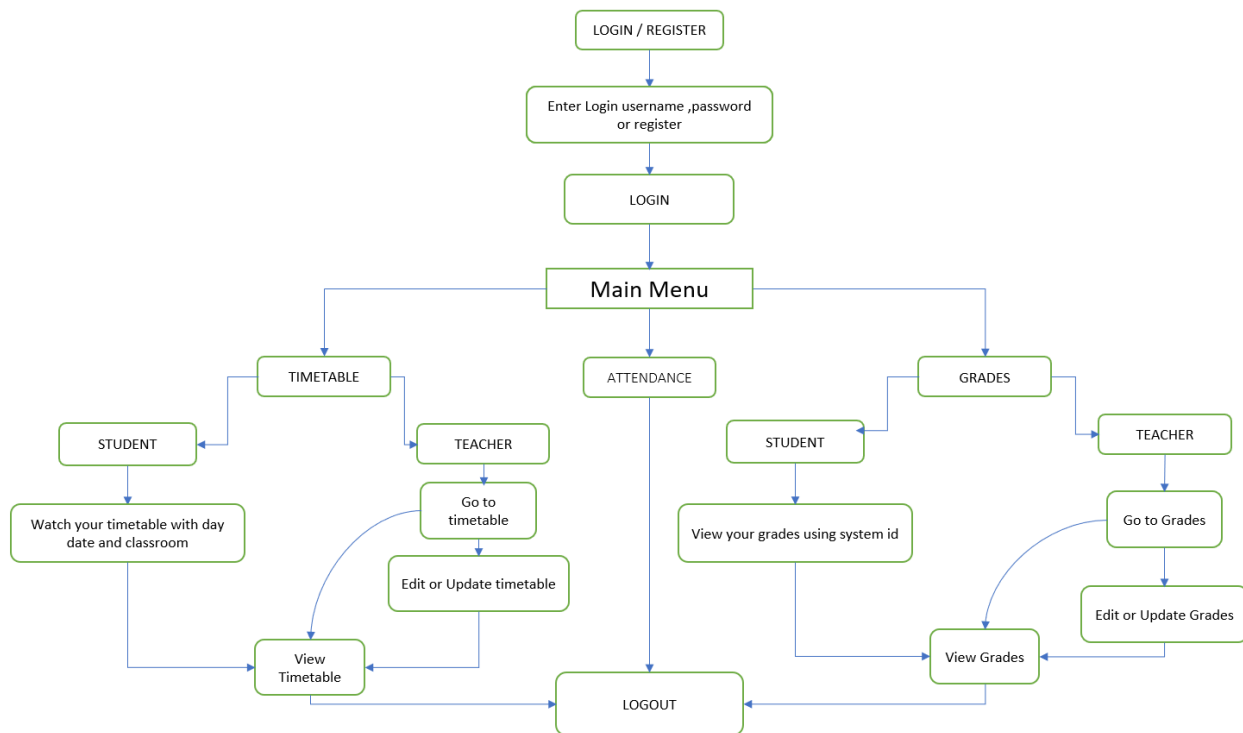
Fig. 3. Low-Level Diagram of all modules

Teachers can first log in and view timetables as well as make changes if required, Timetable management has always been hard work for the person managing it. so, with our app it has been very easy to manage the timetable, the app is having nine-time slots with university timetable slots and it has a section and day row in which first we will write our section and then fill in the day we are saving our timetable for, then we will provide all the details for nine timeslots and then save it. Now for getting the details of the timetable for the day of a particular section we can just fill in the details like section and

day all the timetables will be visible for the same day as you asked for. Teachers and students can log in with their credentials. After they log in, students can directly view their timetable for the day by using section and day. They can see their timetable in detail. Teachers can also view their timetable for the scheduled class, and they are able to edit or update it as per the schedule. This module helps both users(students and teachers) to find their timetables easily. The timetable is very easy to store and fetch with MySQL database .

It is the flow chart for the marks Module in which a person has to give input whether they are a teacher or a student. Then they will log in to their respective criterion, if the student is logged in to the app, then he will be eligible to view his marks/Grades if the Teacher is logged into the app, then will be able to get student details as well as update/edit marks. Marks management has been a rumbunctious task for the teachers and faculty members as it consists of a number of subjects having different marks for a number of different students which makes it a big cause and effect, if a simple mistake happens in between it, will have great repercussions

on students marks so it's intended to have great mental stability when filling marks and storing it with a reliable source and in a secured way so for that our app is having a very simple and concise interface with easy storing and fetching which makes it much easy to store and manage.

After logging in, students can view their marks so, they can put more effort to increase their performance. Students cannot modify or edit it. However, teachers have authority so they can view the marks of all students and update them. Marks of students can be updated by their respective teachers as students have scored in the exam

3) System Requirement

This is to explain what are the Software and hardware needs to build this web application as well as the platform configurations on which it will run.

TABLE I.   SOFTWARE REQUIREMENTS

Name	Requirements
Android mobile	Version 5 or lollipop and upper
Database Server	MySQL
Front end	XML, Java, Android Studio

TABLE II.   HARDWARE REQUIREMENTS

Name	Requirements
Internal memory	2 GB or more
Random-access memory	256MB and above

4) Implementation

All the implementations done in modules are described below with module-wise categorization.

a) Face Recognition-Based Attendance Module

The app will also have an attendance using face recognition in which first we have written code for attendance using face recognition in python and then using MySQL database a dataset is created in which all the data is fetched and stored then with the help of PHP, JSON file is created which helped in converting MySQL data and then with the help of URL, it is then connected to Android Studio. The app will have proper functionality using date, if the user wants to check his/her attendance on some day he will input the date, and then with the help of MySQL database it is then checked, if "date=user input date" if it's found true then the attendance comprising subject and time can be seen on the screen.

To implement the attendance module first a python file is created then after writing the python code for face recognition MySQL database is connected with the python file, whenever any student comes in front of the door, name, time, date, day, and subject according to time will be uploaded on MYSQL database, then PHP file is created, which is a JSON file used to connect MYSQL database with android studio and finally, app implementation code is written in android studio with XML and Java code

b) Marks Module

The app will also show the grades and marks of students. In this first, we have two modules, the teacher module, and the student module. In the teacher module data is inserted into the database and using MySQL database data is fetched then with the help of PHP, a JSON file is used to convert data from MySQL, and a URL is created which is then further used in fetching data from Android Studio. In the Students module, data inserted by the teacher can be recalled here and marks & grades can be viewed.

The first layout of the android app is created then the code of Java is implemented so that the layout can work in the backend then a PHP file is created which is a JSON file, that is connected with the MySQL database, when the teacher fills the details of student it will be uploaded on the database, then again PHP file is created to fetch the data from database to show grades details to the student.

c) Timetable Module

The app will show the proper timetable and schedule of class and subject accordingly comprising the lecturer/teacher going to deliver the lecture. It consists of two things days you want to check your timetable and the Subject going to be delivered on that day. First, we go for the proper day we are checking the timetable, going forward we will know the lectures their schedule, and the lecturer who is going to come accordingly class or block the lecture is going to be taken can also be viewed in their timetable section.

The first Layout of the android app is created then the code of Java is implemented so that the layout can work in the backend then a PHP file is created which is a JSON file, that is connected with the MYSQL database, when the teacher fills the details of student it will be uploaded on the database, then again PHP file is created to fetch the data from database to show grades of students.

IV.   RESULTS AND DISCUSSION

Below Shown of the outputs of the attendance, timetable, and grades, after the implementation and coding.
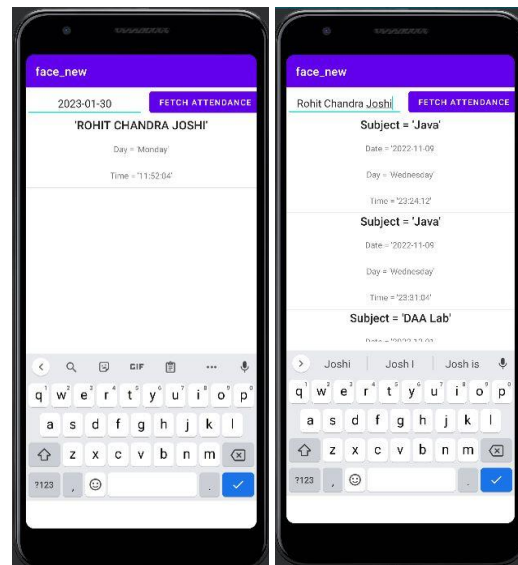
Fig. 4.   Menu page of Android App

Fig. 6.   Attendance date-wise and name wise

Fig.5. Explains the Menu page of the Android App, after login students or teachers will reach here.

Fig. 7 explains how the output will generate when we fill date in date wise attendance module and name in name wise Attendance
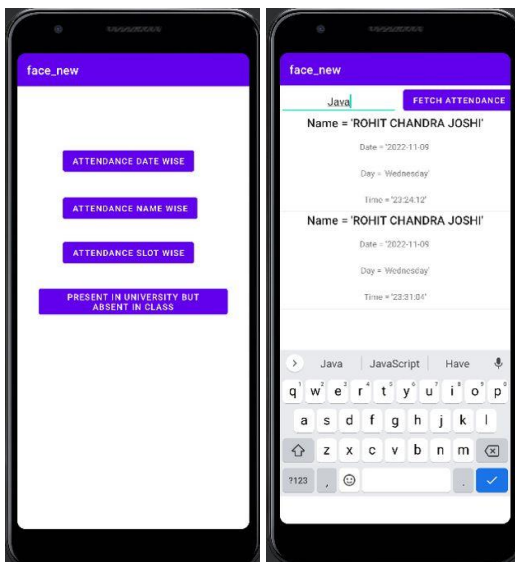

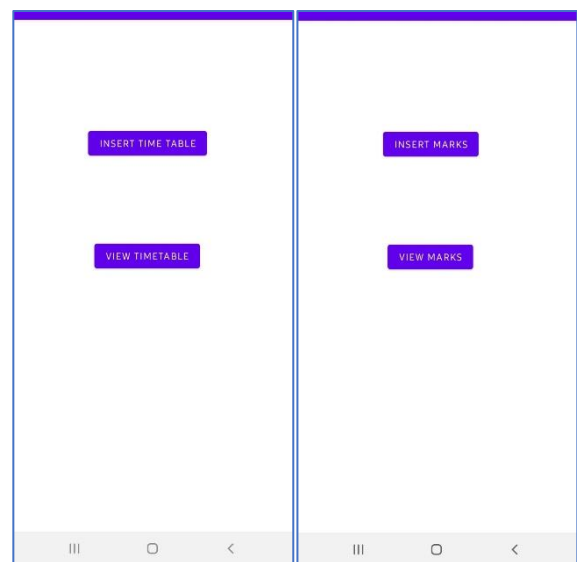Fig. 5.   Attendance module and attendance Subject wise

Fig. 7.   Timetable Module and Student Marks module

Fig 6 explains the page of all modules and slot-wise Sections in which student and teacher can check their attendance by entering the name of the subject.

Fig 8 explains the Timetable and Student marks module page, when a Student or teacher clicks on the module on the menu page they will reach here
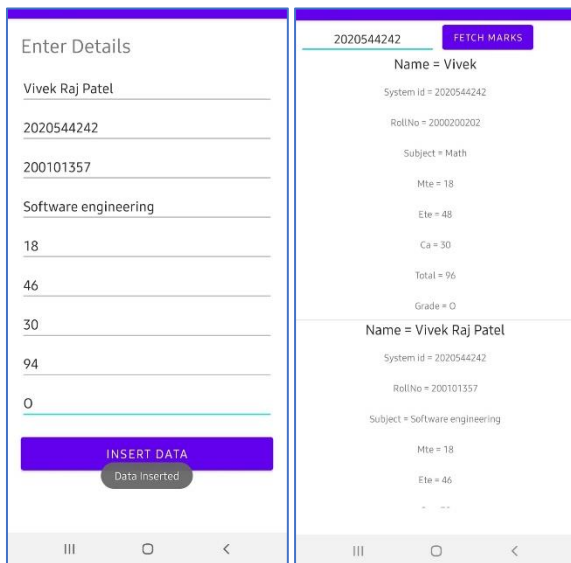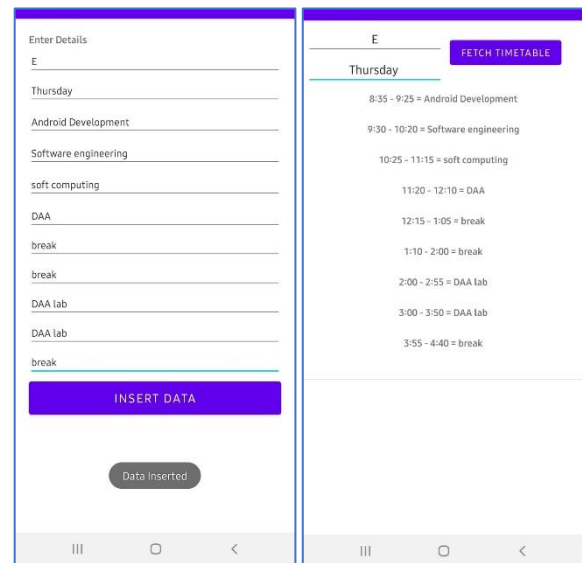
Fig. 8.   Insert Marks and View Marks

Fig. 9.   Insert Timetable and View Timetable

Fig 9 Explains how the Teacher can insert student marks and how the student can check their marks and grade.

Fig 10 Explains how the admin can insert Timetable details and how students or teachers can view the timetable by filling in Section and Day details.

V.   CONCLUSION

In the paper, we have tried to solve the arduous task of taking attendance, managing grades, and the difficulty of students knowing their timetables. All these are solved taking the concerns of both students as well as teachers. Attendance is taken with the help of face recognition which will provide much more reliability and accuracy than previous ways like taking attendance vocally and registering it on paper. The students usually suffer from confusion and trauma in remembering their classes in university or college. With this, it will be very easy to get to know their next classes or timetable for the day. Grading is done, with this students can know their grades anytime and teachers will be able to out on grades and store and it will be visible to the students. Furthermore, with this, we look forward to making the university timetable, attendance, and grading much easier. This module is finally working well for the universities where students can mark their attendance using their face and also they can check their attendance in this app with a selected date, and selected name and they can also check their

attendance in each slot, app is very useful for today's generation where time is important and attendance using face can be very useful, as there are 3 modules so the student can view their time table also and that time table is mapped with slot based attendance, as it is a complete university app so there must be some important modules should be there which are used in daily life so it has one another feature which is marks module in which teacher can insert marks of student and after calculating the marks it will be visible to the student.

VI.   FUTURE WORK

This project will be upgraded in the future so that students can use more features of our app currently students can mark their attendance with their face, and view their marks, teachers can upload student marks using our app, and admin can upload timetables to the database and student can fetch the time table according to the day and section, so in future, we will add some more modules like teachers can upload ppts and student can access all the ppts uploaded by the teacher, also student can be able to fill feedback form, there can be more modules in the app which we will work in future

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