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A Smart GPS Based Attendance Management system

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ABSTRACT

This project is all about to generate an android application to calculate the attendance of the students in colleges and updating the result directly into the college server. The data will be stored in the smart phone if the internet connection is unavailable at that time. When the internet connection is available, then the faculty can login into their college account and update the attendance result.

Attendances of every students are being maintained by every school, college and university. Faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that solve the problem of student record arrangement and student average attendance calculation. The developed system store the absent and present student's attendance details .So that management of attendance becomes easy.

1. INTRODUCTION

1.1 Attendance Management System Using GPS

Tracking the location of any object or person, generally termed as localization, has been very interesting topic of practical application and active research. It has improved reach of persons to unknown locations with much ease. Tracking locations of an object or a person while it is moving , has been very popular in the research community since very long. It involves the use of Global Positioning System (GPS) technology to continuously track mobile objects while it navigate. GPS systems work by communicating directly with at least three GPS satellites (four in case of 3-dimensional tracking) to trace the latitude and longitude coordinate values of an object's current location.

Now-a-days, even moderately priced smart-phone devices are equipped with GPS units that contain an antenna that uses the battery power of the device to communicate with the GPS satellites. This communication occurs at a data rate of around 50 bits per second and for long durations to precisely identify the current location of a

device. This communication is very costly in terms of the power consumption of the smart phone device and the time taken, though after delayed initial start-up. it quickens a bit. Even then, it requires continuous communication with the satellites for continued tracking of the device, or while navigating.

The smart phones now-a-days are essentially equipped with other sensor units that communicate locally to do their tasks. Some of them include the accelerometer, the magnetometer and the gyroscope. The product cost as well as operational cost of these sensors is much cheaper than the use of GPS units. In proposed work, devised a technique that uses combination of these 'local' sensors as a very cheap and efficient alternative to the costly GPS. The accelerometer, the magnetometer and the gyroscope have been used in combination to provide continuous location information of a moving object. This strategy ensures that costly satellite communication is avoided, and local calculations are used to generate latitude longitude coordinate values of the successive locations. This process starts as soon as the initial location of the device is identified, which can be performed either using GPS initially, or by using known location points from a map. The initialization step starts by asking the user to provide some initial information to calculate the foot-count and footstep length. The walking or running pattern of a person is then identified using the device. After that, the latitude-longitud values of each successive step of the user movement are generated locally using smart phone sensors. This happens without using the costly GPS. One more advantage the proposed strategy provides is that it is equally capable of generating good location details even in indoor conditions where GPS suffers badly. This is true even in the case where GPS gets constrained by signal interference and cloudy weather conditions.

Motivation:

The attendance system is one of the most important system used in every organization to keep the track of attendance. The previous conventions followed for taking attendance was very tedious task and requires a lot of paper work. It was not automated and so handling and maintaining the system was a tough job. The previous attendance system used in colleges needed the faculty to give the attendance details to be uploaded in the server. So there was a need to automate the attendance system and to reduce the manual effort needed in storing the records and maintaining it. The attendance system through mobile devices is fully automated. It is easy to use the system and take attendance which does not need any external effort to store and upload the attendance in the server.

Nowadays, Android phone has emerged as the world's most popular mobile platform. Android is the world's most popular mobile platform. It's the largest installed base of any mobile platform and growing fast. Millions of users are using android phones and android application is becoming more and more popular.

Objectives:

Design a Student attendance system to keep track of attendance in mobile devices for easy and proper evaluation of attendance.

- Develop and implement an attendance system.
- To create an Android mobile application to provide a User Interface to interact with the system.

2. LITERATURE REVIEW

2.1 Computerized Attendance System

A desktop application developed by S. K. Jain, U. Joshi, and B. K. Sharma (2010) , in which all the list of registered students in a particular course will be displayed when the lecturer start the application. The attendance is done by clicking a check box next to the name of the students that are present, and then clicked on register button to mark their presence. But in this also, human involvement for attendance tracking is needed.

2.2 Bluetooth Based Attendance System

In 2013, Vishal Bhalla, Tapodhan Singla, Ankit Gahlot and Vijay Gupta , have proposed the attendance system which can take attendance using Bluetooth. In this project, attendance is being taken using instructor's mobile phone. Application software is installed in instructor's mobile telephone enables it to query student's mobile telephone via Bluetooth connection and through transfer of student's mobile telephone Media Access Control (MAC) addresses to the instructor's mobile telephone, presence of the student can be confirmed.

An automated attendance management system using both a stationary RFID reader with four circulatory antennae and a handheld RFID reader was implemented in mobile and electronic platform respectively1. A system comprising of an antenna placed at the entrance of the classroom and a student database is depicted by the attendance management system in the electronic platform. As students enter their class, their names are shown on the screen in order to ascertain that their attendance has been marked in the professor's database. However, one major drawback of this system is that as the distance between the RFID tags and electronic device decreases the RFID tag read rates tremendously. A different type of automatic attendance system was proposed that uses fingerprint verification technique2. The technique of extraction of abnormal point on the ridge of user's fingerprint or minutiae made the fingerprint technique verification achievable. This verification is used to confirm the authenticity of a user who is authorized by comparing the captured fingerprint template with the stored templates in the database. Another system is based on true or false value of previous verification of person's authenticity3.

2.3 Fingerprint based Attendance System

In 2013, Seema Rao and Prof.K.J.Satoa proposed one new system for employee attendance using fingerprint. This system checks one fingerprint template with all templates stored in the database, like wise it checks for all employee which will take more time. The main problem in this case is it is very time consuming as it check one fingerprint with all the temple stored in the database.

Fingerprint is a form of biometric identification which is unique as well as does not change in one's entire lifetime. It consist of two processes namely; enrollment and authentication. Fingerprint based attendance management system is one of the most

advanced application in biometric technology. It cannot be forged easily. With the integration and use of biometric technology getting simpler, our proposed system also contains a GSM Modem which can be used to send the attendance information of the students automatically to their parents and also stored the attendance of respective student for calculate the stored attendance percentage weekly and alerts to class in charge of respective class . The design system using a small LCD user interface can be interfaced with the microcontroller by using serial communication interface. The previous projects done were only the fingerprint based attendance system and a report generation. It does not have any SMS alert to her/his parents. This project is to send SMS alert to parents by means of GSM when attendance is calculated.

2.4 Face Recognition based Attendance System

The Face Recognition based Attendance System, where we use a CCTV camera to be fixed at the entry point of a classroom, which automatically captures the image of the person and checks the observed image with the face database using android enhanced smart phone. It is typically used for two purposed. Firstly marking attendance for student by comparing the face images produced recently and secondly, recognition of human who are strange to the environment i.e. an unauthorized person. For verification of image, a newly emerging trend 3D Face recognition is used which claims to provide more accuracy in matching the image database, The main problem of this system is recognized face will compare with all the entire database for authenticate the individual attendance.

2.5 Mobile Based Attendance System

In 2013, Dr. S. Ramnarayan REDDY, Deepanshu GOYAL and Ankit BANSAL, tried to implement a system which overcomes the limitations of the existing approach by taking the attendance through teacher's mobile phones. Doing the same work on mobile phone not only saves our resources but also enables the user to get easy and interactive access to the attendance records of student.

2.6 Manual based attendance management system:

In the present system all work is done on paper. The whole session attendance is stored in register and at the and of the session the reports are generated. We are not interested in generating report in the middle of the session or as per the requirement because it takes more time in calculation. At the end of session the students who don't have 75% attendance get a notice.

1)Not User Friendly: The existing system is not user friendly because the retrieval of data is very slow and data is not maintained efficiently.

2)Difficulty in report generating: We require more calculations to generate the report so it is generated at the end of the session. And the student not get a single chance to improve their attendance

3) Manual control: All calculations to generate report is done manually so there is greater chance of errors.

4)Lots of paperwork: Existing system requires lot of paper work. Loss of even a single register/record led to difficult situation because all the papers are needed to generate the reports.

5)Time consuming: Every work is done manually so we cannot generate report in the middle of the session or as per the requirement because it is very time consuming.

2.7 Web Based Attendance Management System

In most educational institutions the attendance is taken manually. It is not only time consuming, but it is also unsecure and unreliable and it can be lost. Some institutions are using punch card for attendance while this will be difficult for teachers to keep track of the large number of students because by using punch card, a student can help the other students or his/her friend to punch their card even the other student may be absent or come late in class, so it is not reliable.

To overcome these problems I have developed a better system which is Web based; it is fully responsive where a user can use in mobile, tablets and different computer systems. In this system records are kept safe and secure and the attendance information of particular or all students of particular class can be accessed easily and without time consuming, the report is generated automatically.

In early years punch card was used for data storage , it is also known as Hollerith cards, through these cards companies were able to store and access via entering the card into the computer system . Now a day also it is used as one of the most popular attendance system. Employees are using this card for in and out, they only need to wave the punch card near a reader then it will ensure the presence of employee . Many desktop applications for attendance has been developed there are some examples:

3.IMPLIMENTATION

3.1 System Requirements

The application will follow the use cases described in _gure 2. All use cases are now described formally. Within the 3 actors, the manager has a special role and is automatically created with the user Id 1.

It can do exactly what a standard user can do but has special rights that the others don't have.

The application will allow to do: Creation of users. Any user who wants to be followed needs to be register in the system _rst. The application will o_er a web interface to enter the following data:

1. First Name
2. Last Name
3. Street
4. Zip code
5. City

6. Phone
7. Password

Then the user receives a user Id (integer) and is recorded in the database. This part is done on the web client side.

The password must be more than 4 characters long. Any _elds must be empty otherwise the user is not register.Modi_cation of the user pro_le. Once logged, the user can modify its pro_le using the same data as above and same constraints.

User login This web page is the _rst one in the system. The user must be identify in order to access any options. The web page contains two _elds:

1. User Id
2. Password

This page proposes the link to the registration web page in case the user is not yet register.

Creation of a track for a given user. The user, once registered, can log in the system and create a track. There is two possibilities to do it:

1. From the web client application.
2. From the mobile application (mobile phone).

If a new track is started from the mobile application, the user must provide:

1. User Id
2. Password

Then the server will create a new track and be ready to store the future positions in under this track's id.

For a track started from the web client, the user can (but it is not mandatory) give:

1. North coordinates
2. East coordinates

This will represent the _rst point of the track. The track has a unique identi_er within the system. The time and date when the track is created is taken from the server's clock.

Sending GPS coordinates to a server using mobile data communication.

The user get the coordinates (position) from its GPS device and send them to the server with mobile phone. The position must contain:

1. User Id
2. Time
3. North coordinates
4. East coordinates
5. Altitude

Then the server record the position under the user's current track id. If no track is created or the user Id does not exists, the system gives an error message and do not record the position.

Follow a user in real time mode on the Internet. Any person having the right to watch a user's track must log in the system under the user's ID and password. Then he/she can choose the track to be drawn. A list of the user's tracks is available. This is done through the web page. The drawings of the track are done in two di_erent manners: Swiss Topo 2D maps and Google Earth. If the track chosen is the current one and drawn in 2D mode, it is refreshed periodically using a "refresh time" parameter.

Delete a track. The user can delete tracks from a list of tracks. If the track deleted is the current one then the previous one become again the current track and all the future positions sent to the server will be save under this track id. Manager - Delete users. The web page allow the manager to delete users from a list of register one. This list shows all the available users. Manager - Follow a tracked user in real time mode on the Internet.

The manager can choose the track to be drawn. A list of all user's tracks is available. This is done through the web page. The other options are the same as standard users.

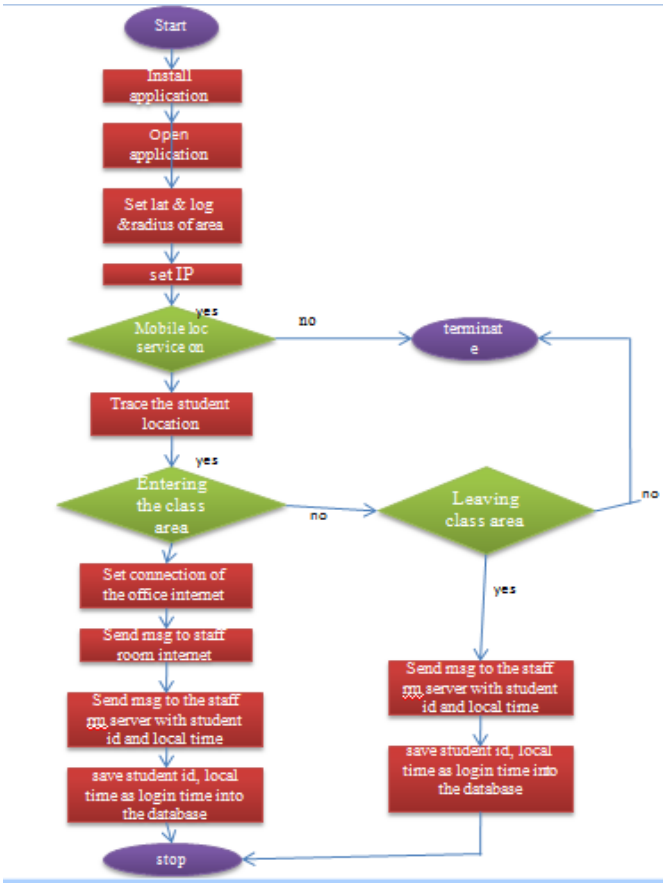


Fig1:process of taking attendance using GPS

5.2 Admin

Admin which has right for creating space for new batch. Any entry of new faculty, Updation in subject if necessary, and sending notice. It has right to create a new user , faculty and modules.

5.3 User

Characteristics

The system has single user that is the Faculty of the institute. Here is a summary of the permissions enjoyed by the user

Faculty

The faculty logs in through his account and gets the details of the courses taken by him and the student enrolled in those subjects.

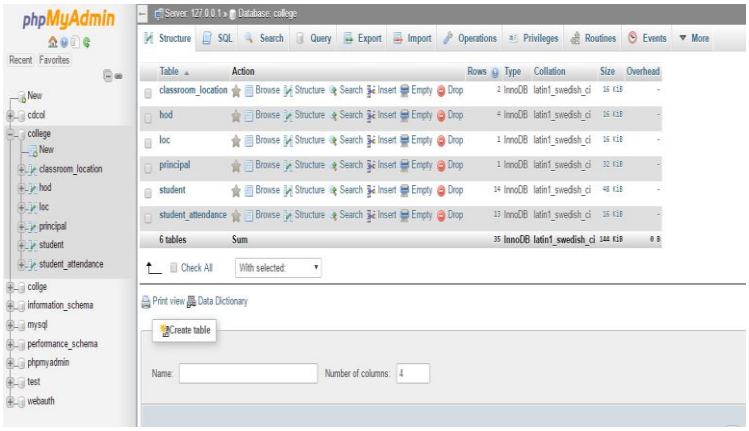
The faculty can take attendance for their respective subjects and store the details in the mobile internal database

The faculty can also view the attendance details if required at later stage.

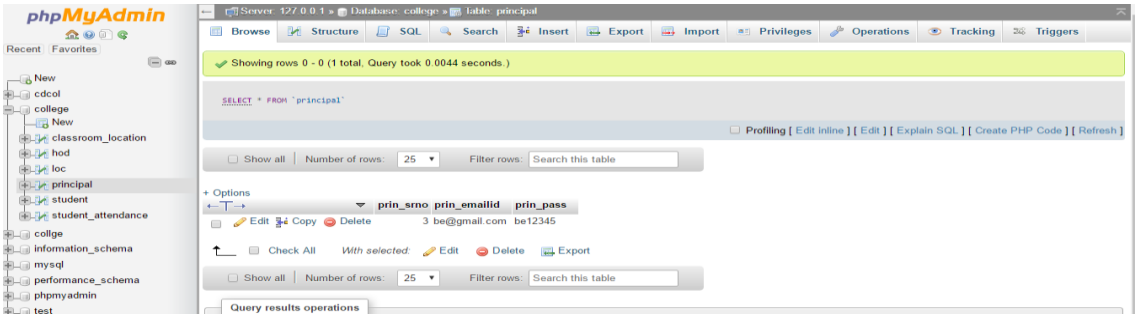
The faculty can directly upload the attendance details in the server through his mobile phone.

5.4 Result

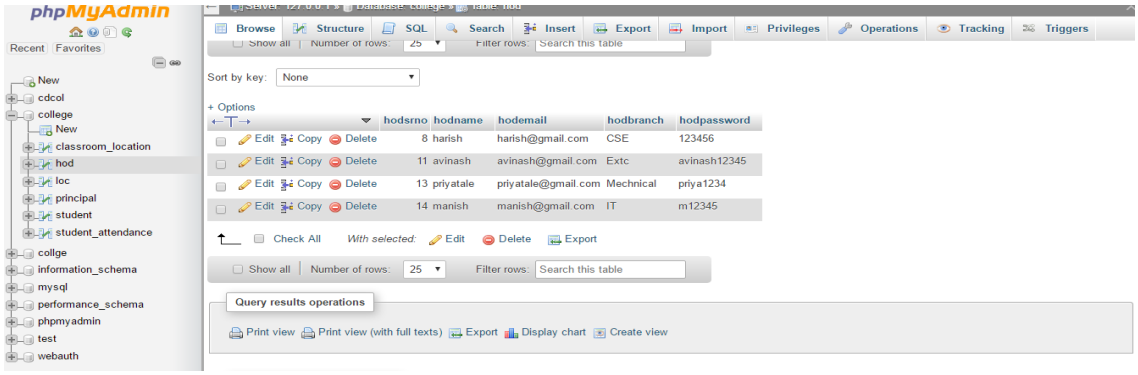
1) Screenshots



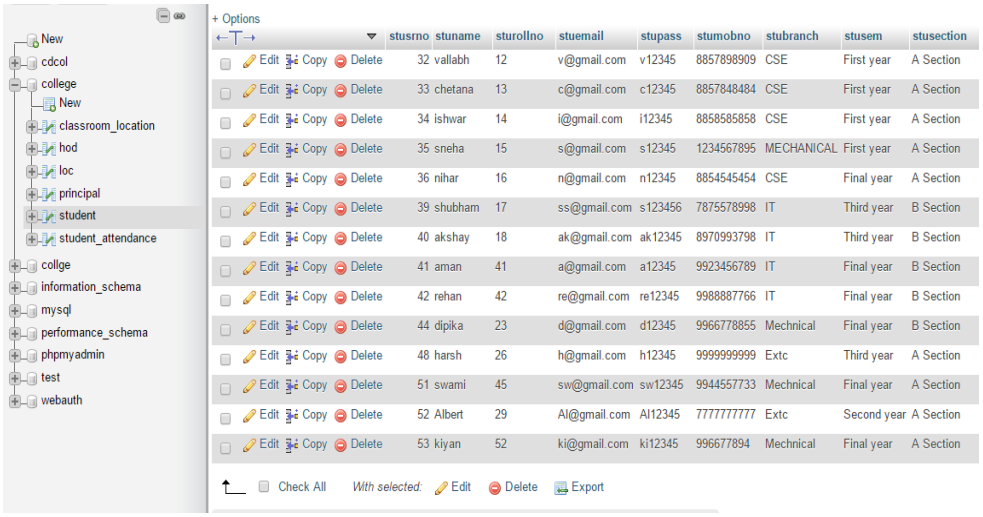
Screenshot 1: College attendance management system



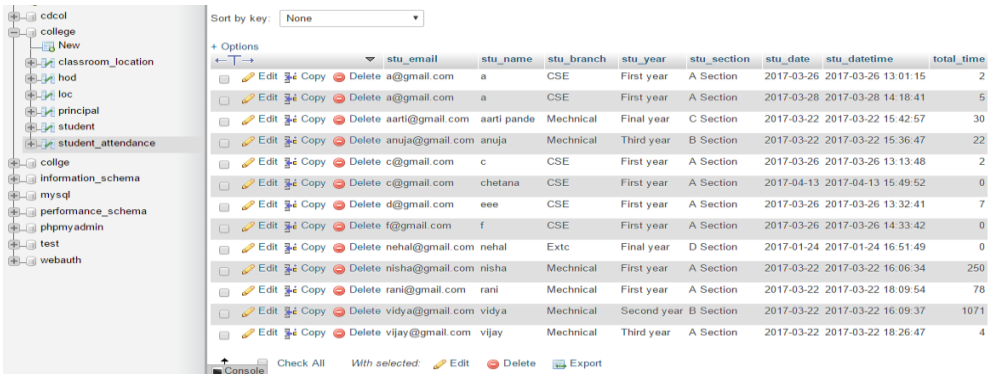
Screenshot 2: Database of principal login



Screenshot 3: Database of different HOD login

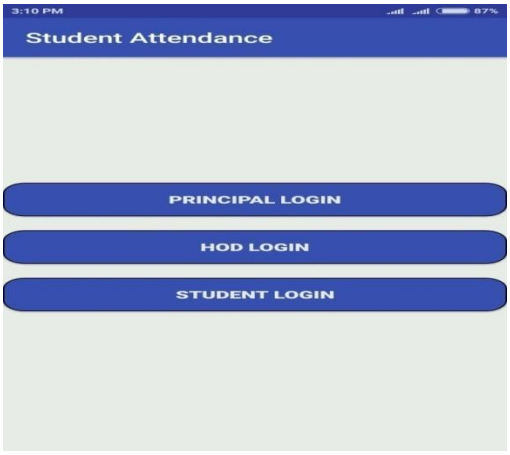


Screenshot 4: Database of students login

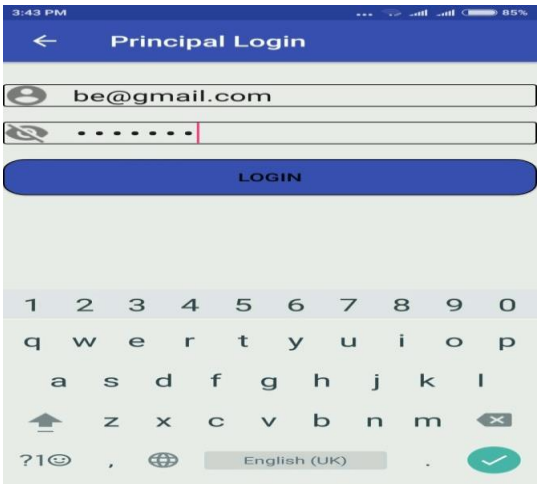


Screenshot 5: Database of student attendance

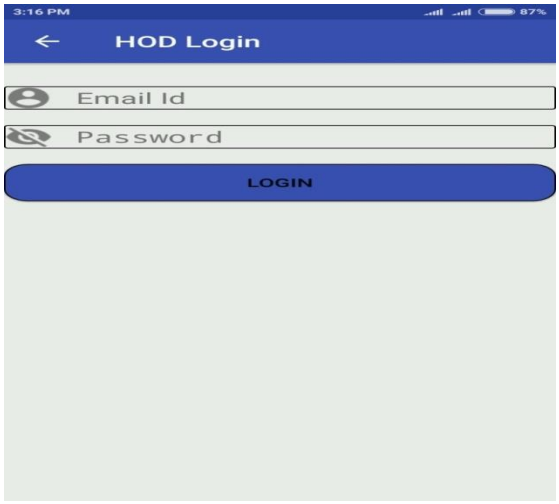
Screenshot 6: Mobile app Home page



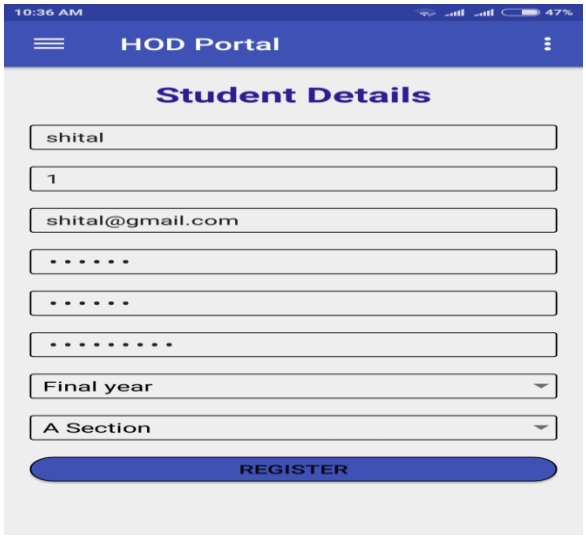
Screenshot 7: Registration page



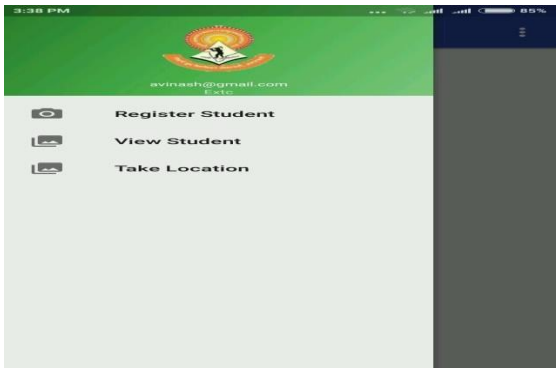
Screenshot 8:Principal registration



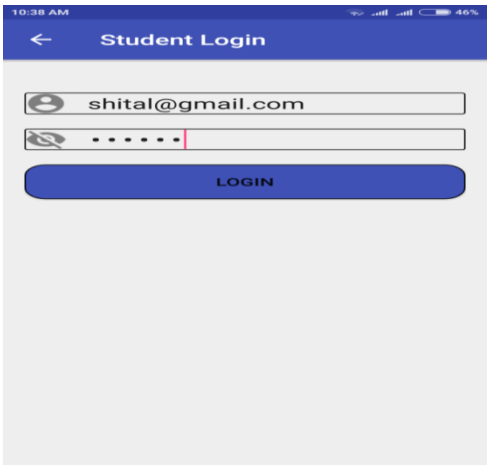
Screenshot 9: HOD registration



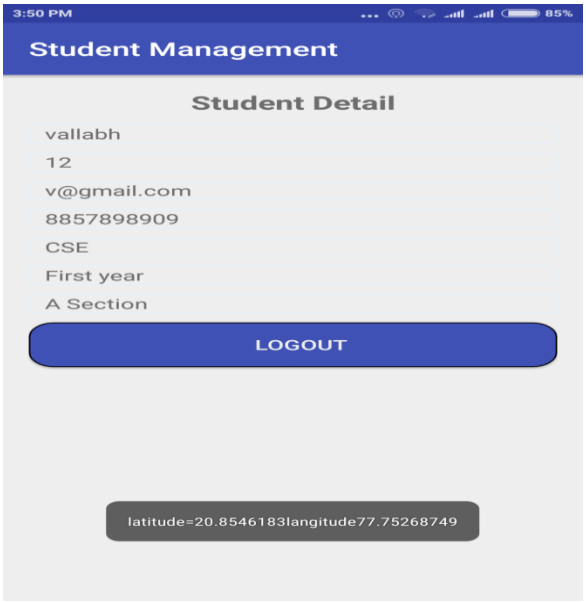
Screenshot 10: HOD portal



Screenshot 11: Student login(location ,registration)



Screenshot 12: Student login



Screenshot 13: login successful

5.5 Future work

Attendance Management System is a software developed for daily student attendance in schools, colleges and institutes**.** If facilitates to access the attendance information of a particular student in a particular class. The information **is** sorted by the operators, which will be provided by the teacher for a particular class. This system will also help in evaluating attendance eligibility criteria of a student.

The purpose of developing attendance management system is to computerized the tradition way of taking attendance. Another purpose for developing this software is to generate the report automatically at the end of the session or in the between of the session

The scope of the project is the system on which the software is installed, i.e. the project is developed as a desktop application, and it will work for a particular institute. But later on the project can be modified to operate it online.

Currently, the initiator sends carpooling invitation to users. Their location is forwarded back to him when they accept the invitation. This helps in the creation of the Google Map for the event initiator. In the future, we could have a web service that handles all this location information. This would also solve some privacy related issues like the publishing of recipient location etc. At the moment, the routes are decided on the "First Come First Serve" basis. This means, the route is decided on the order in which the recipients accept the carpooling invitation. But the path obtained from this may not always be the shortest path. Thus we could have use algorithms like the "Dijkstra's" algorithm or Algorithmic concepts like "Dynamic Programming" to calculate the shortest path between source, destination and all the recipients. Thus, optimization on this front can be obtained.

The web service can be programmed to handle the context of the location. The context of the location can be determined by its proximity to the location of the event creator. Thus, the web service can determine a radius and determine the recipients which fall within the radius as the ones who would receive the carpooling event message; while those which lie outside the radius would be ignored. Thus, broadcasting of the event can be avoided. All the past and completed events could be stored in a separate "history log".

Chapter 6:

CONCLUSION:

The attendance management system using GPS , using this GPS location tracking system is developed for the automation of attendance system using smart mobile phone for college ,institute. System have reached a steady state where all bugs have been eliminated. The system is operating at a high level of efficiency and all the teachers and users associated with the system understood its advantages.

Automated time and attendance monitoring system provides many benefits to an organization. It reduces the need of pen and paper base manual attendance tracking system. System has developed a smart location based time and attendance tracking system which is implemented on android mobile app on smart phone.

The location of an organization has a specific location which can be determine the GPS. Each student can be determining by the GPS using smart phone.

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