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Head

Department of Electronics and Computer Engineering

Pulchowk Campus, Institute of Engineering

Lalitpur, Kathmandu

Nepal

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ABSTRACT

This project aims the development of GPA, a mobile platform designed for tracking user location and suggesting the surrounding serviceable places like hospitals, tourism areas and colleges. It also assists in people's daily life by adding daily schedules and mapping location for specified places as per added schedules. The client software is based on Android, an open source mobile platform. The idea for this project originated from the GBT (GPS Based Travel) which aims in assisting visitors by displaying nearby available places on requirement basis.

This project explores a new dimension on traditional GPS projects to make it more applicable and manageable in places like Kathmandu. The simplicity of this project makes it a candidate for minor project as we can focus on more advanced topic like real time phone tracking.

Contents

Objectives

- To identify the accurate current location of the user
- To identify the nearby places such as hospital, college, tourism area within coverage of the user
- To add the schedules and be notified about that task as per the location

Introduction

Project Background

Over period of time, new infrastructures are developed and old infrastructures are replaced and maintained. With existence of these infrastructures, it becomes difficult for visitors to identify new places. As Kathmandu is more unmanaged place, it becomes difficult for one to figure out the required places. As nowadays personal life is being busy, it becomes difficult to be remembering schedules with location of the schedules too.

This project aims to create an Android Application that automatically detects user's current location and nearby places as per requirement basis using GPS. Using this application one can also add daily schedules and map the location of the schedules too.

Android Development

Prior to beginning this progress we had no experience of Android Development. The first step was to figure out how Android Projects are structured.

History

Android is a mobile phone operating system. It was originally developed by Android Inc., which was acquired by Google in July 2005. Today, development is overseen by the Android Open Source Project (AOSP), led by Google. The AOSP is "tasked with the maintenance and further development of Android". As of the 1st Quarter of 2012 Android has a market share of 59% making it on the verge of Leading phone operating system of the market .

Architecture

Android is based on the Linux Kernel. Android Developers are able to access all the components of the Application Framework used by core applications when creating an application. These features include the Location Manager, Bluetooth, the GPS, and Email etc.

Application Framework

An Android Application has four parts- Activities, Services, Broadcast Receivers and Content Providers. Activities are the visual interfaces for each task in the application. Activities

in my Application include displaying the map and the list of schedules added. Each activity, despite being linked, is independent class. Services are the background tasks that don't have a user interface. Services might be linked to one or more activities. The Content Provider shares the application's data with other applications. This data can be stored in android native called SQLite database.

LITERATURE REVIEW

Development of Android applications has gained popularity in recent years. As a consequence, the demand for useful, portable and efficient application is ever increasing. In this scenario, we have chosen to develop GPS based customized application as per the personal information acquired in addition to tracking locations for finding one's current position and suggesting appropriate guidelines to find appropriate places.

In present context, we find hundreds of android GPS applications ranging from just showing maps to highly advanced ones. Among the advanced ones three popular apps can be pointed out as:

Social Waze GPS & Live Traffic

Waze Social GPS & Live Traffic is a free Android GPS app to guide you in knowing the traffic conditions, traffic levels, there are events in a certain place live.

Sygic

Sygic is an offline application to the operation of the GPS application that provides a complete map of its path will be pursued based on the facility map that has been recorded on this application.

GPS Tracking Pro

GPS Tracking GPS Pro is an Android application launched by the developer MapLogix used to determine the location of the family, relatives, or friends to view our map. Applications of GPS Tracking Pro will be very easy for you to find out if your family, relatives, or friends in an emergency.

REQUIREMENT ELICITATION

When I had come first time in Kathmandu I don't know about any places in Kathmandu and I was lost many times in different places. But what I know about here is that if I can reach to Dharahara, then I can go to my room. Another thing that I used to do is that when I was lost somewhere, I use taxi to come to Dharahara because taxi is available everywhere although they are highly expensive. I came to Kathmandu to study bachelor but I didn't know where colleges are situated that I want. There is another problem, when I became sick then I don't know where is nearby hospital to check up me. All the problems that I had faced are not the problems for me but also for everyone who come to Kathmandu first time.

When I discussed about the minor project with my friends, I remembered those moments when I was new to Kathmandu. Then I proposed this project as minor project and my project partners accepted it.

REQUITEMENT ANALYSIS

The requirement of the user is firstly to track the current location where he or she is. This will help the user to know about the location where he or she is staying. Then he may want to know about the nearby hospitals, colleges, tourism areas etc. The map needs to display the way to go to there.

As we all know that no one is perfect. Every person is busy with their work, so they can forget their task that they have to do. For example, a person may be invited to a party in Himalayan Hotel, Jwagal, Lalitpur three days before the date of party. The busy person can forget his invitation, so it will be better if anything is there to remember him if he is not in his required location at required time. These all requirements need to be fulfilled by an application.

Use Case Diagram

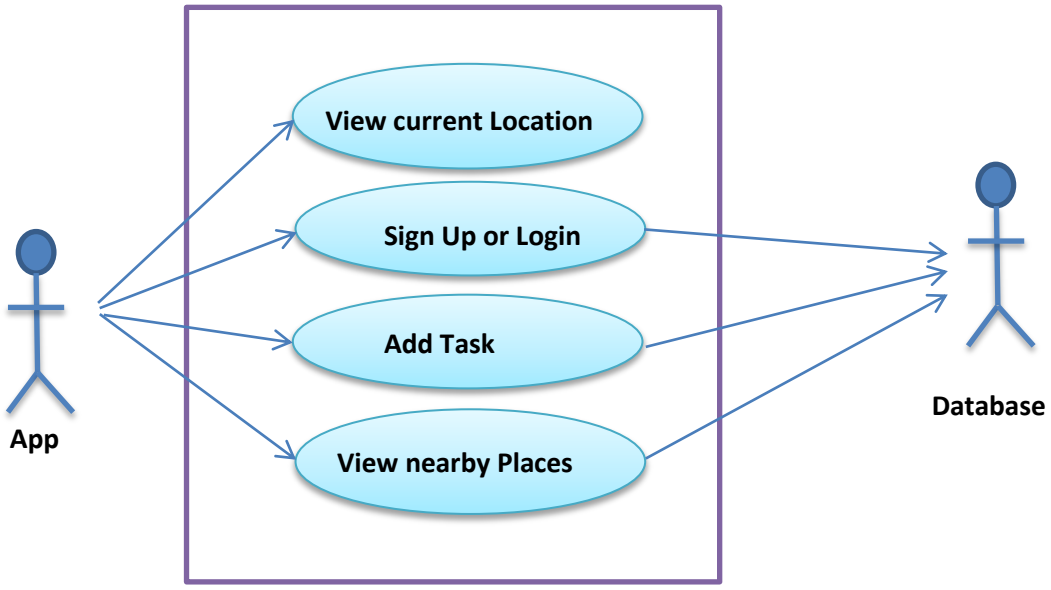


Fig: Use Case Diagram of the application

Flowchart

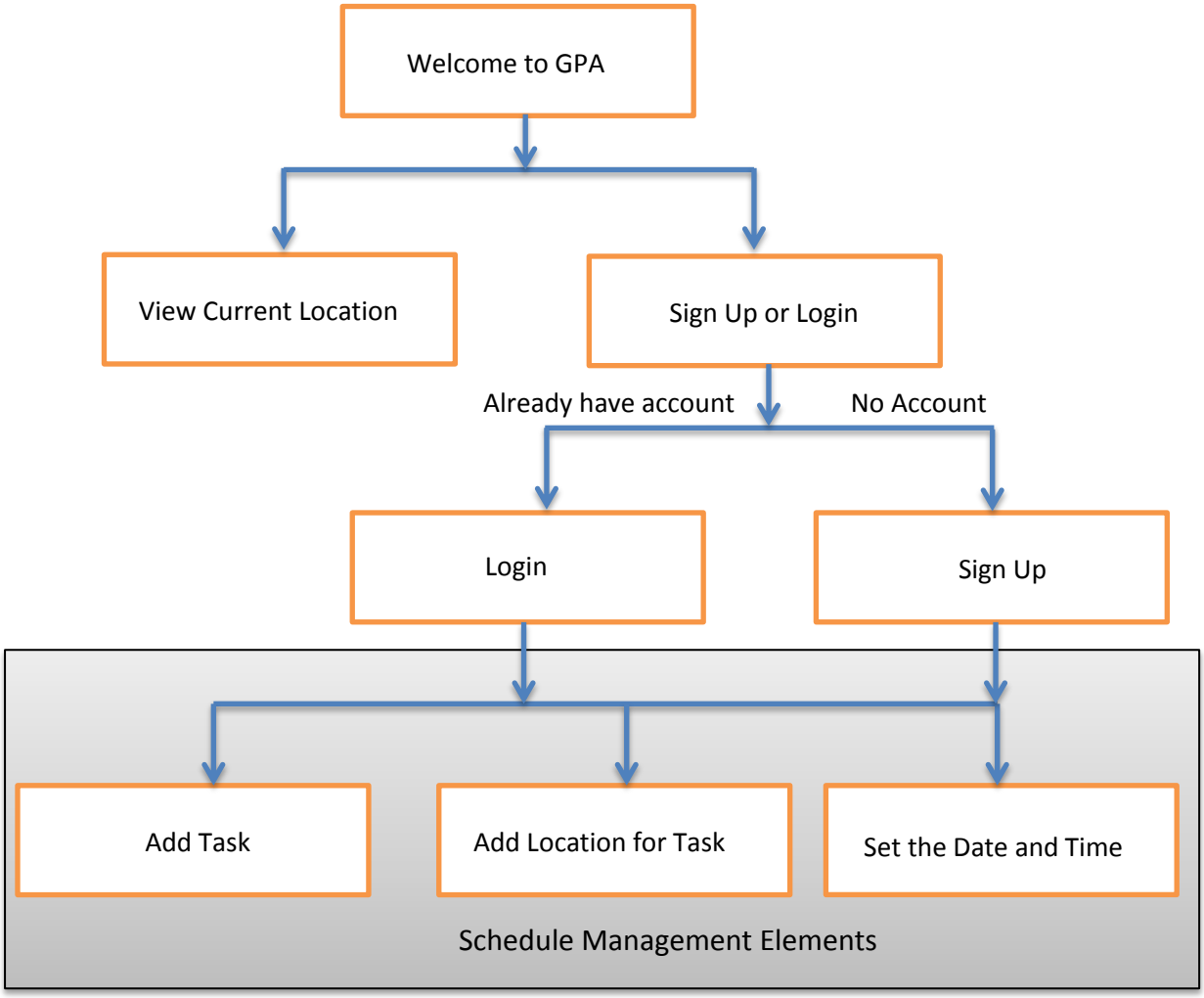


Fig: Flowchart of the GPA system

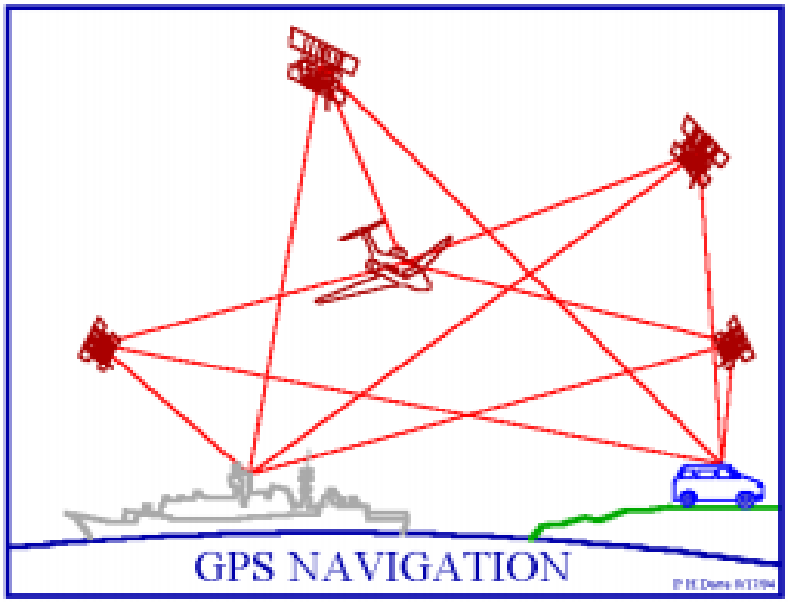
SYSTEM DESCRIPTION

Abstract Description

GPA, an acronym for GPS Personal Assistant, is an android application. As the name implies, we have exploited Google API for GPS in process of development of this application. GPA has been already introduced previously. Here, we describe the system in crude manner.

Global Positioning System (GPS) is a feature that must be owned by every kind of smartphone. It is a satellite-based positioning system available 24/24h everywhere on the globe with an accuracy better than 100m. Originally designed for navigation and real-time positioning (meter-level accuracy): navigation (airplanes, ships, car, missiles, etc…). It is also capable of mm-level accuracy, with important scientific "by-products":

- ✓ In geodesy: shape and rotation of the Earth, terrestrial reference frame
- ✓ In solid Earth geophysics: deformation of the Earth's crust (earthquakes, volcanoes, plate tectonics)
- ✓ In atmospheric sciences: tropospheric water vapor, ionospheric electron content.



Usually the system used is a system A-GPS. It is a GPS system that is able to find locations with the help of a satellite connection, but its facility and features provided by smartphone has support for our different needs. Of course, using the GPS application service on Android is an alternative to the usual way to make your smartphone more useful in carrying out your activities.

Google offers a variety of APIs, mostly web APIs for web developers. The APIs are based on popular Google consumer products, including Google Maps, Google Earth. An **application programming interface** (**API**) is a specification intended to be used as an interface by software components to communicate with each other.

On above foundation, GPA is formulated. We are all acquainted with numerous GPS based android applications which help us to find about specific sort of place which may be about educational institutions or health centers or tourism areas or financial enterprises or communication and transportation services to name a few. But is a person linked to only one of these sectors throughout his life? This very concern triggered us for developing generalized app that are less abundant.

Moreover, place where we visit are accompanied with purpose which leads to the notion of schedule management straightforwardly. Thus GPA is devised to fulfill the notion of "**Right person in right place in right time**". Right person here refers to the confidentiality of his/her plans achieved via authentication system inherent within GPA.

General Description

From applicatory point of view the system comprises of following features:

- Person can sign up if s/he is using GPA for first time.
- Other authentication chores including log In, log out, change of account information are present.
- For many person schedules are managed securely.
- A person can perform CRUD operations on his/her tasks.
- Above feature is in harmony with qualifiers of task i.e., time and place by retaining the intactness they possess.
- Current location is tracked continually.
- Notifications are sent appropriately before deadlines.
- You are alarmed at deadlines.
- Nearby areas are suggested automatically leaving you aside from tedium of even general acquaintance of where you are and assisting there for the motive you possess.

System Block Diagram

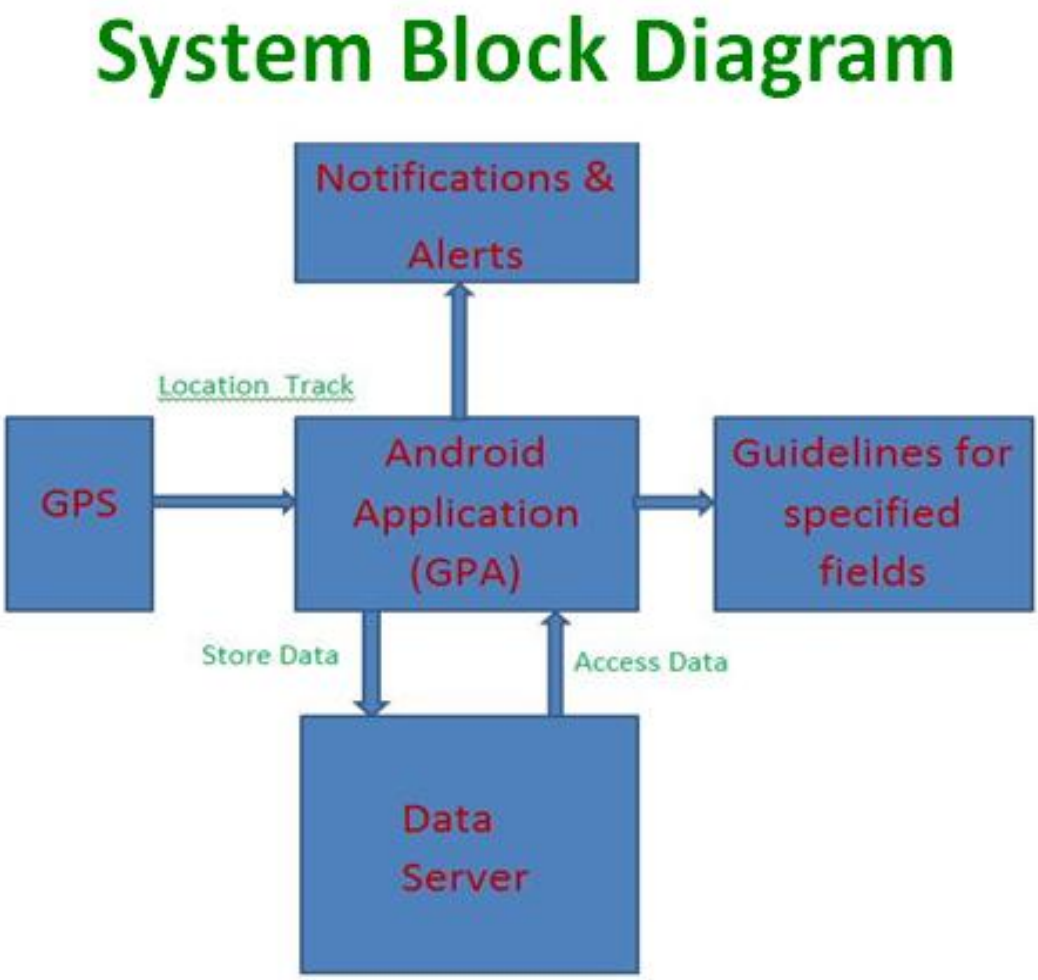
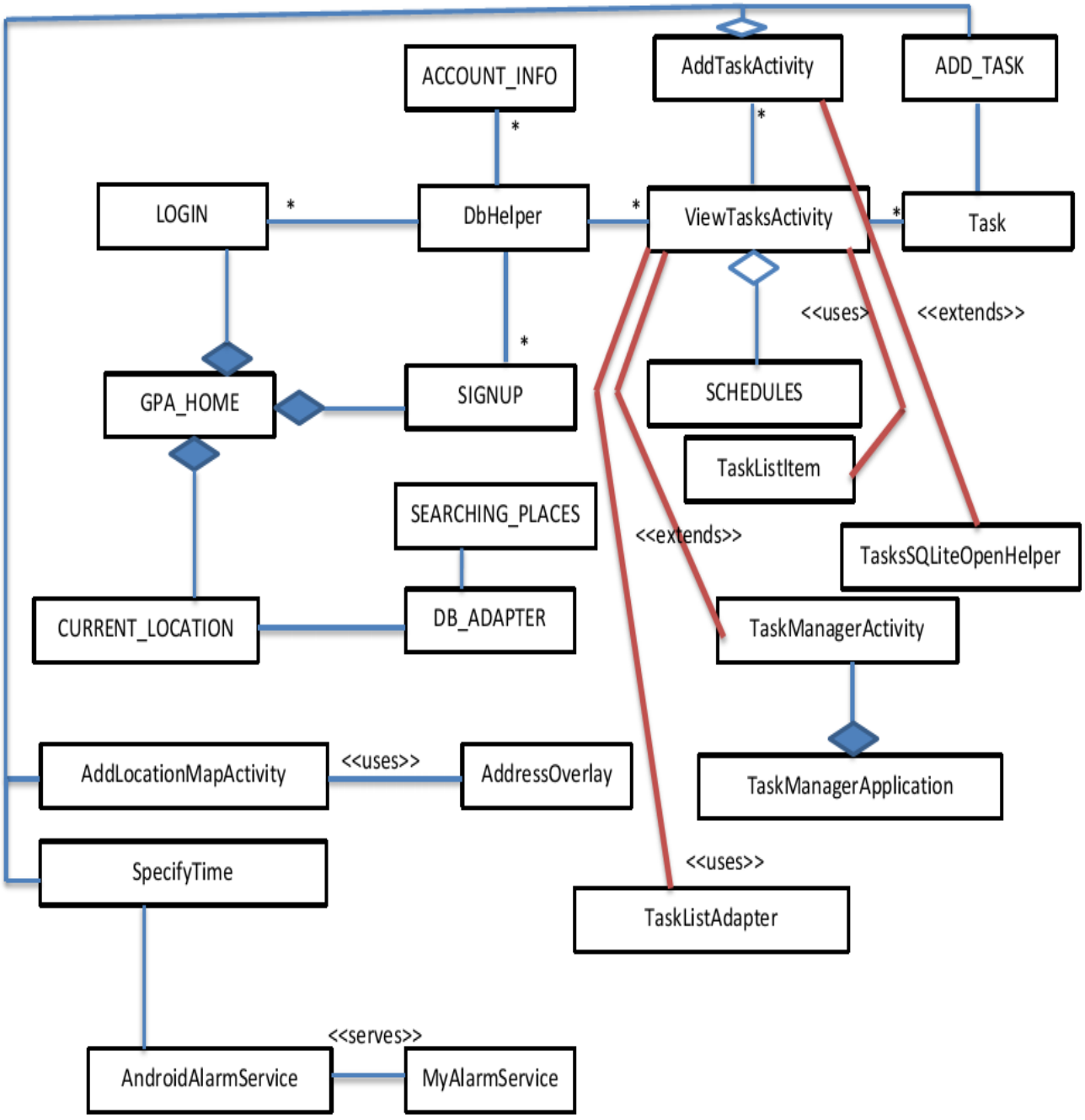


Fig : system Block Diagram

Implementation Model

The application is developed with android as target device utilizing emulator in developing environment. Programming language has been opted for Java that anyone infers empirically. The system can be depicted through diagramming underneath.

Implementation Class Diagram:



Application Logic

In our application we have basically implemented inevitable programming logic for fulfillment of the requirement pointed out during the commencement of the project as every project is destined for it. Besides, we would not have been able to show nearby places in map without one of the renounced shortest distance algorithm known as Haversine formula.

The formula is:

Let, latitude and longitude values be in degrees only like 56.976372^0 not even $56^0 58' 34.9392''$

For place A:

Latitude=Xa

Longitude=Ya

For place B:

Latitude=Xb

Longitude=Yb

Radius of earth, R = 6367 km (appx.)

Then, displacement (D) in km is given by:

$$D=R * 2 * \tan^{-1}\left(\frac{\sqrt{a}}{\sqrt{1-a}}\right)$$

Where a = $\sin^2((dX/2)*d2r) + \cos(Xa*d2r)* \cos(Xb*d2r)+ \sin^2((dY/2)*d2r)$

Where d2r is conversion factor from degree to radian i.e., $\pi/180$

And dX = Xa-Xb

dY=Ya-Yb

are latitude and longitude differences respectively.

DEVELOPMENT

None of the application can be developed in a Single phase. It includes different phases which have to achieve certain level of works. Also it have to be developed by distributing works among modules. Then one have to accomplish certain level of task within that component too. And lastly all the modules have to be integrated to develop a prototype model.

Likewise mentioned above development of GPA included three phase:-

-Data and Information Acquisition

-Methodology

-Strategy

Data and Information Acquisition

Data and information acquisition includes collection of latitude and longitude co-ordiantes.Our Application prototype gives coverage for Limited Lalitpur district so first of all we have to collect the latitude and longitude co-ordinate's of coverage area. This part of the work was achieved through internet. First of all we browsed the Google map. Then we searched the location of the Pulchowk campus .Along the location of the Pulchowk campus it also displayed the nearby location places. The we noted the latitude and longitude along with the names of the nearby hospitals, colleges and tourism area. This approach helped us to find out the geopoint co-ordinates along with its address. As these latitude and longitude are to be reverse geocoded and be displayed in the map so we entered these coordinates in Android Native database SQLite database.

Methodology

With the existence of IDE it has become more feasible for programmers to develop application on certain environment. Similarly android application development supports Eclipse IDE. So we developed our application on Eclipse IDE using the Android Developer Toolkit plugin. There are different versions of Android with upward compatible features. So we developed our application in Android API Level 8 (for users of Android 2.2 and later). This makes it available to 50% of Android users. We decided to use Eclipse because it is the Google approved development environment for Android Development and as such has the greatest level of online support. We developed our application using the Java Framework. Testing was completed on the Android Emulator and Samsung Galaxy Y running Android 2.3.6.This application development was eased by availability of Google API which provided the feature like displaying Google map, determining user current location, reverse geocoding to obtain user address using current geopoints,overlaying the current location and nearby places using images.

Strategy

There are lots of strategies for developing application. In our case we adopted agile Development approach. So we didn't concern in our documenting things while developing the application. While developing our application we distributed the work among our group members.

Application development phase were divided the work up into 4 parts:

- Schedule Manager
- Map Handling Activities by GPS Sensing Device
- User Interface
- User Authentication
- Database

Schedule manager work included the addition of daily schedules of user along with the setting the schedules date and time. Likewise map handling activities includes displaying the current user location and nearby places. User Authentication part includes registration of new user and login handling for registered users. Database part included entry of latitude and longitude of the places along with their names. User interface includes handling graphical part that makes user easy to use the application. Each part was treated as a separate entity and later merged to form the applicable prototype

RESULTS

As our project is android platform based, this application is easily available to the people who owns the android platform mobile. Interface of our project includes activity that offers services like tracking user location, registration for new user and authentication for existing users. With registration or authentication user can enter the activity where one can add schedules with user specified date and time. When user clicks on current location this it displays the current location and menu for querying the nearby hospitals, tourism area and colleges.

CONCLUSION AND FURTHER WORK

Conclusions

We found this project to be interesting rather than we ever anticipated. Without doubt, this has been the most challenging and at the same time applicable project we have undertaken since we started college. So we have developed the groundwork for an application with great potential which can be developed on other mobile operating system too. We were in tight schedule for completion of this project so it may contain some limitations.

Further Work

This project is coverage is limited to areas of Lalitpur .So further work includes extraction of longitude and latitude co-ordinate's of Kathmandu and rest of Lalitpur area so user can obtain their nearby places in these area too. Likewise this project includes the querying places for hospital, colleges and tourism area. So it can be expanded to added for service like ATM, Banks, etc.

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