Location Detection Alarm using Global Positioning System

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Abstract: *Global Positioning System is now widely used in variety of applications.With the development of smart phones GPS application spreading in public convenience such as view map of specific city or region, find distance between stations, find path from one location to another. In this paper we are proposing an application which satisfies our day to day needs. GPS have several modules based on its functionality. In this work among of them, the location based application module is primarily concerned with retrieving the current location of the user and comparing it with the location of the destination place (for which the reminder was set by the user) and generates an alarm when the user comes in the proximity radius (which is defined by the user in the settings module) showing the reminders set for that place. The complex algorithm and programming in this application is done by using eclipse software. Concerned GPS application developed in android development platform using java development kit. In this application all the data is linked through Google.*
Keywords: *GPS, Eclipse Software, Android, Java Development Kit ,Google*

I. Introduction

Global Positioning System (GPS) navigation system is most demandable in different real-time aspects of society. In every dimension of life such as emergency rescue, battlefield, communication, and travelling convenience, GPS is adapted which help to make easy and reliable way of live. Day to day GPS need is increasing and its scope is scaled. In 2007 Google launched the android to advance the open standard to mobile devices. Android is a linux based operating system with an open source license for mobile devices. Android software development kit (SDK) supports the authoring functions with the rich functionality like touch screen, accelerometers, 3D graphics and GPS as well as collaboration among the applications like e mail, messaging, social networking and location based services. In our project we have developed a android based user friendly application in which an alarm is generated as soon as the user reaches to its preset location proximity radius. For this we used the location based module of android software For providing all these services there are several sub modules incorporated within the location based application module.

The paper gives the related work in section II. The proposed system is described in Section III, the background information about the technologies which are used by the proposed system is given in section IV, the system architecture is explained in section V, the implementation details are presented in section VI.

II. Related Work

A lot of work has been done on navigation by using Global Positioning System. Davidson et. al. [1] proposed a portable car navigation system which was developed to provide the uninterrupted and reliable navigation system even when the GPS signal is not present.in this a 3D accelerometer, digital maps and one gyro was used for improving the position availability in weak signal environment. M. Sheleiby et. al. [2] developed an Automatic map scaling car navigation system by using context aware computing. Maps were presented to user with the various scales. With the revolution in android based smart phone various another techniques were introduced using the android operating system. Jayashree.et. al. [3] proposed a location tracking application in a cellular mobile network based on Location Based Service. The proposed system is implemented as a client server system that helps the users to find their friend's location and get alerts whenever they are nearby. Liu et. al. [4] explained the design and implementation of Android operating system based group navigation system. By using the GPS and Google Map, the system implements a geographical location and route planning between user and his friend. The system provides a convenient and efficient platform for users travel and connection between friends. Shrestha et. al. [5] presented message sharing system completely based on android which provides two way communication between web server and android based application. It is very secure communication. The proposed system uses Java programming language for android mobile user application.

Chandra et. al. [6] explained about Location Based Service which is a key factor for future mobile application. The system was developed with J2ME API based on providing location based service using GPS. The application is implemented as client server system which helps users to locate friends. Siriteanu et. al. [7] Presented a Social Network system in which the users were alerted when their friends are around. Available

Android location services like GPS technology, wireless and mobile towers were used to find an approximate location of a mobile phone running this program and then sharing the location information through SMS.

III. Proposed System

This paper describes the position detection and alarm generation system which has the following objectives:
➢ Develop an android application which can be used to locate the position of user
➢ This application has an alert mechanism to generate an alarm to the user as soon as he/she reaches to its preset location or to its proximity radius(10 meters)

Some advantages are as follow:
• user can track his/her own location.
• It is a good application for security point of view if the user is new to that place.
  Some Disadvantages are
• Network connection is necessary
• Application can be used with the android enabled smartphones.

IV. Technology Background

4.1 Global Positioning System
      The **Global Positioning System** (**GPS**) is a space-based satellite navigation system that provides information of location and time in all weather conditions, anywhere on or near the Earth surface where there is an unobstructed line of sight to four or more GPS satellites. The GPS project was developed in 1973 to overcome the limitations of previous navigation systems by integrating ideas from several predecessors. The current GPS consists of three major segments i.e. space segment (SS), a control segment (CS), and a user segment (US).

4.1.1 Space Segment
      Space segment consist of 24 to 32 satellites (as shown in Fig. 1) in medium earth orbit & also includes the payload adapters to the boosters required to launch them into orbit.
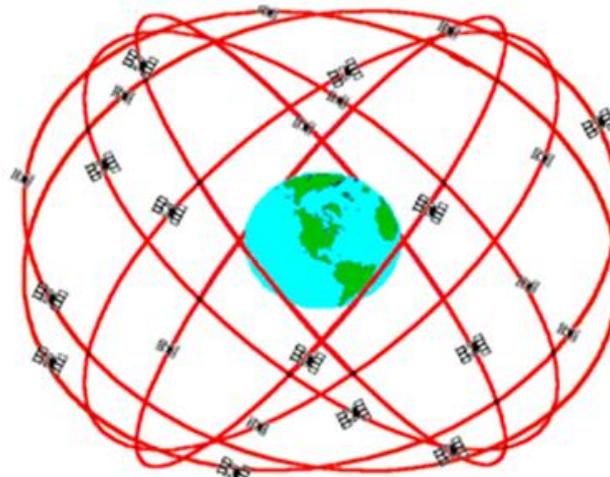
GPS Nominal Constellation
24 Satellites in 6 Orbital Planes
4 Satellites in each plane
20,200 km Altitudes, 55 Degree
Inclination

Fig. 1. The Global Positioning System (GPS), Space Segment

4.1.2 Control Segment
      The control segment is composed of a master control station (MCS), an alternate master control station, four dedicated ground antennas and six dedicated monitor stations.

4.1.3 User Segment

The user segment consists of the users and GPS receivers. A GPS receiver is a specialized radio receiver designed to listen to the radio signals being transmitted from the satellites

4.2 Android

Android is an open source operating system based on the Linux kernel and launched by Google. On comparing with the development of applications on PC there are some different features of developing the applications on the mobile phone operating system. In this paper we have also introduced the basic architecture and application framework of android operating system, gives brief description of the main structure of android application. Android is running on Linux kernel and its applications are written in Java Programming language. So android applications are running on Java virtual machine known as Dalvik Virtual Machine.

It has different API libraries to execute the applications. Android architecture and its main component are shown below in Fig. 2

Fig. 2 Android Architecture

- ➤ Applications: In the frame work on the top there are a set of core applications including an email client, a SMS app, a calendar and a map application, web browser, contacts-app and so many other.
- ➤ Application Framework: The developer is allowed to access all API framework of the core programs. The application framework simplifies the reuse of its components. Any other app can release its functional components and all other apps can access and use this component (but have to follow the security of the framework). Same as only the users are able to substitute the program. In this layer there are managers which enable the application to access the data like following
  - i. Activity Manager: It controls all the activities and manages the lifecycle of the applications. It enables the proper management of all the activities.
  - ii. Resource Manager: It provides the access to non code resources like graphics.
  - iii. Notification Manager: It enables all applications to display custom alerts in status bar.
  - iv. Location manager**:** It fires alerts when user enters or leaves a specified geographical location.
  - v. Package manager: It is use to retrieve the data about installed packages on device.
  - vi. Window manager: It is use to create views and layouts.
  - vii. Telephony manager**:** It is use to handle settings of network connection and all information about services on device.
- ➤ Libraries: Android has its own library set which is written in C/C++ .To access these libraries application framework is used. We cannot directly access these libraries. In the Fig. 2 some of the core libraries has been listed.
- ➤ Android Run Time: All the android applications are executed in this section .Android Runtime consists of a Java Core Library and its own virtual machine i.e Dalvik virtual machine(DVM). The Core Library provides Java core library with most functions. This DVK enables the users to execute multiple applications at the same moment.Dalvik virtual machine is register virtual machine and makes some specific improvements for mobile device.

➢ Linux Kernel: Android is based on the linux kernel(version 2.6). This layer is core of android architecture. It provides core service like process management, memory management, security, driver model etc. It also acts as a hardware abstraction layer between the software or hardware better communication.

4.3 Google Maps
        Google Maps provides a map of an open Application Programming Interface (Google Maps API). Developers can easily link the Google Maps services when required for their application.

V. System Architecture

        All the large systems are composed of many small sub systems that provide the required and related set of services. In the starting of design process these sub-systems are identified and the framework is established for controlling the sub systems is called architecture design (shown in Fig. 3) and the output of this design process is the description of the software architecture.
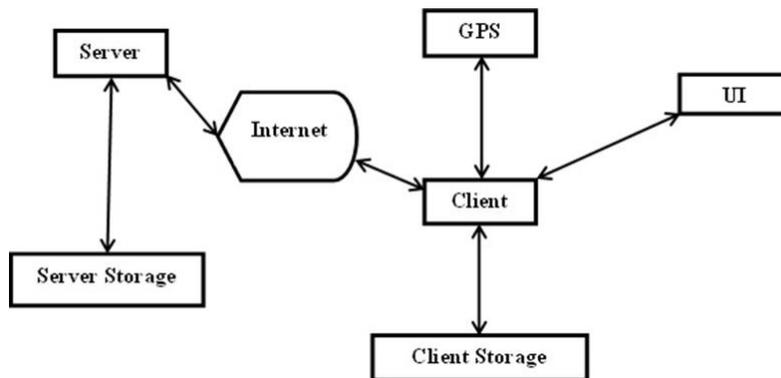

Fig. 3 System Architecture

VI. Implementation

        The proposed system is implemented using the Android. It mainly depends on location based module. This can be further divided in following modules
- Activity Module
- GPS Module
- Google API Module
- Notification Module
- Alarm Module

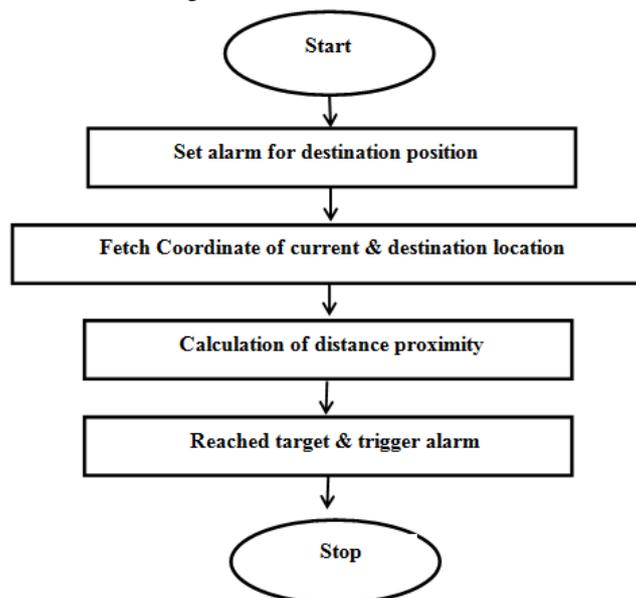The operation of our system is shown in Fig. 4

Fig. 4 Implementation of our system

VII. Conclusion

The proposed system uses the GPS and Android for enhancing the navigation technique. A friend location alarm alerts the user as soon as it reaches to its destination location .This technique is very beneficial for user who is new to that place for security point of view. The only drawback is that it is completely dependent on the connectivity of the user with internet.

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