FSSE Tracker

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Abstract: Location based services offer many advantages to the mobile users to retrieve the information about current location and by using more services that information is processed to get more useful information near to their location. Location based Services can be implemented on Android based smart phones to provide these value-added services: like direction extraction to reach out to a place, coordinate extraction and convert them to absolute positions. Location based applications provide wide range of advantages to individuals as well as organizations. This application has specific purpose for the organization, as it shortens the gap between the company agents and the associated department, by tracking company agent's location and make the system flexible to interchange information.

Keywords: Tracking, LBS, GPS, MIDP.

I. INTRODUCTION

Mobile technology has been one of the growing fields of technology these days. Well, it is all because of Android, which brought the revolution in the mobile technology. Android provide a full-fledged development environment for developers to develop flexible, robust, secure and powerful applications. Tracking systems are not far, Google has provided many APIs to enable location tracking in applications and many applications have been developed which are using those services. Location Tracking has been at the demand for many useful applications, where an individual can locate another person by using the application which is LBS (Location Based Service) enabled. A general location tracking system includes various entities like mobile phones which use the application and whose location is tracked somewhere else. Cellular communication towers, which provide the communication services to the mobile users. Operators handles the process of location tracking and they actually find the location of a mobile user. Location server provides the medium for operators to connect with the towers and to store the necessary data. Satellites are the backbone of this process, as they find the coordinates of the mobile user and associate a mobile device with longitudinal and latitudinal coordinates. GPS(Global Positioning System) navigation system is provided by these satellites.

Location-based services (LBS) refer to a set of applications that exploit the knowledge of the geographical position of a mobile device in order to provide services based on that information. LBS provide the mobile clients personalized services according to their current location. Location-based services offer many merits to the mobile clients. For the mobile user, the examples of location based services are:

- Profile changer based on place or area

- Person Location tracking by Operator/copanion

- Nearest client notification reminder

In order to make LBS services possible, some infrastructure elements are necessary, including mobile devices, applications, communication network, positioning component, and service servers. A positioning component is usually needed in a LBS application to determine the location of user's mobile device. Service providers maintain service servers which offer different

kinds of LBS services to users and are responsible for processing service requests and sending back request results. Servers calculate positions, search for a route, or search specific information based on user's position.

These are the different classes present under Location API package to retrieve the Location information of the user.

- **LocationManager:** The class provides access to the location service. It also provides facility to get the best Location Provider as per the criteria.

- **LocationProvider:** It's an abstract super class for location providers. A location provider provides periodic reports on the geographical location of the device.

- **LocationListener:** This class provides callback methods which are called when location gets changed. The listener object has to be registered with the

- **Location manager:** The class provides the application to choose suitable Location Provider by providing access to set of required properties of the

- **Location Provider:** Android also provide an API to access the Google maps. So with the help of the Google maps and the location APIs the application can show required places to the user on the map.

The four types of requests are available with the Google Places API. There are 4 fundamental Place services available:

- **PlaceSearches:** It returns an array of nearby Places based on a location defined by the user.

- **PlaceDetails:** It returns more specific data about a user defined Place.

- **PlaceCheck-ins:** It allows the request that a person has checked in to a Place.

  PlaceReports: It allows the users to add new locations to the Place service, and to delete Places that the application has added to the database.

The main objective of the project is to develop Android application which provides location tracking functionality for Android device using GPS. The application is developed specifically for sales department team which need to track the location as well as task progress of their field salesmen. They continuously interacts with the agents by sending them task details based on their current location and agents respond back with task progress or any other detail.

II. RELATED WORK

The number of existing applications that make use of the information captured by a GPS receiver uses that data for multiple purposes. Various efforts have been taken out on location tracking, some of them are:

Seema Vanjire, at el [1], proposes an Android Application development which is based on LBS & provides different location based services like profile changing of mobile from normal mode to silent mode & vice versa for certain places that user registered. Many issues are tackled in this application development like, Location positioning technologies, Query processing, Cache management.

Anil Birajdar, et al [2], discusses the implementation of a simple and cost effective system that assists users in tracking colleagues and friends within a campus environment. The system uses the information built in a typical mobile such as its IMEI and IMSI and the various Wi-Fi access points on campuses to pin point a user's position.

Mohammed Abdul Qadeer, et al [5], a technique is given to send GPS coordinates of a mobile through a SMS to other mobile phones. Two algorithms, Kalman Filter and Velocity Renovation, which can be used in conjunction with GPS, are used as a basis for location tracking. The first coordinates are generated from a GPS assisted mobile on Google map, this location is

then sent through SMS to another person. The latter can then see the exact location of the sender on his map with an accuracy of 0.57m.

Khalifa A. Salim et al [8], in this work, an integrated cost effective web based GPS-GPRS vehicle tracking system is designed and implemented. The system enables enterprises owners to view the present and past positions recorded of the target vehicle on Google Map through purpose designed web site. The current position of the vehicle was acquired by GPS device which is integrated in the target vehicle and the location coordinates are sent through GPRS service provided by the GSM network. The GPS data are sent using Get method of HTTP protocol, the data at server side are stored in a database tables and can be retrieved as request for position browsing on map. A web application is developed using PHP, JavaScript, Ajax, XML, and MySQL with embedded Google Map to retrieve and display on track details.

III. SYSTEM DESIGN ARCHITECTURE

The current location of the user is calculated using inbuilt GPS receiver present in the mobile phone. The calculated coordinates of the user are shown on the map using a third party Google maps API. The application architecture and its working principle are centered on the use of GPS. It is the most common technology for these kinds of applications. Crossing data from all the LBSs should provide much more accurate position of the device. Figure 1 shows the main five elements that construct the system, which are the GPS system, the mobile clients, web server and the database.
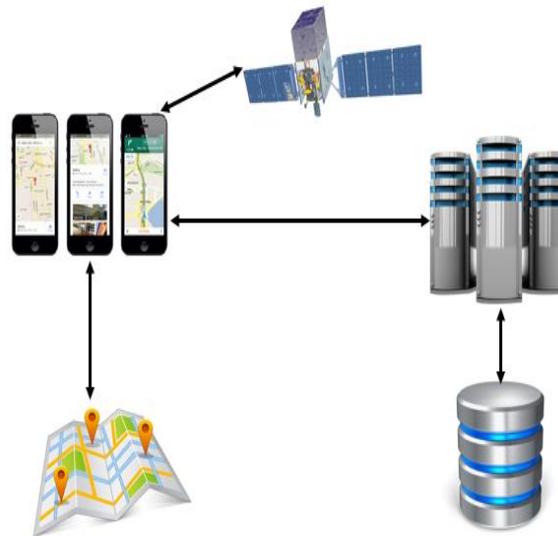

Figure 1 System Architecture

Mobile User

The mobile user (agents) requests its location from the Global Positioning System (GPS) periodically and sends it through the communication network to the server. The sales team personals can request the location of an agent at any time from the server. Mobile user also has an internal database to store application settings.

Server

The server receives agent's location and updates the user about the location of agent whose location need to be find out. The server is given information about person co-ordinates as latitude and longitude. Then server uses a Google Places API to convert this information to actual address format.

Database

The database contains all details of agents which are linked to the service with their location. The database also stores the user's mobile number along with the other user's mobile number with whom user is sharing his location. Database tuple mainly has six attributes namely who, whom, latitude, longitude, altitude and time which stores user's mobile number, mobile number of other user with whom user is sharing his location, latitude coordinate of user location, longitude coordinate of user's location,

altitude coordinate of user's location and time at which user updates his location. Whenever, user updates his location the time is also updated.

GPS

Every time the mobile phone updates the user location in the server, it requests the location of the user from the GPS receiver. The GPS receiver determines the longitude and the latitude with the help of satellite system and sends it to the server, which can be programmed to convert this data into actual location address.

Map Service

Map service provides the Google maps and several map handling functions as required by the user. However the map service is an indirect part of this system, and it will be supplied by an external source. Then latterly sends to the mobile phone. Data from the application settings and emergency contacts are saved in a database file. When the application is started; the data is loaded from the data file and will apply it to behave according to those parameters.

System Modules

All FSSE

This module provides an interface for the users to find out all agents available within an area. The search is made based upon geographical area mainly as state or city. Since there are multiple branches of the company within a state and even within a city. So selection of particular state or city is made, to provide feasible and specific search result. The information they can get it from includes, available agents within the state/city, tasks given to those agents and status of those tasks. Agents on the other side use counter part of this application called FSSE Collection application, through which they continuously update their work status and send it to the main company server.

NearBy FSSE

This module is based upon the location of company clients, as the company need to approach their clients at door step as soon as possible. This module is used to search for available agents nearest to the place of client. Agents are given task details and route details about the client. Agents send all their details about the task from the starting time, their location coordinates after every 15 minutes, work progress, work status, payment details, ending time and many more.

Tracking

This module is used to track a particular agent; it provides a search option to choose a particular agent's ID and details about the agent are displayed. Information includes agent name, task assigned, start time of task, task progress, location of agent etc. Agents use FSSE collection application to update task status and send it to organization's main server, where from it is redirected to FSSE tracker from which the team members can retrieve data.

IV. IMPLEMENTATION

The mobile application is implemented using Android mobile platform. Java programming language is used for business logic and JSON (JavaScript Object Notation) is used to data interchange between user and server. PHP is used for implementing server side functionality and SQLite is used for the database. Android studio is used for developing this application. Android Studio is an integrated development environment (IDE) for developing mobile applications on the Android platform. Android Studio is freely available under the Apache License. Based on JetBrains IntelliJ IDEA software, the Studio is designed specifically for Android development. Android Studio is the official IDE for Android application development, based on IntelliJ IDEA.

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1. Mobile User Side Implementation

The User side application is developed using Android Software Development Kit and target Android version is 5.0, and minimum requirement is kept Android 2.0. Android 5.0 consists of high level of API packages, and provide most of the Android services and functionalities. User device should be GPS enabled as the application is based upon the GPS. The configuration targeting resource-constraint devices like mobile phones is called the Connected Limited Device Configuration (CLDC). It is specifically designed to meet the needs for an Android platform to run on devices with limited memory, processing power and graphical capabilities. User interface and Get location are two main components done on the user side.

Graphical User Interface (GUI)

The requirements for mobile graphical interface is different from those for desktops. For example, the display size of mobile phones is small and input devices do not always include pointing tools such as a mouse or pen input. Therefore, the user interface programming guidelines for applications running on mobile phones are not the same as for the desktop computers. Mobile Information Device Profile applications are expected to run on many different mobile phones without modification. This is particularly difficult in the area of user interface. Mobile Information Devices (MIDs) have got screens of all sizes, in gray scale and in color. Furthermore, for input, the MIDP is fairly open-ended. The input devices on MIDs vary widely in their abilities, from numeric keypads to alphabetic keyboards and soft keys to touch screens. Below are some important guidelines that are kept in mind while designing the application with MIDP graphical API functionality:

- User interface is kept simple and easy to use. Because common users who probably may not have technical knowledge of Android may use the application easily.

- High-level APIs are used as much as possible, so that the application provide portability across different mobile phones.

- No keys other than those defined in the Canvas class are assumed to exist.

- The application does not assume any specific screen size; instead, it queries the size of the display initially and adjusts itself accordingly.

- Choices are presented to users as menu lists, because entering alphanumeric data through a mobile phone can be tedious.

Get Location

The location includes the latitude, longitude and altitude coordinates. These coordinates can be calculated using the Location Manager API available in Android, provided by Google. Location Manager package is used to enable location-aware applications for Mobile Information Device Profile (MIDP) based devices. As for location data retrieval, the GPS Location Provider is in charge of connecting to the GPS sensor in order to get the current location data (location coordinates, altitude, date and time). Upon sentence parsing, the GPS Location Provider can use the gathered location data to create Location objects.

2. Web Server Side Implementation

The application needs centralized database for the purpose of location sharing. SQLite is used for the database and PHP is used for implementing server functions to modify these data as user demands. Firstly this need is fulfilled by using local server on Personal computer (PC) .For this purpose XAMP server software is used which include PHP, MySQL and Apache web server in one package. In this application, once a client sends its request over the network to the server, it is then up to the server to interpret the request and generate an appropriate response. The application's receiving end on the server is a PHP page which

is a regular HTML page with two elements added: First, the file's name ends with the ".php" extension, so that the web server knows that it should be interpreted specifically.

3. Map Services

This part mainly provides such functions as zoom, parallel moving, geocoding and relocate centre. Location service: exchanging data between client and server, displaying map information that centred by mobile terminal in real time. The MidMaps is the map service which provides Google maps for our application.

V. RESULTS AND ANALYSIS

The application has been installed on the user devices particularly for a group of persons, and run this application to check proper working. The server files are uploaded on the main server of the company and databases are configured to the application. The agent's details are stored in the database and is made available to the application users. Agents which use the FSSE Collection are configured with this application.

The application runs smooth with 5-10 users, which simultaneously access database and application server. FSSE Collection application on the other side sends data frequently to the server, where from it is retrieved by using this application.

VI. CONCLUSION

Location Based Services emerges as most used services in applications today. Location tracking has been a key feature of any application which uses cost free inbuilt GPS. The location tracking application helps users to track the location of any other person without much effort and providing them necessary information. It also makes users able to send their current location coordinates to the server and update their location after every period of time.

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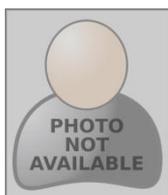
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