

Locus Discovery and Tracing System

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Abstract— Locus Discovery and Tracing System help us to find friends and family member's location with the help of Global Positioning System (GPS). The Location Based Service (LBS) is used to track the exact position of vehicle with the help of the GPS. Locus Discovery and Tracing System provide ability to track user's mobile device when user nearby location. This system uses mobile device, mapping service and repository system. The mobile device used to find location and send the pop up alert message to user. The repository used to store data about mobile user and map location. The mapping service is used to produce mapping data for mobile client and also web client. The nearby location is determined by the geographical area (geo-fence); the geographical area is divided into different types of zones. When user cross these one of the area the alert message is sent to user based upon zones (i.e. safe, risky, high risky).

Keywords— Discovery, Detection, Position, Location, Locus, GPS, LBS,

INTRODUCTION

The Global Positioning System (GPS) is a satellite-based navigation system that consists of 24 orbiting satellites, each of which makes two circuits around the Earth every 24 hours. These satellites transmit three bits of information – the satellite's number, its position in space, and the time the information is sent. These signals are picked up by the GPS receiver, which uses this information to calculate the distance between it and the GPS satellites. With signals from three or more satellites, a GPS receiver can triangulate its location on the ground (i.e., longitude and latitude) from the known position of the satellites. With four or more satellites, a GPS receiver can determine a 3D position (i.e., latitude, longitude, and elevation) [1].

Various GPS-based tracking systems have been successfully deployed and utilized in various applications such as fleet and vehicle location identification, and in route guidance. Recently, systems that integrate GPS and GSM technologies with Google earth to provide real-time data have also been proposed.

In today's world, child's safety is a major concern. It becomes difficult for the parents to keep track of their children all the time they are away from home. This application is of interest to the parents and police department to restrict the roaming of a mobile user to a predefined geographical boundary. If mobile user breaches this boundary, then a alert message containing mobile's current location is sent to register mobile phone numbers and email ids [2].

Tracking or detecting the position of people is very important for various reasons such as identifying the culprit, to notify friends about serious issues, to convey an important message etc. For this purpose, Global Positioning System (GPS) is being used widely. This paper proposes the Position Detection and Tracking system using Android which can be used to track friends and family members [3].GPS using following segments:

The Space segment: The space segment consists of 24 satellites circling the earth at 12,000 miles in altitude. This high altitude allows the signals to cover a greater area. The satellites are arranged in their orbits so a GPS receiver on earth can always receive a signal from at least four satellites at any given time. Each satellite transmits low radio signals with a unique code on different frequencies, allowing the GPS receiver to identify the signals. The main purpose of these coded signals is to allow for calculating travel time from the satellite to the GPS receiver. The travel time multiplied by the speed of light equals the distance from the satellite to the GPS receiver. Since these are low power signals and won't travel through solid objects, it is important to have a clear view of the sky.

The Control segment: The control segment tracks the satellites and then provides them with corrected orbital and time information. The control segment consists of four unmanned control stations and one master control station. The four unmanned stations receive data from the satellites and then send that information to the master control station where it is corrected and sent back to the GPS satellites.

The User segment: The user segment consists of the users and their GPS receivers. The number of simultaneous users is limitless [4]. In general, GPS receivers are composed of an antenna, tuned to the frequencies transmitted by the satellites, receiver-processors, and a highly stable clock (often a [crystal oscillator](#)). They may also include a display for providing location and speed information to the user. A receiver is often described by its number of channels: this signifies how many satellites it can monitor simultaneously [5].

The user segment uses GPS receivers shown below:



fig.1 GPS receivers

Location based Services can be classified in 2 categories they are following:

a) Public Safety / Emergency Services

The location of the client can be determined by the mobile carrier hence it finds great use during Emergency since it can be used during the emergency/health hazard to locate the mobile clients.

b) Consumer Services

Now days, smart phones like (Android, Blackberry and iPhone) provide a set of location based applications and services which helps the users to access the multiple services based on the user location.

- Maps Navigation-The users can use the Google Maps to get to the particular location or to trace the route between any two locations.
- Marketing /Advertising-Many corporate companies advertise their items based on the location of the clients. For Example –Sale in Shopping Mall near to your location.
- Location based Reminders-The phones can be used to set as the reminder based on the location [6].

Literature Review 1 :(Location Based Services using GPS On Mobile phone)

Ahemad Tutake, Abhijeet Tekawade, Ravindra Shinde, Mr. Sumit Hirve, Pranay Dhole are published paper on “Location Based Service using GPS on Mobile Phone” in International Journal of Innovative Research in Computer and Communication Engineering Vol-1, Issue -2.4. 2013.

This paper describes that the user’s exact position can be track and find geographical location of the user. Location can be calculated using coordinates of geographic longitude, latitude. Location Based Services aimed to provide location based information for the users.

LBS used to find friends/family members location when they are nearby and send user location to the client. And also send alert message to the user through mobile phone. This will help to increase security for the woman.

This system uses the mobile station to retrieve the information about location with the coordinate values from server [7].

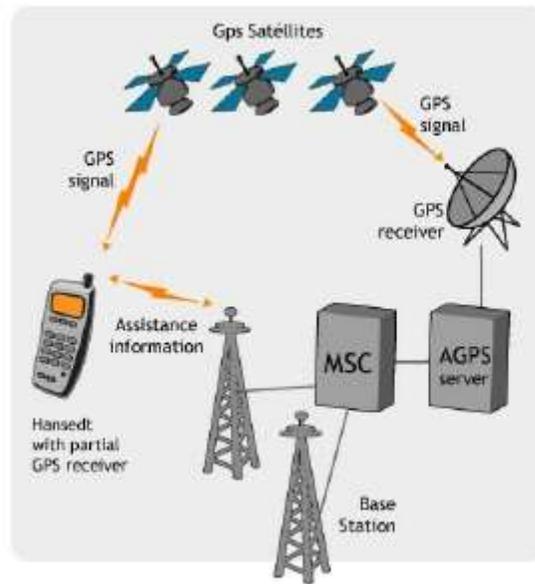


Fig.2 GPS working

Literature review 2(Mobile Tracking Application)

Purva Zalke, Radhika Kinage, Meenal Kulkarni, Jyotshna Kumari are published paper on “Mobile Tracking Application” in IJIRSET, Vol. 2, Issue 3.3.2013 Copyright to IJIRSET-617.

This paper describes about that the safety of child by using the mobile tracking application. This application involves only GPS enabled android mobile phones. Mobile tracking application stores the user’s information and geo graphical areas. The geo graphical areas are divided into 3 zones (safe, risky, high risky).

Based upon these zones only user can identify the child whether he/his is safe or not and send different alert message for each zone. Radius of each zone can be setting up by the admin.

This application uses the GPS tracker to find the location and Google map is used to view the location everywhere; user can zoom in/ zoom out the location on the map.

The application can send message automatically only to user who are registered. This application used to discover the mobile location and if the location is outside the secured side means it will send alert message for corresponding zone to number which is registered by user.

In this application the GPS receiver uses two data such as almanac and ephemeris data. Almanac data used to store information about each satellite whereas ephemeris data used to store information about single satellite. This application includes methodology following: [8]

- Step1. Install application.
- Step2. Login
- Step3. Enter phone number
- Step4. Specify radius for each of the three zones
- Step5. Select the Centre location on the map
- Step6. Set the zones
- Step7. The application checks for updates from the GPS at regular intervals
- Step8. If the current location is outside the fence1 then send alert message1 go to step7
- Step9. If the current location is outside the fence 2 then send alert message2 go to step7
- Step10. If the current location is outside the fence3 then send alert message3 go to step7.

Literature Review 3(Location Tracking Of Nearest ATM Center Using GPS)

GUGAPRIYA A , KAVIYARASI S, VAITHEKI J. are published paper on Locus Tracking of Nearest ATM Center using GPS in) INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND RESEARCH Volume No.1, Issue No.3, April-May 2013, 253–255.

This paper describes about tracking a nearest ATM center by using a Location Based Service on smart phones. Nowadays, the mobile devices are important one in the field of location based services. The mobile device is used in the field of banking service for fund transaction. M-banking service is more familiar in smart phones.

Location based service is used for real time information and to find the location. GPS is used to identify exact location of user and to navigate where u want to go for. In this paper author described that the GPS in mobile used for tracking ATM center. It can be done by integrate GPS receiver to the mobile.

GPS receiver calculates its location by measuring the distance of more satellites with the help of GIS. It shares the location information to the server. Using GPS chips user can identify any devices by integrate GPS chips to the devices. Example:-watch, car , etc..

In Location Based Service, GIS (Geographical Information Service) provides all functionalities of the LBS.

Google Maps are often used to view map location. Google Map is a part of GPS. GPS uses a MAP service for view map. It is often widely popular [9].

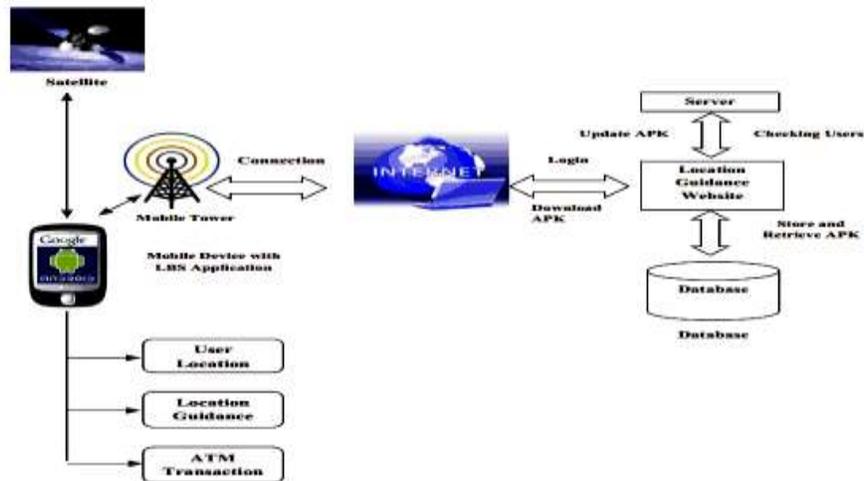


Fig.3 Tracking ATM center

The overview of GPS working on the Mobile (Android)

GPS-Global Positioning System

GPS is used to discover the exact spot of the portable device. Used to navigating from one place to another and discover time information of the user. It can be made up of three segments –

- 1) Space segment
- 2) Control segment
- 3) User segment

The space segment used to transmit one way signal that provides the GPS position and time information. And it consists of 24 satellites on the orbit.

The control segment used to upload or update the navigational & mapping data on satellite. The control segment switches the satellite. The user segment consists of the mobile device that has GPS receiver to retrieve information from the satellite. And provides the diffused information, guess the 3-D position.

GPS receiver calculates its location by measuring the distance of more satellites with the use of GIS. It shares the location statistics to the GPS server. Using GPS chips user can identify any devices by integrate GPS chips to the devices. GPS receiver uses two data such as almanac and ephemeris facts. Almanac facts used to store statistics about each satellite whereas ephemeris facts used to store information about single satellite.

Android:

Android is an operating system based on a interface of java with Linux environment. Android-SDK used to develop application of android. It is developed for assistant numerous applications. It supports wireless application such as GPS, BLUETOOTH. It rehearses the 2-D and 3-D graphics [9].

Mobile station:

Mobile station is accompanying with the satellites that could be used to retrieve the statistics about coordinates using GPS and base station is used to track the locus from server base station of location database. Mobile station is interconnecting with the base station.

Mobile Tracking:

The mobile tracking is used to track the mobile phone of friends/family or users who are locate nearby. Mobile tracking used to implements the client server system by track the mobile phone. This system used to discover the nearest location for instance hotel, ATM. This system also tracks the device when moving. To locate the device at least it releases the roaming signal.

It uses the GPS to track the exact locus and send alert message to the user about the locus. The user can provide the alert message to friends if they nearby user location. GPS can be identified present statistics of location and if user travels to new place it can be updated.

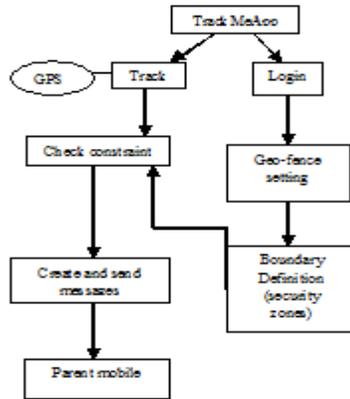


Fig.4 Block diagram of track me app

Mobile tracking application stocks the user’s data and geo graphical regions. The geo graphical regions are separated into 3 ranges. Based upon these ranges only user can identify the child whether he/his is safe or not and send different alert message for each regions. Radius of every regions can be set up by the admin. This application uses the GPS tracker to find the location and google map is used to view the location everywhere; user can zoom in/ zoom out the location on the map [7].

Google Map

Google Maps are often used to view map location. Google Map is a part of GPS. GPS uses a MAP service for vision chart.



Fig 4.1 The three zones are mentioned below diagram

Location processing

Location processing used to process the location information and send to the user with the alert message. Ex, sent alert message with location to the parent about location of child.

Location Tracing

Location tracing used to track the location of user using GPS receiver. GPS receiver equipment integrates within the mobile [11].

Use of GPS

- 1) Woman security
- 2) Locate friends/family
- 3) Find location of child
- 4) Analysis of bus tracking
- 5) Tracking the car within nearby location
- 6) Detect the lost mobile
- 7) Track staff location
- 8) Detect accident zone.

System architecture

The Locus Discovery and Tracing System consists of the following six modules:

- 1) Mobile client.
- 2) Web client.
- 3) Repository.
- 4) Data (Documents, Audio, Video) sharing center.
- 5) Message Alert system for detection of Position of Friends.
- 6) Map service.

Mobile client

The mobile device used to find location and send the pop up alert message to user.

Repository

The repository can be used to stockpile records about mobile phone user and map location.

Mapping service

The mapping service is used to produce mapping data for mobile client and also web client.

Web client:

The repository information can be maintained and viewed in this section. The user improves the statistics of position from the web client on user mobile phone.

Alert system:

The SMS alert system used to discover the locus of our friend and family member And update records to server. It directs spot modernize to the user when friends are within particular space.

Data sharing center:

Data sharing center used to sharing the data such as Audio, document, video, Image [10] etc...



Fig 5 map service

LBS used for Location Tracking Through mobile phone:

LBS Application

Core LBS Features (Location Tracking, GIS Provider and Location Collection Services) to provide a consistent interface to LBS applications.

The LBS features(Locus tracking , Locus collection services and GIS provider) access to provide interface to application of LBS.

Location Tracing

Location tracing used to track the location of user using GPS handset. GPS receiver kit incorporates within the mobile.

This has functionality, which is following:

1. It stores the user's present and past locations.
2. It can be notify the user when user moving to other place.
3. It can be describing that which user is locating in which geo location.

GIS Provider

The GIS provider helps to determine the map information and information about the geographical coordinates. It is important component in LBS.

Location Collection Service

It is used to collecting the information such as latitude, longitude for a user.

To implement the LBS android using the following classes

1. Location Manager
2. Geo-coding
3. Google-Map
4. Location Provider

Location Manager

This class aids to keep all other component which is important to implement the LBS.

Location provider

Location provider used to describe the physical location and provide the location information to the all users [11].

Detect Accident using GPS and GSM

GPS is used for detecting the accident with the support of GSM. GPS uses GPS handset to discover accident location by calculating its speed. Accident can be discovered by use of sensors. After discovering the location it is send to GSM and GSM refers the data to the control unit, it has the GSM number to send data to reserve number which can be aid to call ambulance service.

Vehicle must have installed the GPS headset on its own. Server detects the nearest ambulance service and provide short route for the ambulance and also direct to hospital. Ambulance must have the GPS chip.

After this the traffic signal discovers the ambulance and alert roads to free way. When the near to the traffic it will automatically mark the signal as green by RF module [12].

CONCLUSION

In this paper, use of GPS user can detect the exact position and navigate user to destination location. It is often used to detect the accident using GPS with GSM and sensor network. To track the friends/family members when they are locate nearby residence of the user. If they trace nearby place then location is outline to the user. LBS can be sending the position data to the user and also send alert message to the user.

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