Dynamic Object Tracking System using GPS

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Abstract - Navigation is the field of study that tends to focus on the location and movement of either an individual or a vehicle. It can also be said as any skill or study that involves the determination of position and direction. In real life people who are travelling can follow other people to a certain place. The follower may tend to lose the path which the guider is providing. In modern times with use of navigation systems we can locate ourselves in a map using our smart phones. But the navigation system can only support a static location and provide directions. The proposed system consists of a dynamic location set by a guider. The location is updated automatically by the system itself and application is proposed as a solution for the problem.
Index Terms – Android Device, GPS, Location Tracking

I. INTRODUCTION

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track trip distance, distance to destination, sunrise and sunset time and more.
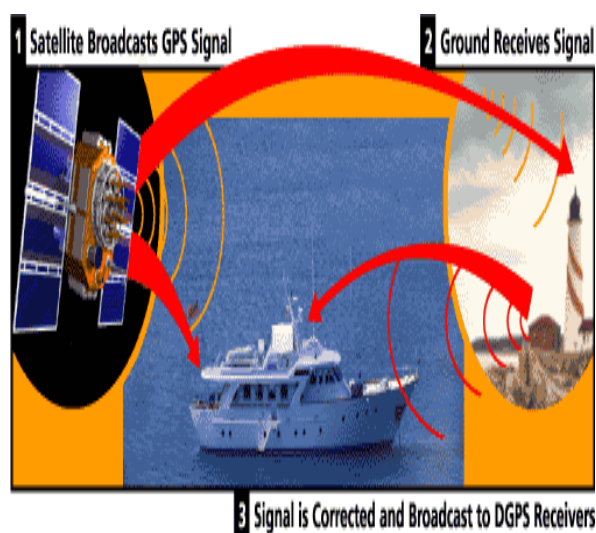

Figure 1: GPS System

Having the knowledge of location of individuals makes it convenient to track them down. Tacking down a persons location without their consent is illegal. However on users mutual agreement, a lot of benefits pops up using GPS. Friends can keep track of each other's locations. Follow friend's route to a location etc.. The project determines moving object as target usn GPS[4]. The targets are linked and the moving objects are tracked down on the map using the co-ordinates of their location. With both the locations marked on the map

one can easily determine the location of family members and friends. The easiest fastest route to a moving object can be determined using GPS trackers with the users involved

In previous model Google maps is the common base map application for all the third party applications that runs location based applications with Maps API. As of now the apps in the market work based on only one moving location and create directions to a static location which is already a location on the map.

But we planned to implement the system deals with dynamic target location in which both source and destination are moving objects. The co-ordinates of the moving targets are marked in sequential interval of time and stored in cloud as well as local database. Thelocations marked are retrieved and the shortest and other possible paths between the objects are guided to the user.

II. TECHNIQUES USED FOR OBJECT TRACKING

A. *Multilateration*

Multilateration(MLAT) is a navigation technique based on the measurement of the difference in distance to two stations at known locations that broadcast signals at known times. Unlike measurements of absolute distance or angle, measuring the difference in distance between two stations results in an infinite number of locations that satisfy the measurement. When these possible locations are plotted, they form a hyperboliccurve[3].

To locate the exact location along that curve, multilateration relies on multiple measurements: a second measurement taken to a different pair of stations will produce a second curve, which intersects with the first. When the two curves are compared, a small number of possible locations are revealed, producing a "fix"[1].

Using a single receiver listening to the signals (pulses, for example) from two synchronized transmitters, it is possible to measure the difference between the arrival times (time difference of arrival, or TDoA) of the two signals at the receiver. Then the principle is similar to trilateration, except that we no longer fi nd ourselves on a circle or a sphere, but on a hyperbola (2D) or a hyperboloid (3D). Here too, we need four transmitters to enable the receiver to calculate its positionaccurately.

Advantages

The advantage of multilateration is that the receiver doesn't need to know at what instant the signals were transmitted—hence the receiver doesn't need to be synchronized with the transmitters. The signals, and hence the electronics, can be kept simple

Disadvantages

An aircraft must be equipped by an operable transponder the transmitting signal must be correctly identified by many receiving stations. That is why there can be problems which are related to the search of suitable places for the receivers, especially when the route is served Communication lines are needed between the distant receivers/transmitters and the main center of data processing.

B. *GTS (GPS TrackingSystem)*

Open GTS not only supports the data collection and storage of GPS Tracking and Telemetry data from remote devices, but also includes the following rich set of features[1]

Web-based authentication: Each account can support multiple users, and each user has its own login password and controlled access to sections within their account.[3] GPS tracking device independent: Devices from different manufacturers can betracked simultaneously.

Figure 2: Open GTS

The GPS costs you very low in comparison other navigation systems. The most attractive feature of this system is its 100% coverage on the planet. It also helps you to search the nearby restaurants, hotels and gas stations and is very useful for a new place. Due to its low cost, it is very easy to integrate into other technologies like cell phone[2]. The system is updated regularly by the US government and hence is very advance. This is the best navigating system in water as in larger water bodies we are often misled due to lack of proper directions.

Disadvantages

Sometimes the GPS may fail due to certain reasons and in that case you need to carry a backup map and directions. If you are using GPS on a battery operated device, there may be a battery failure and you may need a external power supply which is not always possible. Sometimes the GPS signals are not accurate due to some obstacles to the signals such as buildings, trees and sometimes by extreme atmospheric conditions such as geomagneticstorms.

C.   Automotive NavigationSystem

An automotive navigation system is a satellite navigation system designed for use in automobiles. It typically uses a GPS navigation device to acquire position data to locate the user on a road in the unit's map database[3]. Using the road database, the unit can give directions to other locations along roads also in its database.[6] Dead reckoning using distance data from sensors attached to the drivetrain, a gyroscope and an accelerometer can be used for greater reliability, as GPS signal loss and/or multipath can occur due to urban canyons or tunnels.

Figure 3: Automotive Navigation System

Advantages
More secure and better cosmetic finish than a portable device, and lower cost compared to the installation of an original factory-supplied GPS.

Disadvantage
This system is good for the driver only not for the owner of the vehicle who is not near to / far away the vehicle, so the owner cannot keep a watch on the driver as well as the vehicle.

D.   Advance VehicleLocator
            The AVL (Advance Vehicle Locator) device which is placed in vehicle that accepts data from GPS satellites and stores it temporarily in the device. The device is installed with a SIM card which is useful for the purpose of communication with local network.
            Now, the data in the device is sent to the tracking server over GSM for further operation. This tracking server contains all data from AVL devices placed in the vehicles[4].
            Later on, as per the request of user the data from tracking server is displayed on user interface. That means, the user of the system interacts with the help of user interface provided. Also the registered user can interact with the system using cell phone, just by sending a text message. In this way, the overall system works thus generating reports and also generatingalerts.

Advantages
The help of multi tracking system we can track multiple vehicles using the AVL device. As system is having integration of GSM & GPS we can use in it various applications. It is having wide scope of applications such as live tracking or personal tracking. You can determine your location, whether you are travelling locally or in a foreign land

Disadvantages
An AVL system how it will be accepted by employees need to be answered to avoid the risk of delays and setbacks. An AVL systemscan be expensive.
There is the cost of purchasing the AVL system package and then training personnel to use it. Along with the costs of a system there is the chance that personnel will object to it. Some people have strong feelings on being "watched". Because of this a system like AVL is viewed as a threat or a tool that the agency will use to discharge unwanted employees.

III. CONCLUSION
            The Dynamic Object Tracking System makes convenient for group of peoples who travel.They can interact each other conveniently and stay together using this application. Users can keep track of one another and follow up to their friend's location easily. With the help of GPS this system will find the current location and the destination location and that will be highlighted in Google map for userreferences.

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