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Smart Way Tracking To Identify Individuals Location Using Android System with GPS

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Abstract — As the technology grows, every device becomes portable where mobile plays the vital role in it. It has several applications developed for the favor of user facility. Among that, we also have an application in which with the help of GPS it is possible to track the selected destination of user. The concept of using GPS satellite has spread its roots in the field of location management. We present a new approach of using GPS in order to spot an individual's location if they are missed in case of any organizational tour or outdoor visit through a smart location tracker application deployed in Android Operating System. It has several benefits where one can monitor the children's continuously without any manual effort.

Index terms – Mobile, GPS Satellite, Smart Location tracker application, Android Operating System.

I. INTRODUCTION

A Smart Location Tracker (SLT) is a software application that provides a smart way of spotting out and tracking an individual with very short interval of time. This application make use of GPS satellite to receive the latitude and longitude of the respective devices.

1.1 GPS SATELLITE

The Global Positioning System (GPS) is a space-based network of orbiting satellites that provides exact details of its location and time information back to earth in all weather conditions. It can be accessed from anywhere on the Earth other than unobstructed line of its sight. GPS was initially developed by the US government for the purpose of monitoring military navigation but now anyone with the GPS device can able to receive the radio signals that are broadcasted by the satellites. Later on in 10980's GPs were used in civilian applications. The GPS technology has also been brought to the mobile phones that helps in tracking one's location. The most important application for the GPS is satellite navigation in aircrafts, vehicles and ships. GPS tracking services are often referred to as location-based services. GPS provider and Network provider are most common location providers. GPS device will also update its location as soon as the user changes his/her position.

1.1.1 WORKING OF GPS SATELLITE

There are about 30 satellites orbiting the earth at an altitude of 20,000km. Wherever we are from the planet, atleast four satellites will be visible to us at any time. Each one will transmit its location and the current time at regular intervals of period. The signals that they transmit travels at the speed of light and they are intercepted by the GPS receiver which in turn calculates the distance of each satellite based on the time taken for the messages to arrive from satellite. With that information containing the distance of atleast three satellites, GPS receiver can able to pinpoint its current location using a process called Trilateration.

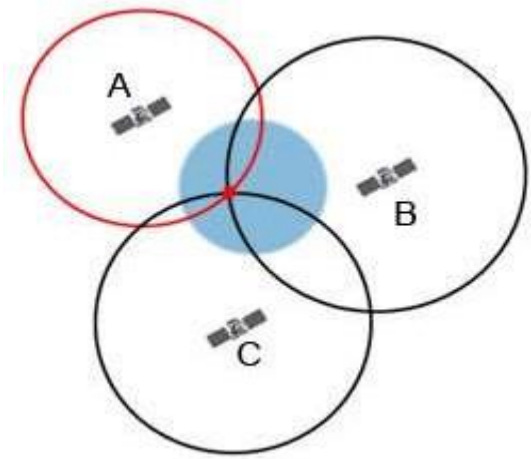

Fig. 1.1 Trilateration process

Consider that you are standing somewhere on the Earth having three satellites above you in the sky. If you know that how far away you are from the satellite A, then you might also know that you must be located somewhere on the red circle. On repeating the same process with all the other two satellites B and C, you can conclude your location based on the intersection point of all three satellites. This is what the GPs receiver does to track the current location. The more satellites above the horizon, the more accurately your GPS can determine where you are.(Fig 1.2)

Fig. 1.2 Satellites orbiting the Earth

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1.1.2 FEATURES OF GPS SATELLITE

The eight important features found in GPS are as follows:

- Designed for desired use
- Locates satellites rapidly
- Adequate screen size and resolution
- Has voice recognition software
- Access live traffic information
- Upgradable to new applications
- Compatible with preferred mobile phone
- Offers special features of value.

1.2 SMART DEVICES

Smart devices are devices that acts smart as their name indicates. These devices are usually connected with internet to act smartly embedding lots of features within it. The first smart device that made the world to turn around is the Android mobile phone. This device was initially having very limited applications with touch screen developed for the favour of user. Later on it acts as an IoT device by connecting them to the Internet and embedding most of the features in PC. The main features includes a high-resolution touch screen display, Web browsing capabilities, Wi-Fi connectivity, and the ability to accept sophisticated applications. Most of these devices can run on any of these popular mobile operating systems like android, iOS, BlackBerry, Symbian and Windows Mobile. The major benefit of this smart phone is its portability and so there were several applications developed on this portable device to fulfill the user requirements.

After the emergence of IoT, several smart devices had been developed which includes,

- Smart watches
- Smart speaker
- Smart Thermostat
- Smart switches
- Smart Home Hub, etc
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II. LITERATURE SURVEY

A. Vehicle Tracking System using GPS and Android

In today's world every individual uses mobile phones for their communication. Simultaneously, the Mobile Providers are also providing several varieties of services to the users. In order to expand this concept, GPS based vehicle tracking is proposed for an organization to help them finding out the addresses of their vehicles and their position on mobile devices. The organizations invest money in monitoring and tracking vehicles aiming to provide improved services that ensure the safety in cargos transports. The proposal gives the exact location of vehicle with distance and the real-time information about their vehicle during travel to the organizations.

The system includes an android mobile equipped with GPS and GSM along with the processor installed in vehicle. Vehicle on motion reports the server about its location update using GPRS service. This information is plotted using Google maps on monitoring device. Additionally, the paper provides the detailed information about GNSS like GLONASS and GALILEO.

B. Mobile Tracking Application for Locating Friends using LBS

In today's very fast moving life, services based on location becomes very much important in everyone's life. As the trends increase to the level of several advanced mobile phones, it is very important for the mobile user to have LBS (Location Based Service). LBS are the services that make use of user's location that consists of X and Y coordinates. In the proposed paper GPS acts as Network provider via geographical location for the mobile network. This application helps in anti-theft facility for the favour of women or other user's by providing his/her location to the nearest police station. It also helps the user to track their friends and receive an alert message when they are nearby.

C. A GPS-based Mobile Dynamic Service Locator System

The most wide means of communication have been provided by the mobile network providers. In order to expand this concept a proposal called GPS-based Mobile Service Locator System is developed to help the individuals finding addresses and locate their service of interest using mobile devices. The proposed system has the ability to determine the proximity distance between user and locations. It is very much flexible and extendable that helps in incorporating additional mobile service providers and new services. The main point of departure from the similar existing systems is that proposal is GPS-based rather the mobile-based service that provide more accurate calculation.

D. School Bus Environment Monitoring by Advance GSM and DGPS Technology

The idea deals with monitoring and tracking of the school bus by advanced GSM and GPS technology that is implemented on RTOS and embedded board. The proposal includes continuous monitoring of a school bus and other vehicles for the purpose of safety of travelers using advanced technologies. The vehicle tracking system at real time consist of an electronic device equipped inside the vehicle. This continuous monitoring happens with the help of internet or by a special software.

E. SMS Based Vehicle Tracking System using GPS and Android OS

Several mobile applications were developed and deployed on an Android mobile phone based on tracking GPS location and sending them to the corresponding remote location. The

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safety of vehicles are very essential for the public. Thus, vehicle tracking and locking system is been installed in the vehicle to track their place of location. The working of this system is the client who wants to know the location of vehicle can send a message to the vehicle and in turn they receive the current location of vehicle in the form of web link. The user on clicking the link gets directed to Google map to get the exact location of vehicle. As the mobile providers also provide number of services, on expanding this concept the proposal of GPS based vehicle tracking system is being developed for the sake of organization to help them in finding addresses of their organizational vehicles during travel. This system is not limited to any specified vehicles. It produces the continuous report about its location updation to the server using GPRS service.

F. Locating Friends and Family using Mobile Phones With Global Positioning System

On providing Location based services (LBS) a mobile application is proposed in this paper using Global Positioning System which acts as a location provider. The main objective is to design and implement the client server system helping the users to locate their family members and also to receive alerts when their friends are nearby to them. This application is developed using J2ME where both the recent API and older API's were combined together to make application reliable for all kinds of mobiles. MySQL database is used in this system. In order to prevent server overloading, server was implemented using PHP.

III. EXISTING SYSTEM

A. Routing for Navigation System

People around the world are in need of moving from place to place both for survival and other reasons. In that case most of the people will not be aware of the route for their destiny location. In order to provide favour for such situations Google map application was developed. This helps in providing the route to be navigated by the user on receiving their destiny.

B. Tracking Individuals using GPS device

An individual can be monitored by fixing a GPS device with him. This helps in continuous observation of that particular individual with his location by the user with the help of an application developed for this purpose. The user can view all the information about the movement of that individual.

C. Vehicle Tracking System

Organizations that provide vehicles on rent can monitor their vehicles by placing a GPS device in their vehicle. This helps the organizations to overcome the theft of vehicles that leads to the loss of company.

Fig. 3.1 Vehicle tracking

DRAWBACKS

But in all those applications, it is possible to track an individual only after he/she moves a far distance from the user. This issue is mainly identified in kidnap case or missing the route among crowd.

IV. PROPOSED SYSTEM

Our application is actually dedicated to the students who are moving out in case of any organizational tour or outdoor visit. In such cases, there will be a guide to monitor the students for their safety. It is not possible for the guide to continuously monitor all the students. In order to overcome this problem, a software application is proposed to monitor all the students without any manual effort.

WORKING OF THE PROPOSAL SYSTEM

Initially, the students are required to wear a smart watch which has the GPS device equipped with it. The Guide should have the software application developed in his/her smart mobile phone. Before moving to any outdoor visit, students are requested to register themselves to get their ID from the application with the guide. On reaching any site which is going to be visited, the guide can fix the corresponding boundary limit based on the area occupied by the site. Now, in case if any student moves across the boundary limit due to any reasons it will automatically be indicated to the guide through an alert message. This message gives the detailed information of the particular student with their distance and the clear route of their location.

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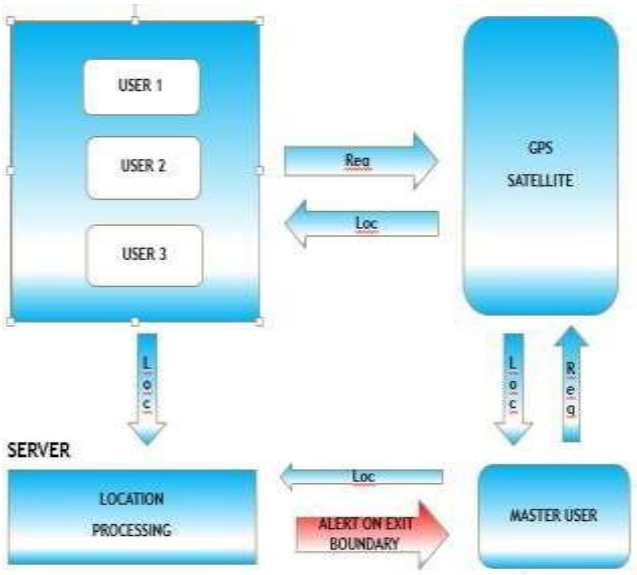

Fig. 4.1 Proposal Architecture

Here both the users and the master user (Guide) request the GPS satellite to get their location through the GPS tracker fitted in their smart devices. On receiving the locations, server starts processing the data i.e Latitude and Longitude for every limited period. On comparing the distance between the users and master and if any information about exceeding the boundary is observed, then the server put an alert message to the Guide along with the distance and clear route of the user exited boundary.

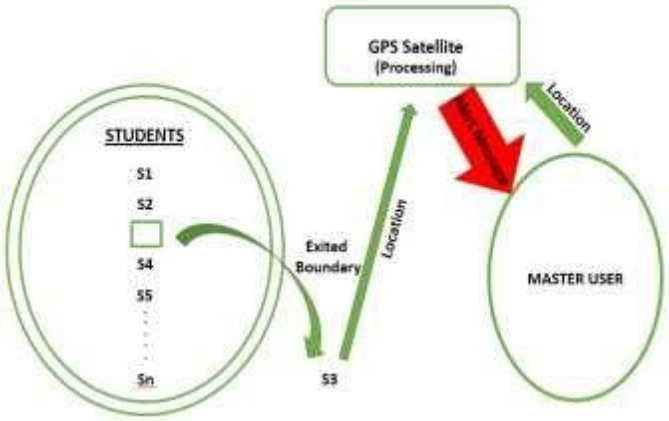

Fig. 4.2 Exiting Boundary

BENEFITS

- Reduces manual effort of continuous monitoring
- Useful for any kind of outdoor visit
  - Organizational tour
  - Crowded area (Missing of children in crowded temples)
- Projects the clear route of missed children with distance
- Instance update at critical situation

V. System Requirements

Hardware Requirements

- GPS enabled electronic device
- A computer with 8GB ram and a latest processor

Software Requirements

- Java
- Android Studio
- Device drivers

VI. Conclusion

The Smart Location Tracker application helps in identifying the location of individual (children/student) in order to prevent them from missing in crowd at any outdoor visit. As the smart watch is cost efficient it can be applied majorly in future. Thus with the help of this application developed, it is been expected that one of the user requirements have been solved.

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