A Survey on Various Location Tracking Systems

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Abstract – *Today we are using different Location Based Services like Google Maps, Live vehicle tracking & other applications. The tracking system is a main part of today's life. The location tracking system plays a crucial role in many fields like cab services, security systems, industrial purposes and many other fields. So in this paper we studied different location tracking system with their working, advantages. Also we did a comparative study of such tracking system.*

*Key Words***:** Google Map Services, GPS, GSM, RFID, GPRS.

1. INTRODUCTION

Tracking system is widely used in our day-to-day life. Tracking system helps us by many purposes like track nearby shops, tracking location of buses-trains or any other vehicle. Also this system is helpful for many security purposes. Facility of Real Time Location Tracking is a important of transportation system. We can also share locations among our friends or other people.

1.1 Technologies Related to Location Tracking System:

1. GLOBAL POSITIONING SYSTEMS (GPS)

The Global Positioning System (GPS) is an operational system comprising of earth orbiting satellite built routing system. It provides it users all around the world with 24 hours a day accurate positioning and time observable to the standard global time in the three dimensions. It comprises of three "segments" namely, the Control Segment, the Space Segment and the User Segment. Correct functioning of these three segments leads to the precise and consistent working of the whole system. The Control Segment is also known as the main control centre as it is involved in the transmission to the satellites. The Space Segment is composed of a collection of satellites that orbits about 20,000 km beyond the Earth. The User Segment is composed of the receivers that listen to the satellites at any given time. The User Segment involves the receiver that is currently functioning and its linked antenna. GPS does not work efficiently in indoor environment as GPS satellites possess weak signals which cannot cross the walls of buildings. Hence, GPS is not effective for indoor localization. Indoor localization requires high None Line of Sight (NLOS) and efficient positioning system.

2. Global System for Mobile communications (GSM)

GSM (Global System for Mobile communications) is a standard developed by the European Telecommunications Standards Institute (ETSI). GSM describe the protocols for second-generation digital cellular networks used by mobile devices. It was first deployed in Finland in December 1991. Till 2014, it has become the global standard for mobile communications. The 2G networks replaced the first generation(1G) analog cellular networks.

3. Radio-frequency identification (RFID)

RFID uses electromagnetic field to automatically identify and track tags attached to objects. The tags contain electronically-stored information. Passive tags collect energy from a nearby RFID reader's detector radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object.

4. General Packet Radio Service (GPRS)

GPRS is a packet oriented mobile data standard on the 2G and 3G cellular communication network's global system for mobile communications (GSM). GPRS was established by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. GPRS is typically sold according to the total volume of data transferred during the billing cycle, in contrast with circuit switched data, which is usually billed per minute of connection time, or sometimes by one-third minute increments. Usage above the GPRS bundled data cap may be charged per Mb of data, speed limited, or disallowed.

5. Google Maps

Google Maps is a web mapping service developed by Google. It offers satellite imagery, street maps, 360° panoramic views of streets (Street View), real-time traffic conditions (Google Traffic), and route planning for traveling by foot, car, bicycle and air (in beta), or public transportation. Google Maps began as a C++ desktop program at Where 2 Technologies. In October 2004, the company was acquired by Google, which converted it into a web application. After additional acquisitions of a geospatial data visualization company and a real time traffic analyzer, Google Maps was launched in February 2005. The service's front end utilizes JavaScript, XML, and Ajax. Google Maps offers an API that allows maps to be embedded on third-party websites, and offers a locator for urban businesses and other organizations in numerous countries around the world.

1.2 Need of Tracking System:

- Tracking location of person.
- Tracking and monitoring movement of moving objects.
- Tracking is useful for security purpose.

- Finding location co-ordinates.

2. Literature Survey

2.1 A real time GSM/GPS based tracking system based on GSM mobile phone:

In this paper, GPS based tracking system is used for tracking the location of the vehicle and speed of the vehicle using mobile phone text messaging system. This system provides the real time text alert for the speed and location of the vehicle. In this system first the present location locked and send via mobile text message to owner of the vehicle. If the vehicle moved from present location along with the location of the vehicle and if the speed of the vehicle exceeds system send alert text message.

Working Steps:

1. Add the number of owner of vehicle to the system having features to add one more number.
2. System provide GPS Lock/Unlock. System Lock/Unlock present GPS location of the vehicle and send mobile phone text message to owner of the vehicle.
3. The system also provide feature to Lock/Unlock speed of vehicle. If the vehicle speed exceeds than limits, system get alert message to owner of vehicle.
4. At any time this system provides current location of the vehicle.

2.2 Android based energy aware Real time location tracking system:

In this paper proposed system is android based energy aware real time location tracking (EWAREL) using GPS Sensor. Its hybrid positioning technique employs other inertial sensors and data sending mechanism for saving sufficient energy. This system introduced EWAREL a lifesaving application for real time monitoring of people who suffering from Alzheimer's. AWEARL used for giving direction, health monitoring and prevented from being lost.

Working Steps:

1. EWAREL based client server architecture. User having android application that perform real time background tracking and synchronization to server when internet connection is present.
2. Store the change in location when internet connection is absent and update the location when internet access is present.
3. Monitoring client also contain android application to track people.
4. Monitoring application alerts when the client does not send location information at predefined time to server and when unreachable.

5. If the client's device battery is nearby empty, monitoring application alerts the monitoring user about client last location and time.

2.3 Design and implementation of Real time tracking system based on Arduino Intel Galileo:

This paper introduces an efficient real time vehicle tracking and monitoring system based on GPS. The device inside the vehicle is collected using device like embedded board Arduino Intel Galileo and SIM908 module. The SIM908 module include GPS/GPRS GSM service.

Working Steps:

1. The system receive GPS co-ordinates of the vehicle as GPS signal and transmitted this signal data to Apache web server 2.5.9.
2. The system send this data to vehicle owner as SMS.
3. If the vehicle theft, the proposed system gives vehicle location information including longitude, attitude, altitude, data, satellites, speed OTG and course.
4. Using this information stolen vehicle can be track and find in minimum possible time.
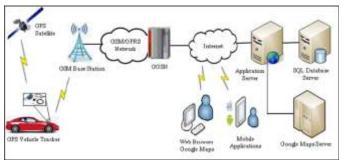

Fig. Vehicle tracking system architecture

2.4 Geographical location based RFID tracking system:

In this paper, proposed system is based on RFID system for location based service. This system introduced geographic location code which supports monitoring of RFID tags in real time. For identifying RFID tags this system allocates geographic location code for each region. This RFID tracking system collected using components: RFID node, relay node, access node, location server, RFID server, middleware.

Working Steps:

1. RFID node get location from near Reference node.
2. RFID node reads the near tags and sends the data which include tag's Id, location information to relay node. Then relay node send data to access node.
3. Access node send tag ID to RFID server and sends location information to the location server.
4. The user request the tag information to middleware on access node. Middleware ask to RFID server

about tag information and ask location server about tag's location information simultaneously.

5. Each server response to middleware on access node and middleware sends data user's application program.
6. The program display tag's location and information on map.
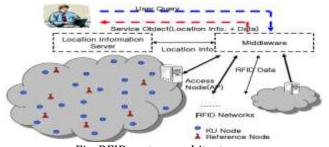7. Client's application program can show history of RFID tag mobility.

Fig. RFID system architecture

2.5 Implementation of vehicle tracking system using smartphone and SMS service:

In this paper the proposed system, tracking the real time bus location using GPS and mobile based services. The system contains two parts server side and client side. The server device provides exact location of bus to the server or user in case of SMS based query from client's device. The client device can find bus location either using SMS service or using SMS service. If client used smart phone he can used application to track bus location using internet service.

Working Steps:

1. The proposed system contain Android application which has two modules.
2. First module is server module which install into an Android phone which will be in the bus.
3. This module find out the GPS co-ordinates of bus using location service of the android phone i.e. GPS. This server module also includes a SMS gateway service.
4. Second module is client module which installed in client's android phone.
5. Client module has three sub-modules: Location Module, SMS alert, SMS tracker.
6. Location module: Using google map this module shows the partial location of bus with time.
7. SMS alert: It sends location information to the client as text message.
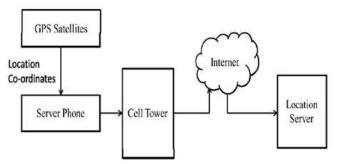8. SMS tracker: This module gives information of location without using internet access and Android device.

Fig. System Diagram of location Tracking

2.6 GPS based tracking system for transit object:

In this paper A mobile application addresses the safety threat to people during travel. Proposed model is smart mobility tracker and it tracks the user location using GPS and inform same to their preferred contact depending upon travelling distance. The desired contacts are cautioned with high priority alert when user is found to go desired route. A secondary GPS device locates the user during unprecedented situations.

Working Steps:

1. The user feeds start and end point of his journey to application based on which location marked route display.
2. When user start journey then location of user sent to SMT (smart mobile tracker) server with respect to distance between source and destination.
3. This information notify to the preferred contact selected by user.
4. Path travelled by user monitor by SMT server. If any changes in course, the server notify to preferred contact with alert message with high priority.
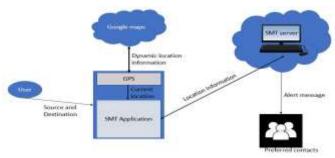

Fig. Architecture Diagram

2.7 GPS Locator: An application for location tracking and sharing using GPS for java enabled Handhelds:

This paper gives details in field of location based service for java enabled mobile device equipped with GPS receptor. This system presents a technique to send GPS co-ordinates to other mobile through short message service based on global positioning system. This system application enables the user

to get their current location co-ordinates and also can view their location on google maps. This application shares the user's location with their friends via web server through internet connectivity in their devices.

Working Steps:

1. The system built portable and run on any mobile phone that support J2ME.
2. The system can run on mobile that have built in GPS receiver.
3. User's current location shows in google map.
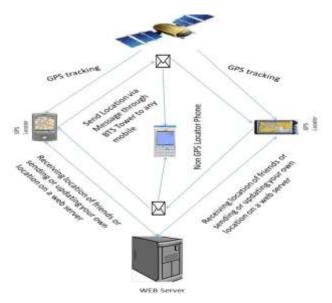4. User can share their location with friend and contacts.

Fig. GPS locator Requirements

2.8 Design and implementation of an accurate real time GSP tracking system:

This paper present and accurate and reliable real time tracking system using global positioning system and global system for mobile communication services. GPS tracking system contains portable tracked device attach to person, vehicle or any moving object and provides tracking center where portable device location monitored. The mobile tracked device receives its co-ordinate from GPS and send these co-ordinates as SMS via GSM modem to tracking center. The tracking center is personal computer with many interface programs to display location on google maps using free version of google map API's.
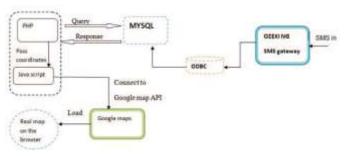

fig. The overall tracking centre data flow

2.9 Location based service in Android with Google Maps integration:

LBS uses technology like GPS, mobile network, wifi module to provide services like location tracking, navigating to particular location, etc. Android application provide services to implement location based application. Application like location API, direction API, Google map which helps in making location aware application under android platform.
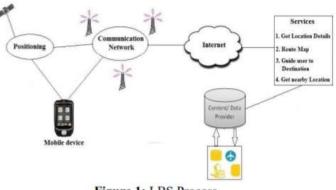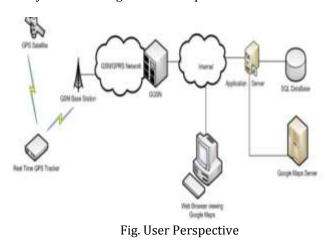

Figure 1: LBS Process

Working steps:

1. User send request for service server using LBS application on mobile device.
2. The service request of user and user's current location retrieve form GPS component and send to service server using communication network.
3. Service server analyse the geo-specific information as the request of user.
4. Requested information send back to mobile device via communication network.

2.10 Real time tracking system using Google Maps API V3

In this system the GPS chip gives the output of positioning information which is further transferred over GPRS link to mobile operator's GGSN and then to a remote server over a TCP connection. That server stores the incoming positional data. When user clicks on tracking page, user will give input using an HTML page with embedded JavaScript code. Then

JavaScript retrieve the positional information into Google Maps through Google Maps API V3 which displays the position on map. The positional Information is retrieved every second. The general concept is described below.

Fig. User Perspective

This system represents a significantly novel deployment scenario, considerably different from more traditional tracking systems.

3. Comparative Analysis:

From the above papers, all the locations tracking system based on wireless technology. Smartphones or Android devices plays vital role in this system. All the location tracking system based on GPS (Global positioning system) which gives accurate positioning and time. [1,6] track the location and Android application notify the location information with alert text message. [2,5,7,8,9] Android application to track location using internet connectivity. [3] Apache web server receives location information through GPS and send SMS to user. [4] RFID system to display location on user application program. [8] portable track device attached to person, vehicle or object and location of device is monitored. [10] Android application inventor and development kit which attached to android device for transfer data between device and external peripheral.

4. CONCLUSION:

Various kind of techniques have been adopted for location tracking system have been survey. Different author gives many techniques with flow diagram flow charts and their explanation with successful execution with the system advantages and disadvantage. All the Proposed designed and implementation is done in surveyed

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