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A SURVEY ON REAL TIME GLOBAL POSITIONING SYSTEM FOR TRACKING AND APPLICATIONS IN DIGITAL INDIA AND MAKE IN INDIA

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ABSTRACT

Our world is getting better using cutting edge maps and location technologies". Maps and location technology have been part of our past, present and future, from ancient history of cartography maps for explorers and adventurers to being used today for automation and Robotics. A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology GPS is a widely used tool for navigation & position tracking. It is free of charge. It is also useful in finding user's position in time. It is employed in finding location and the corresponding changes on the earth surface with grater` precision. There are numerous applications of GPS covering almost every domain.

Keywords: *GPS etc.*

I. INTRODUCTION

The safety of private and public vehicles is a major concern nowadays so having GPS vehicle tracking system ensure their safety while travelling. This vehicle tracking system can be found in consumers vehicles as a theft prevention and retrieval device. Police can follow the signal emitted by the tracking system to locate a stolen vehicle. Generally this system is meant to be installed for the four wheelers but for country like India where majority of the people using two wheelers, here is the cheapest source of an anti-theft tracking system. Vehicle tracking systems are commonly used by fleet operators for fleet management functions such as routing, dispatch, on-board information and security. Other applications include monitoring driving behavior, such as an employer of an employee, or a parent with a teen driver. Vehicle tracking systems are also popular in consumer vehicles as a theft prevention and retrieval device. Police can simply follow the signal emitted by the tracking system and locate the stolen vehicle.

GPS technology has fully transformed the transportation industry. They are mobile app developers that can hand you GPS tracking solutions that include business-effectual tools required by your business and customer needs[1][2][3].

II.   REALTED WORK

Need of GPS
GPS tracking systems are used to track anyone and anything these days. Technology has rapidly advanced in the past few years and it has become very easy for the average person to use a tracking system.

Technology used in tracking

Geofence
Currently, mostly the existent tracking systems use techniques of virtual fence known as Geofence which compares the entity position with a predetermined zone or a point of interest, checking if the entity is inside or outside an area. Those techniques do not allow full coverage of the course, making difficult to determine if a truck or another delivery vehicle is travelling in a planned path .

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GSM technology

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. GSM (Global system for mobile) uses a process called circuit switching. This method of communication allows a path to be established between two devices. Once the two devices are connected, a constant stream of digital data is relayed. GSM networks consist of thee major systems the Switching System (SS), The Base Station(BSS) and the Mobile station(MS)[2][3].
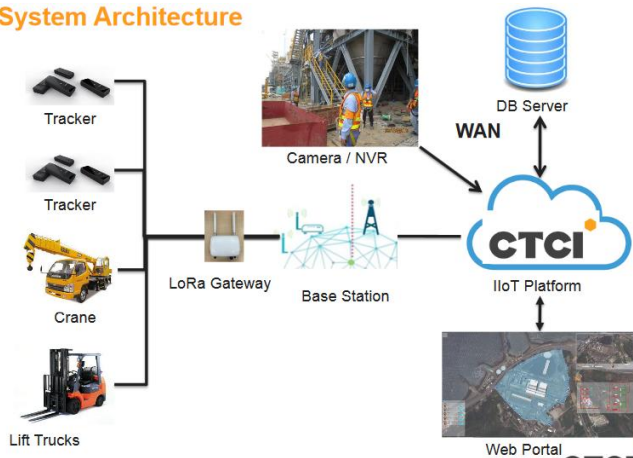
GPS technology

Global Positioning System tracking is a method of working out exactly where something is. A GPS tracking system, for example, may be placed in a vehicle, on a cell phone, or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person. So, for example, a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck, and by parents to check on the location of their child, or even to monitor high-valued assets in transit[2][3][5].

GPS architecture
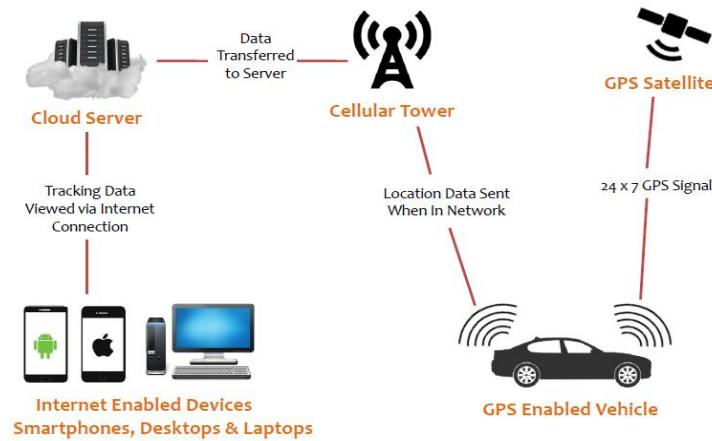
Fig 1 GPS Tracking System

Fig 2 System Architecture

GPS working

Fig 1 and 2 Architecture shows working of GPS system GPS contains single android mobile that is equipped with GPS and GSM modems along with processor that is installed in vehicle. During vehicle motion its

location update can be continuously reported to a server using GPRS service. This location information will be plotted using Google maps on monitoring device.

The GPS satellite gives the exact position of the device which is situated in the Car. This device is in turn which is connected to the local GSM service provider via a GSM network as it has SIM card present in it thus the GPS parameters which the device has are send to the tracking server which has a Static IP address via a GPRS network. The tracking server consists of a Socket listener application running in the back-ground which listens at a particular port. The GPS parameters received by the port listener are given to the Parser and converter for proper conversions and this data is stored in the database. These values from the database are fetched and are manipulated to get the reports in proper format. [1]

Algorithm analysis for GPS

Vehicle tracking system
The algorithm used for GPS location latching is based on 3 time lock GPS status. So it has three for
Loops present.
The algorithm is:
Check No. of Satellites Visible = n
If (N>3) then get the lat and long
It checks this condition 3 times for getting confirms lock. So the time complexity of this algorithm is
$O(n^3)$.
The space complexity of this project depends on the data client wants to store in database. More the duration of data more is the space complexity

Features
- Web based tracking i.e. view from any computer from any where
- Current position with speed of vehicle on computer/ mobile (Real Time Tracking)
- Different maps available for better geographical coverage
- Immobilization of vehicle any time from any place through SMS
- Reports regarding journey start, journey end, over speed, idle condition etc.
- View and print reports of vehicle on detailed Maps for last 3 months
- SMS / email alerts for journey start, journey end, over speed, idle condition etc.
- Route Mapping and geo-fencing to control movement of the vehicle
- Multiple shaped geo-fences for better control
- Find the nearest vehicle available to any point
- Mark your own places on the map
- Keep records for fuel filling, service, maintenance, insurance etc.
- Keep data of drivers and attach with vehicles for better reporting.

III.   METHODOLOGY

To find the location of the vehicle, the owner needs to send a message to the vehicle tracking system. When the user request is sent to the number at the modem, the system sends a return reply automatically to that mobile which indicate the position of the vehicle with latitude and longitude.

The software can produce all the reports in quick time.

The methodology consists of modeling of device and below it is explained in steps.
Step 1:
Fix the transmitter of vehicle tracking system in the vehicle. Start the device using the push pull button for on-off device.

Step 2:
On the other end connect the receiver to a computer using a RS232 cable and start the receiver using the push pull button for on-off device along with the computer.

Step 3:
A GSM modem in the transmitter sends the position of the vehicle from a remote place to the requesting mobile. The owner will get a message in form of latitude and longitude.

Step 4:
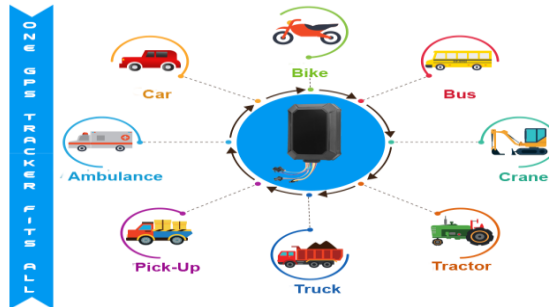The information is also transferred to the computer for output using cable RS232.
 DEVICES USED IN GPS

Fig 2 GPS Devices

Fig 2 Shows various GPS Tracking devices used for vehicle tracking, personal tracking, asset tracking.

Application Of GPS

Fig 3 Application of GPS

- Transport Company
- Fuel Tankers
- Corporate
- Bus & Taxi Operators
- Tour & Travel Companies
- Fleet Owners
- Construction Company
- School Transport

Potential Intelligent Applications

Urban Planning: GIS technology is used to analyze the urban growth and its direction of expansion, and to find suitable sites for further urban development. In order to identify the sites suitable for the urban growth, certain factors have to consider which is: land should have proper accessibility, land should be more or less flat, land should be vacant or having low usage value presently and it should have good supply of water.

Transportation Planning: GIS can be used in managing transportation and logistical problems. If transport department is planning for a new railway or a road route then this can be performed by adding environmental and topographical data into the GIS platform. This will easily output the best route for the transportation based on the criteria like flattest route, least damage to habitats and least disturbance from local people. GIS can also help in monitoring rail systems and road conditions

IV.   CONCLUSION

GPS has made the business more efficient than ever and will keep on doing it as the technology improves over the period. GPS is very important tool for navigation and tracking purpose. Its popularity has increased drastically and covered almost all the domains. This paper explains about GPS and its components. It also discusses about Accuracy and Precision which is the two major factors affecting the performance of GPS. Lastly the applications of GPS are explained in a detailed manner.

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