

Tracking of Object with GPS, GSM, RFID

Tanuja Saini¹, Mandeep Shandu²

¹M. Tech. Student, Dept. of Electronics & Communication Engg., Rayat Bhara University, Chandigarh, India

²Assistant Professor, Dept. of Electronics & Communication Engg., Rayat Bhara University, Chandigarh, India

Abstract: Now a days is the era of internet and thing related to the internet. Internet help the to track each person, friends ,files, objects, vehicles etc. by using satellites through GPS.THIS GPS technology enhancement enables the use of GPS device not only as navigation and orientation instruments, is used to capture the travel routes .Global positioning system is globally used for tracking and navigation purpose. GPS mainly used by military, civil, farming, transportation and commercial user around the globe. In this paper describe how the GPS tracking system work at different algorithms such as kalman filters algorithms, localization algorithms, linear and nonlinear image processing filters used different methodologies like GPS, GPRS, GSM, RFID.

Keywords: GPS, GSM, RFID, GPRS

1. Introduction

Today location awareness and navigation become the most important requirements of world. GPS provide personal and location based services [11]. First GPS project was launched by U.S Department of defence in 1973 for used by the United States military and fully operated in 1995 and that run with 24 satellites. Online privacy is the very important.



Fig. 1. Google map for GPS [11]

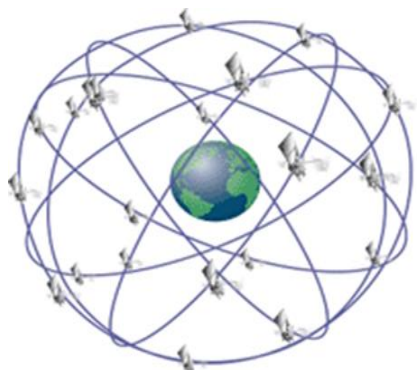


Fig. 2. IN GPS 24 Satellite around the earth [5]

GPS Is global navigation satellite system (GNSS).GNSS is a system for location or position determination that is called geo-positioning .special receiver is used, a geo position in space and time can be calculated based on the reception of satellite signals [8].

The Global positioning system is satellite based technology and has been used since forty five years[6] .now a days, smart phone also provide the facility of navigation and tracking the objects and our own cell phone if it was stolen or drop any where.so that's why size is reduce in GPS receivers and integration of GPS with mobile phone. In section 2 literature survey is presented.



Fig. 3. Object Tracking system using GPS/GSM [5]

2. Related work

A. Literature review



Fig. 4. Block diagram of GNSS based monitoring system

In GPS and GSM based models are used for tracking and routing mobile vehicles in large area outdoor the environment. In this the GPS Units is used that continuously moved with car

and will calculate the coordinates of each position and communicate to GSM device which is installed in both transmitter and receiver.

Position will be calculated by device and display on Google Earth, and so the current position can be known [12]. The best and main advantage of this system is that we can easily identify the theft vehicle and also improve the routing and tracking in transportation, its main disadvantage is when the movement occurs at any time, will get the location, so data may not come by the GPS unit.

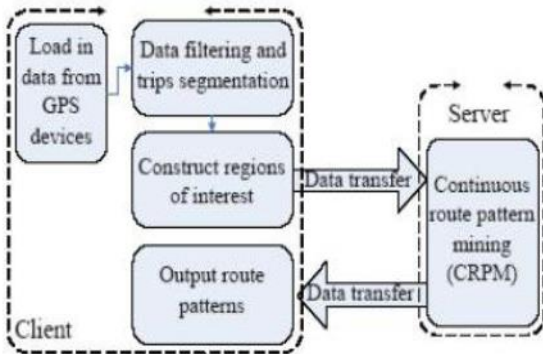


Fig. 5. Some traffic management measure use sophisticated system [6]

GPS based low cost tracking and monitoring system proposed and that transmitted and retrieve location and object status and send it to other stationary module, receiver module collects the information by SMS and process it to a compatible format to Google Earth, view status online.

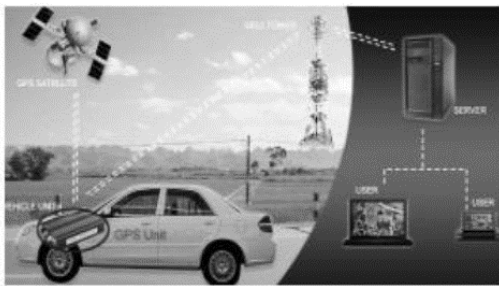


Fig. 6. AVL tracking [9]

This algorithm gives GPS positioning error in smartphone when user is nearby high rise building [13].

Conclusion is that to solve the traffic problem in the cities following concept can be used:

1. GPS traffic management is considered as priority traffic management.
2. Any one nation intending to adopt the model must put in place a policy and law prompting all vehicles owners to fit their with GPS trackers.

The experiment results in the GPS interfering spot. GPS navigator gives the real information i.e. tracked path, on other hand adjusted the location information through proposal algorithm can track the movement path accurately.

The proposed algorithm has better performance than the GPS location information in GPS interfering spots and maintain

reasonable performance in open space where the GPS receive accurate results [11]. GPS and GSM combinable used and system CMOS-8 bit microcontroller is used based on RISC architecture, 16:2LCD is used to display the location value.

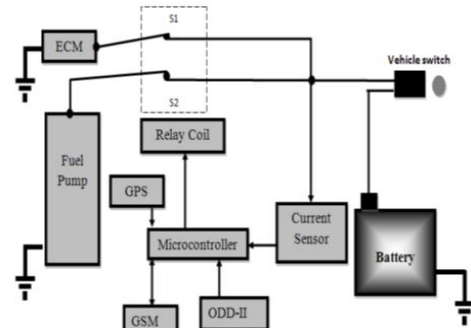


Fig. 7. Structure of anti-theft system [2]

There has some limitations with GPS device and two way communication process is achieved by using GSM modem. This provides the better output while using with SIM CARD of your smart phone. This system has not a limited to find location of the target which calculates the distance between two stations [14]. Main advantage of this model is friendly, easily installed, easily accessible and can be used various purpose. System is located by the use of Web application (HTML BASED) in Google map. This can track the object anytime and anywhere in weather conditions.

GPS satellite sends the GPS data to the device store the temporal stores data in the case of car used the AVL(Advance Vehicle Locator).SIM card is used so, easily identify the objects. SIM card used in communication with local network thus device GPS and GSM [13].

It is automatic navigation system GPSylon and GTS.In this paper GPS tracking system consists of different components and algorithms are used for car, bus, person tracking with the GPS satellite [9].

Problem is required high level data storage for data base. We can use data any time when we want the report for live tracking for preparing Keyhole Mark-up Language used in geographical data display in the browser like Google Maps in laptops or mobiles.

3. Methods and algorithms

A. Methods

1) Object tracking using GPS

Any object is tracking through GPS satellite and unit. Satellite is used to receive and transmit the data from GPS unit used in client side and connected to the satellite, longitude and latitude displays which received from the satellite and attached to the external hardware for more functionality of tracking like sending all details of objects, sending SMS to authenticated person [1].

2) Object tracking using GPS and GSM

GPS and GSM is used for tracking then it has combination

Table 1
Method comparison

Method name	Method component	Advantages	Disadvantages	Reference
GPS	Satellite, GPS unit, Micro controller (data processing in standalone application)	1. Navigation and Localization is easy 2. Area is based on search. 3. Availability is World Wide. 4. Determine the weather information.	1. Signal is deflect by Obstacles. 2. Signal multipath, fading diffraction is occurring. 3. Fast decrease batter life of any hardware.	[8]
GPS and GSM	Satellite, GPS Unit, Server, GSM unit, microcontroller	1. Repeaters are used. 2. Stable network. 3. No roaming issue. 4. Switch over the networks.	1. System is highly complex. 2. Interface is occurring in nature transmission. 3. Maximum fixed cell coverage area.	[12]
RFID	RFID Transceiver, GSM Unit, Satellite, Antenna, transponder, GPS unit, RFID tag	1. Size and weight small. 2. RFID tag easily installed. 3. Human interaction is not required. 4. Easily perform the data updation. 5. Line of sight clearance is not required.	1.8 frequency band available. 2. Have not any standard. 3. Difficult for RFID reader to read data from the RFID tags which is in the liquid and metal.	[2]

Table 2
Study and comparison between existing system

Existing system	Platform/technology	methodology	Comment
Bus transportation system using wireless network sensor	PC based system. WSN are used to monitor the system.	Location analysis, sending information to server	Complex system
Children tracking system	GPS ,mobile ad hoc network, system is pc based	Children tracking and analysis system	System is easily upgrade
Public transport management system	Microcontroller and pc based	GPS tracker, message sending alert	Complex system
Intelligent monitoring and management system	RFID,GSM,GPS,PC based system	GPS based data based alerting system	User friendly
On board public information system using GPS and GSM	GPS/GSM,RFID,PC based system	GPS tracking, message alter and control using maps	User friendly
GPS-GSM tracking system with Google map based monitoring	GPS, GSM, Microcontroller based	GPS tracking and SMS altering system using Google Map	Also user friendly
GNSS based bus monitoring and SMS sending to passengers	Pc based system	RFID based altering and tracking system	Easily upgrade

of GPS and GSM networking. With GPS network data will be received by GPS Unit it will transmitted to server via GSM network. After processing the data, it is transferred to another application is used AVL (Automatic Vehicle Location) and GIS (Geographical Information System) [3].

3) Object tracking using RFID

RFID is used for tracking is combination of GPS and GSM network. Whatever the data will be received by GPS unit is transmitted the data to server via GSM and after processing the data, is transferred through RFID receivers and that communicate with other RFID receiver to send it in result of RFID on GSM network [7].

4. Paper analysis

After studied the various authors paper it is observed that there are large number of methods are used for vehicle altering monitoring and altering system is used for tracking different vehicles [11].

Cars and bikes system needed knows the real time location

of the owner for providing there safety and avoided the theft of system and give alter to the owner by sending SMS. Bus uses the real time tracking system, monitor the bus passenger know the arrival time send the information to base station. Public transportation tracked and monitors the bus for arrival time prediction of bus to respective stop [8].

In bus transportation system, WSM improve the transportation system performance but problem is short range transmission of information [8]. Zigbee has short range of transmission [17]. In child tracking system has limited function size of students is big and limited use. Public transportation system is complex and costly [7]. The process of system is unreliable with slow speed and zigbee has short range of data transmission. The system algorithm is complex and improves the performance. Tracking is based on Google map.

The algorithms and tracking system is used to improve the system performance and problem of existing the system [2]. These algorithms can be improve and reduce by kalman algorithms etc. Processor improves the processing speed by

using GPS, GSM, RFID system because they are user friendly more upgraded systems [2].

5. Algorithms

During literature review studies the basic algorithm for the Object Tracking on the Global Positioning System; this entire algorithm is described as below:

A. Localization improvement algorithm

This localization improvement algorithm in GPS interfering spots by integrating information of multiple sensors such as gyroscope and compass in smart phones [2]. The proposed algorithm is implemented in a smart phone [12]. There are 3 steps to implement this algorithm:

1) Structure of Algorithm

The proposed algorithm consists of three steps:

1. Finding the correct direction of movement.
2. Obtaining the distance moved, and
3. Integrating the prior results and GPS location information.

To obtain the direction of movement, get the heading from the built-in compass in the smart phone. However, the compass is highly dependent on the ambient magnetic field so it has lower accuracy. To obtain more accurate values of the user's heading, we stabilize the heading value of the compass by recurrence processing of the data. After obtaining the direction of the movement of the user, the distance moved is calculated by the summation of the distances of each coordinate from the GPS location information [13].

2) Recurrence processing function of compass heading

$$x_0 = a_0$$

$$x_1 = (x_0 + a_1)/2$$

$$x_n = (x_{n-1} + a_n)/(n + 1)$$

x_i : accumulated heading value a_i : a new compass value
 The measurements of the compass in Smartphone are highly dependent on the ambient magnetic field so its accuracy is low. For this reason, here stabilize the measurements of the compass by averaging. $x_0 = a_0$ $x_1 = (x_0 + d_1 + a_1)/2$ $x_n = (x_{n-1} + d_n + a_n)/(n + 1)$ x_i : accumulated heading value a_i : a new compass value d_i : difference of heading

The heading value of the compass can be stabilized. But the real heading of a user varies continuously as the user moves. To adjust this value, here apply the difference between the previous heading and current heading and process it recursively [2].

B. Kalman filter algorithms

Kalman filtering, also known as linear quadratic estimation (LQE). Kalman filter is implemented to reduce GPS errors and thus it increases the accuracy of the localization system. The algorithm works in two-step process.

1. In the prediction step, the Kalman filter produces estimates of the current state variables, along with their uncertainties.
2. Once the outcome of the next measurement (necessarily corrupted with some amount of error,

including random noise) is observed, these estimates are updated using a weighted average, with more weight being given to estimates with higher certainty.

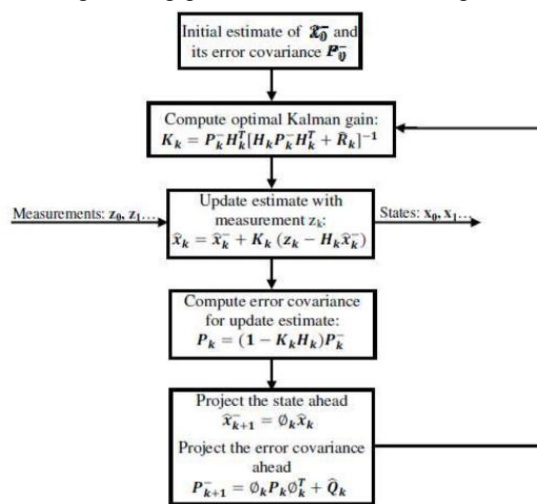


Fig. 8. Kalman filter procedure for estimating of GPS receiver coordinates [15]

The algorithm's recursive nature, it can run in real time using only the present input measurements and the previously calculated state and its uncertainty matrix; no additional past information is required.

6. Conclusion

In this paper we reviewed that various technics are used to improve the performance of tracking, monitoring, and altering of the object. There are many algorithms are used by the different authors to improve the tracking system and send alter SMS message on the mobile phone. Still there is a scope to better optimize the different methodology and algorithms are used to make the system more user friendly and large area applications.

For future we can improve the tracking with high alter system by using different algorithms and GSM, GPS, RFID system are combinable used. the system is focuses on accurate arrival time prediction and real time position of the object. The system is installed in an objects. So we conclude that we want to solve the accuracy and real time arrival and position time by finding accuracy and actual location of the object.

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