VEHICLE SPEED CONTROL SYSTEM USING GSM/GPRS

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ABSTRACT: The proposed work is an attempt to control the speed of the vehicle designed with computer software to enable the third party or owner to get the location, speed and activity of the driver. To achieve this, the system can transmit the information in real time. The use of GSM/GPRS technologies allows the system to track the objects and provide the up-to-date information. This information is authorized to specific users over the internet as the server gets the information. It is the tele-mointoring system to transmit data to the remote user. Thus the applications are used in real time traffic surveillance. This paper proposes a prototype model for location tracking using Geographical Positioning System (GPS) and Global System for Mobile Communication (GSM) technology. The development is based on the windows phone 8 application by means it can provide flexibility and portability for the user to get the information from anywhere. As these GPS technologies having greater range of frequencies, the user can get the information as quicker as possible. This system is very useful to speed control at specific traffic roads.

Keywords: GSM, GPS, GSM, GNSS, Windows phone OS, GPRS.

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1) INTRODUCTION

Proposed design is cost-effective, reliable and has the function of accurate speed tracking and controlling. It is completely integrated system so that it can be implemented in all vehicles, then it is easy to track and control vehicles at any time. The accidents can be avoided if we control the speed of the vehicle. The use of GSM and GPS technologies[1]allows the system to track object and provides up-to-date information about ongoing trips. If a password like SMS is sent by the owner, it automatically stops the vehicle or we can use it for different other work, it can provide real time control. This system finds its application in real time traffic surveillance. It could be used as a valuable tool for real time traveler. The current system can be able to provide monitoring process from anywhere. The purpose of this system is to design and integrate a new system which is integrated with[8] GPS- GSM to provide following feature: a) Location information, b) Real time tracking using SMS, c) track bus driver activity d) Communication is instantaneous therefore we can receive running report quickly.

2) TECHNOLOGIES

a) GPRS

General Packet Radio Service is a packet-switching technology that enables data transfers through cellular networks. It is used for mobile internet[9], MMS and other data communications. In theory the speed limit of GPRS is 115 kbps, but in most networks it is around 35 kbps. It provides high data transfer rates (especially useful for internet connectivity) through protocols like TCP/IP, X.25 and CLNP (connectionless network protocol). We have obtained velocities ranging from18 to 50Kbps in the downlink and approximately 9 to 13Kbps in the uplink.

The data rates vary widely due to the factors such as network congestion, terminal (cell phone) and distance to the base station or user velocity (if the user is moving). The connection is established by reference to its access point name(APN). The APN defines the services such as wireless application protocol(WAP) access, short message service (SMS), multimedia messaging service (MMS), and for Internet communication services such as email and World Wide Web access. GPRS connection for a wireless modem, a user must specify an APN[15], optionally a user name and password, and very rarely an IP address, all provided by the network operator. The GPRS system is an integrated part of the GSM network switching subsystem.

b) GPS

GPS is group of satellites which receives signals from the GPS transmitter and sends data to the receiver. This enables you to know the exact location, speed, events like open/close of door, fuel level of the vehicle where it has GPS tracking unit. The component GPS tracking device [transmitter] which is fitted inside the vehicle where it can't be easily detected by vehicle thief and hence can't be deactivated easily. The transmitter sends signals continuously to the monitoring station. The GPS server [10]which takes care of the data/signal reception, store it securely and provide the data when asked. Finally GPS interface or the control system which triggers sends the speed limit data to the speedometer when the user sends the data from the mobile. Two types of GPS are:

- **PASSIVE GPS**

It has the receiver that simply "listen" to the satellite signals and record [save] those signals as digital form .When you want to see where the vehicle[6] has been driven, you connect GPS tracker to your PC. They can be carried from one vehicle to another, as they are battery powered and no wires connected to the vehicle. Reporter captures a GPS signal once every second (i.e) 60times each minutes.

- **ACTIVE GPS**

It also has the receivers that works as same as passive GPS. The active units include an internal cellular device that actually makes a phone[7] call every few minutes. The phone call transfers satellite readings and information are

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saved inside GPS tracker to an internet site where you can login and track the vehicle to reduce the speed in real time.

c) GSM

A GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band. It operates at either the 900 MHz or 1,800 MHz frequency band. We can monitor and check the speeds[11] thus preventing accidents. Thus if we have GSM enabled devices in the cars the devices automatically communicate with each other when they come in the range of up to 900 MHz band only 100 meters of each other. The range is dependent on the power class of the product. Power transmission rates vary in many Bluetooth devices depending upon the power saving features available in a particular unit, bandwidth requirements, transmission distance. The statistics of road accidents is tremendous and there is a need for such a system.

d) GNSS

The term Global Navigation Satellite System (GNSS) is a set constellation of satellites providing signals from space transmitting positioning and timing data. By definition, a GNSS provides global coverage. GNSS receivers [11] determine location by using the timing and positioning data encoded in the signals from space. The performance of a satellite navigation system is assessed according to four criteria: Accuracy refers to the difference between the measured and the real position, speed or time of the receiver. Integrity refers to a system's capacity to provide confidence thresholds as well as alarms in the event that anomalies occur in the positioning data. Continuity refers to a navigation system's ability to function without interruption. Availability refers to the percentage of time during which the signal fulfils the accuracy, integrity and continuity criteria.

3) RECEIVING GPS SIGNALS

The GPS satellite transmission pattern sends at least four signals to all locations on earth at all times. But the signals can't pass through the solid objects. When turn on GPS[14] it need to receive signals from atleast3 satellites to calculate your location. Most GPS gives a warning if they don't receives strong enough signals. You may need an external antenna to operate a GPS inside the vehicle.

- **PINPOINTING YOUR LOCATION**

GPS illustrates your location in location longitude, latitude, altitude. The indicated co-ordinates to a map to pinpoint your location. The more accurately you can identify your location. GPS may Include a clock that uses the satellite signals [13] to specify time in your location.GPS devices can display current speed based on how much distance you are covering in a given time period. Using GPS a device is able.

- **PRINCIPLE OF OPERATION**

GPS is a satellite based navigation system. It uses a digital signal at about 1.5Ghz from each satellite to send data to receiver. The receiver can then deduce its exact range from the satellite, as well as the geographic position (GP) of the satellite. The GP[16] is the location on the Earth directly below the satellite. This establishes a line of position (LOP) on the earth.
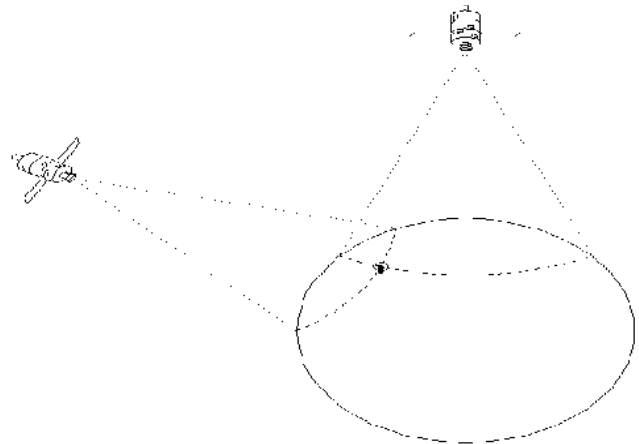
4) WINDOWS PHONE OS

Windows phone is a proprietary operating system developed by Microsoft. Windows phone OS has inbuilt GPS settings. Microsoft licenses the software to the third party hardware which runs on to ensure the best user experience. User collects the GPS[6] coordinates using internal or external GPS modules. Windows phone OS supports .Net framework, web services, databases, SQL Server. It supports languages C# or VB. By using GPS user[2] can get the data through the server. It gets the data through the server. It gets the digitized signals from the satellite. User can control the vehicle speed from anywhere else. The technology of locating is based on measuring power levels and antenna. It can be triangulation information from the towers receiving the signals.

i) WINDOWS PHONEAPPLICATIONS

Windows phone location service is a set of classes that provide the information about the vehicle current location and the speed to an application. The user gets the geo co-ordinates of the vehicle,[3] thus can calculate the speed of the vehicle. The application can get the co-ordinates as such latitude, longitude, speed of the vehicle by adding the dll as System.Device.Location.GeoCoordinateWatcher. Adding namespaces Using System.Devices.Location.GeoCoordinateWatcher; and Using System.GPSCoordinate.Resources; Geocoordinate watcher class[4] has two events a) position changed occurs when location service detects change in position b) status changed occurs when location service starts from initial to ready.

```
private void GetCoordinate()

{

var watcher = new
GeoCoordinateWatcher(GeoPositionAccuracy.High)

{

MovementThreshold = 1

};
```

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```
watcher.PositionChanged +=

this.watcher_PositionChanged;

watcher.StatusChanged += this.watcher_StatusChanged;

watcher.Start();

}

private       void       watcher_StatusChanged(object
sender,GeoPositionStatusChangedEventArgs e)

{

switch (e.Status)

{

case GeoPositionStatus.Disabled:

// location is unsupported on this device
break;

case GeoPositionStatus.NoData:

// data unavailable

break;

}

}

private  void  watcher_PositionChanged(object  sender,
GeoPositionChangedEventArgs<GeoCoordinate> e)

{

var pos = e.Position.Location;

LatitudeVal.Text = pos.Latitude.ToString("0.000");

LongitudeVal.Text = pos.Longitude.ToString("0.000");

SpeedVal.Text = pos.Longitude.Speed.ToString("0.000");

}
```
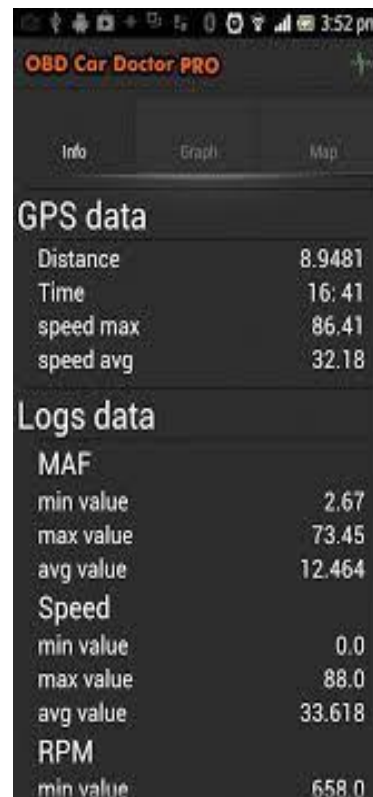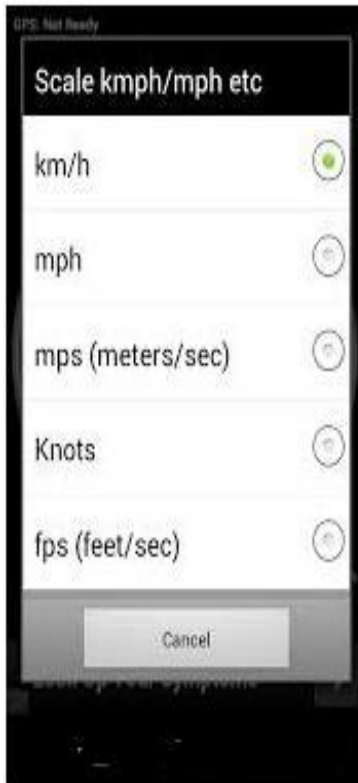
5) SPEEDOMETER

The speedometer is to indicate the speed of your car in miles per hour, kilometers per hour or both. Even in late-model cars, it's an analog device that uses a needle to point to a specific speed, which the driver reads as a number printed on a dial.

Speedometer is fixed in each vehicle, used to calculate the speed of the vehicle. It measure speed from point A to point B. It works by measuring [5] rotation of car's drive shaft, axle or wheel. Satellite navigation units calculate your car speed by measuring actual distance travelled overtime using GPS Satellite tracking. They repeatedly locate your exact position and speed on earth via satellite and calculate how far you have travelled then divide by time, it gives the distance travelled. Accuracy [3] is determined by satellite signal quality. This system will use data from car to integrate with GPS signals to improve overall accuracy. Speed is measurement of distance overtime. Applying the formula above gives

$$v = \frac{s}{t} \approx$$

It can change over the distance, according to the activity of the driver (i.e) Δ (delta) symbols indicates changes over time. Its an instantaneous speed determined over very small interval of time.

$$v = \lim_{\Delta t \to 0} \frac{\Delta s}{\Delta t} = \frac{ds}{dt}$$

(i.e.) the derivative of distance w.r.t time. The speed of the vehicle [9] is stored in GPS vehicle tracker each time and is send to the user's mobile. The user can control the speed by 10,15,20,25 from the mobile itself. The data can be send from the mobile, it digitizes the signal through the satellites, the speedometer automatically reduces the speed, not alert the driver to reduce. It automatically reduces the speedometer speed.

6) SYSTEM ARCHITECTURE
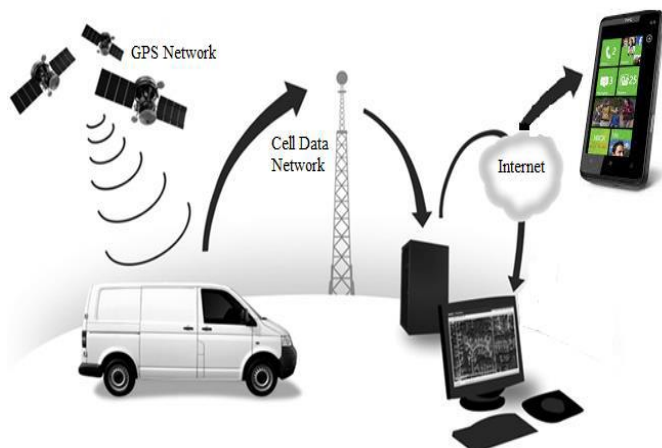
An electronic device (i.e) vehicle tracker is installed on the vehicle. The tracking device works by utilizing the GPS, used in the satellite navigation system. This links via a mobile data connection using computer software that you can use to track location, speed on your mobile or computer. The GPS system[3] is the tracker relays a signals to a satellite which then passes the signal to your tracking software. The satellite will calculate the distance travelled from the information passed from the transmitter before sending information to the receiver. Twenty GPS satellite covering the whole of the planet in which vehicle can be tracked. From the details location, speed, activity, fuel rate etc in mobile. User again sends back speed reduction limit(i.e) 10,20,30,40 etc to speedometer[16] through GPS satellite, back through same processes. It will control the accidents.

7) NETWORK STRUCTURE
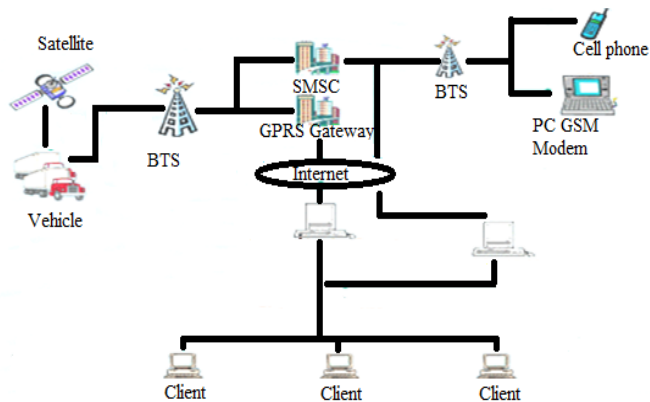
The network behind the GSM seen by the customer is large and complicated in order to provide all of the services which are required. It is divided into a number of sections and these are each covered in separate articles. Base station substation of a GSM network contains the Base Transceiver Station(BTS), Base Station Controller(BSC) and SMSC(Short Message Service Centre) and GPRS gateway. BTS acts as the interface between MS(mobile station) and the network by providing radio coverage functions from their antenna. The channel concept is used

in communication between BTS and MS. SMSC is a network element[11] in the mobile telephone network. It stores, forwards, converts and delivers SMS messages to the mobile. Main duty is to route SMS messages and regulate the process. GPRS gateway is the foundation for the mobile operators that offers high speed data services. The BTS gets the signals from the satellites, and then the SMSC passes the signals as data to the MS. BTS makes an interface between SMSC and MS(Cell phone). GPRS gateway is an interface between the internet and BTS network. The mobile sends the data as signals through BTS to the satellite. The satellite passes the signals[10] to the GPS vehicle tracker. The speed can be controlled through the signals passed from the MS to the satellite.

8) RESULTS AND DISCUSSIONS

We have proposed a new way of looking at analysis of GPS speed control system. Modeling of GPS speed control system should be done in a language which is easy and more intuitive to work. This demonstration will provide more efficiency and reliability. It will control the accidents. It will help in finding the stolen vehicle and in chasing process of police officials. In future, we will develop the system that will be useful for the traffic control at specific locations. The applications can be developer with all possible techniques to be useful to the human society.

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