Cloud Computing Based Vehicle Tracking Information Systems

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Abstract
The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems have brought this technology to the day-to-day life of the common man. Today GPS fitted cars; ambulances, fleets and police vehicles are common sights on the roads of developed countries. All the existing technology can support only tracking the vehicle place and status. No such tracking system implemented using centralized web service and cloud computing. The proposed technology based on GPS technology, GSM and cloud computing infrastructure. The vehicles are fitted with specialized embedded device, GPS device and GSM enabled device. The embedded device fitted with "sensors".
The sensors involve:

i. To identify the fuel level/status.
ii. Alcohol sensor – status of the driver.
iii. To indentify current name of the location.
iv. To find distance covered.
v. To predict arrival time.

This all stimulus data are transferred to cloud server through GSM enabled device. The GPS device used to track the vehicle locations. All the data's are stored in centralized server which is maintained in cloud. Each licenced vehicle owner can access the cloud using web portal. From the web portal the user can retrieve all the real time data. Proposed system may allow for the stability, equilibrium, efficient resource use, and sustainability of a tracking system.

Keywords
GPS, GSM, sensors, cloud infrastructures, web portal.

I. Introduction

Vehicle tracking systems have brought GPS technology to the day-to-day life of the common man. Today GPS fitted cars; ambulances, fleets and police vehicles are common sights on the roads of developed countries. Known by many names such as Automatic Vehicle Locating System (AVLS), Vehicle Tracking and Information System (VTIS), Mobile Asset Management System (MAMS), these systems offer an effective tool for improving the operational efficiency and utilization of vehicles. GPS is used in vehicles for both tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. The all existing technology can provide only tracking the vehicle and also navigations. The proposed technology is integration of GPS systems, GSM, sensors. All mentioned systems are integrated together and transfer the data to server which is maintained in cloud infrastructures. The GPS technology integration is standard for vehicle tracking the main advantage of proposed technology is sensors based monitoring the vehicle activity. The GSM enabled device used to transferred the data to server.

The sensors are involved to monitor the vital parameter of the vehicles and drivers. Fuel monitor sensor is used to monitor the fuel level. That is, where, when and how much fuel was filled into the tank, and also shown remaining content of the fuel in the tank. Terminal of vehicle tracking system receives data about changes of fuel level in the tank from fuel level sensor. User of vehicle tracking system knows about the unauthorized fuel draining almost immediately. All the fuel related data are transferred to cloud server. The authorized user can invoke the data and verify if any manipulation is happened or not. The authorized use can invoke the data for regular interval. If the fuel level is very low the sensor automatically produces the warning signal to driver as well as owner.

Driving security of major concern in highways and the number of accidents and fatalities that occur every year there is a urgent need for a active denial system. Rather than opting for a system that will react to the inebriated status of a particular driver, we are designing a system that will be actively denying control of a moving vehicle. We achieve this using a breath alcohol sensor that will sense the fumes that form a part of the breath in a person who is under the influence of alcohol. If the device detects any up normal with driver if the driver is drunk and drive the speed of the car will be reduced and after some time car will be stopped. The all details are forward to cloud server through GSM enabled device. The authorized user can access the data real time as well as later.

The authorized user can retrieve the information about current locations of the vehicle using web portal. The GPS and cloud server data can access through web portal only. The vehicle speed sensor (VSS) used to invoke the current vehicle speed and transferred the data to cloud server. The user can retrieve the details about the destinations. that is, how far from the current locations and calculates the predicted arrival time using speed of the vehicle. This information's are access through web portal. Each vehicle registered with server with identifications number.

The work is organized as follows. Section 2 elaborates on the motivation and existing system. Section 3 introduces the related works. Section 4 presents the proposed system. Section 5 shows the result. Section 6 shows the conclusions.

II. Existing System

Fig. shows the existing system[4] of the GPS based tracking systems. All the vehicle equipped with only GPS antenna which is used to transfer the locations signal to GPS satellite. The GPS satellite receives the signal and transmitting to corresponding access point and server. The access points are connected with GSM modem which is used to interface desktop to GPS data. The following drawbacks are addressed in existing systems:

i. No specific device for speed monitoring from remote place.
ii. No specific sensor for fuel level monitoring and controlling.
iii. The prediction of the arrival time has not been addressed.

The existing systems are not using cloud computing infrastructure and web portal for retrieving the data. The transmitting the data from GPS satellite received by specific access point and directly stored in server. So utilization of server space is high. In existing technology user can access only location details.

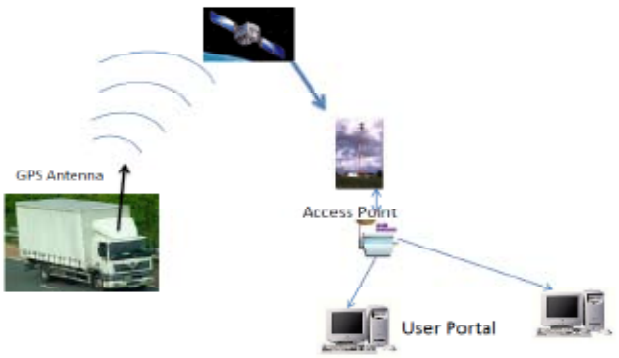

Fig. 1: Existing System

III. Related Works

Few related works that equipped with same solutions are presented:

The work [1] based on both SMS and GPRS technology to locating the vehicle. The proposed work will collect positions of the vehicle via GPS receiver and then sends the data of positions to specialized server by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The specialized server is composed of a development kit that supports GSM techniques-WMP100 of the Wavecom company. After processing data, the position of the mobile vehicle will be displayed on Google Map.

The work [2] mainly consists of three steps including vehicle region extraction, vehicle tracking, and classification. The background subtraction method is firstly utilized to extract the foreground regions from the highway scene. Some geometric properties are applied to remove the false regions and shadow removal algorithm is used for obtaining more accurate segmentation results. After vehicle detection, a graph-based vehicle tracking method is used for building the correspondence between vehicles detected.

The work [3] Vehicle tracking system is one of such applications possible by embedding wireless sensor devices on the vehicles. The most of the state-of the-art technology uses GPS (global positioning system) for tracking vehicles which is very expensive. The focus of this work is vehicle tracking system is to track the desired vehicle with low-cost, effective implementation as in contrast to the existing high-cost tracking systems. we present architecture for vehicle tracking system using wireless sensor technology. The work defined the packet structure for communication between the nodes.

Based on the above work we intent to find none of the solution satisfy our works. So we utilize this opportunity and propose a new technology using GPS, GSM, web portal and cloud computing.

IV. Proposed System

The proposed system automatically gathered information using sensors and transmitting through GSM enabled device and GPS used to locate the current location of the vehicle. The transmitting data are stored in server which is maintained in cloud infrastructure. The client web portal used to access the server data. The authorized user can access the data. The data are stored according to the vehicle identification number. Initially the vehicle registration is carried out. Each vehicle owner have registered with own user name and password for accessing the web portal. The administrator maintained the key list of the vehicle owner information and total number of vehicle. The administrator only can add and delete the vehicle identification number from server. So it's avoid the manipulation of accessing others vehicle data.

The proposed technology based on "sensors". The sensors are involved to monitor the vital parameter of the vehicles and drivers. Fuel monitor control gives user of vehicle tracking system to monitor where, when and how much fuel was filled into the tank; it avoids the manipulation of fuel and, consequently, reduces the operating costs of transport. All the information related to fuel, fuel tank capacity, when driver filled the fuel, remaining fuel in the tank are extracted using sensors and transfer to cloud server through GSM enabled device. The GSM enabled device are direct communication with access points which is nearer to vehicles. The data are automatically updated in server.

The alcohol breath sensor used to identify whether the driver is drunk or not. In case the sensor detects the alcohol, the device automatically produce the warning signal to driver and also data are transferred to cloud server. The proposed system will be heavily denying control of a moving vehicle. And also, If the device detects any up normal with driver, speed of the vehicle will be reduced and after some time car will be stopped. The all details are forward to cloud server through GSM enabled device. The authorized user can access the data real time as well as later. While a breath alcohol test can be administered a number of ways, breathalyser tests are the most common form of breath Alcohol testing and have the following characteristics:

The Alcohol Sensor is a small (approx 8cm long) handheld device which shows breath alcohol level in one of three levels, displayed on an LED display and produce warning signal. The 3 detection points are below 0.02%BAC, between 0.02%BAC and 0.05%BAC, and above 0.05%BAC (Blood Alcohol Content).

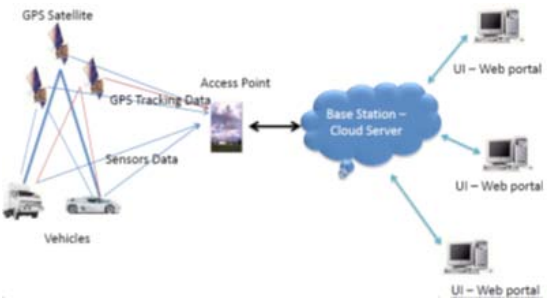

Fig. 2: Proposed System birds view

The Fig. depicts the proposed system birds view. All the vehicles are equipped with GPS antenna and GSM enabled device. The GSM enabled device connected with sensors for monitoring vital parameters. The GPS antenna communicates with GPS satellite for transferring the location details. The GPS satellite transmits the signal to specific access point. The base stations servers are maintained in cloud infrastructures. The sensors are fitted with vehicle. All the sensors are interconnected together and connected with GSM enabled device. The GSM enabled device directly transfers the data to server using GSM network and access point. GSM enabled device using a robust set of techniques or protocols designed to provide fast, efficient, reliable transfer and delivery of signalling information across the GSM network and to support both switched voice and non-voice applications.

The server is maintained in Cloud infrastructure. Cloud computing is Internet-based computing, whereby shared

resources, software, and information are provided to computers and other devices on demand. The authorized user can access the cloud information via web portal. Each user have own username and password. So the manipulation of accessing others data very less and the security is very high. The user can retrieve the information real time as well as off line also. The cloud server is using Best Fit Algorithm for storing the data. The Best Fit Algorithm significantly reduces the storing space and also reduces the CO_2 emission. The proposed architecture effectively utilizes the memory space.

A. Interface Design

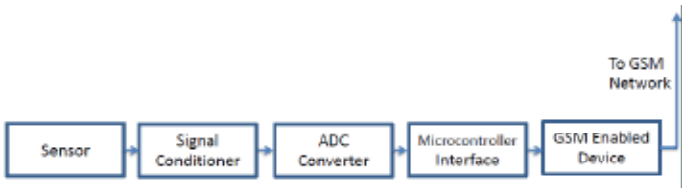

Fig.3: sensor interface design

The Fig. depicts the proposed interface architecture of sensor. The magnetic sensors are involved to monitor the vital parameter of vehicle and driver details and transmitting to signal conditioner. A signal conditioner is a device that converts one type of electronic signal into another type of signal. Its primary use is to convert a signal that may be difficult to read by conventional instrumentation into a more easily read format. The ATMEL 89c51 is used to invoke the GSM device to transmit the data.

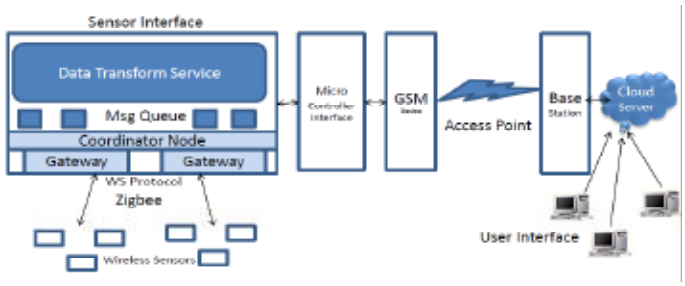

Fig. 4: Proposed Architecture interface design

Fig. shown the proposed architecture interface design is deployed with simple components connected with cloud computing. The wireless sensor network is used to monitor the parameters. The Zigbee protocol is used to transfer the data from sensors. We use commercially available gateway IN WSN 9791 for integrating sensors. The coordinator node is used to collect all the data from sensors through gateway and maintains queue list. The queue list despatch the data according to the priority. The proposed technology uses priority scheduling algorithm for dispatching the data from queue.

The functionality of the components described below:

Sensors are used to collect the vital parameter of the vehicle. Sensors are used to extracting the information from fuel tank, driver conditions, speed of the vehicle and predicted arrival time. There is a specialized sensor fitted with both receiver and transmitter for transmitting the data. The data's are transmitted using zigbee IEEE 802.15.4[4].

Coordinator node is used to integrate all the sensors and collect the patient's data. The coordinator maintains the queue for storing the data. The queue uses priority scheduling algorithm for dispatching the data to centralized server.

Centralized server is responsible for collecting all the data from sensors. The sensors interface connects the sensor module and centralized server. ARM9 processor is used for developing the interface device.

The GSM enabled device used to transmitting the data to base station through GSM network. The data are stored in cloud server. GSM enabled device used for Peer to peer communication between two devices for exchanging register data and also Send / receive config.d SMS messages.

Cloud computing is becoming a buzzword. It refers to a computing system in which tasks are assigned through a combination of connections, service and software over a network. Cloud provides the logical and physical infrastructure to store the data. Only the authorized person can access the data from cloud environments. One of the advantages of cloud computing is that both small and medium sized business can instantly obtain the benefits of the enormous infrastructure without having to implement and administer it directly. This also permits accessibility to multiple data centre anywhere on the globe. It also means that as the need for resources increases, companies can add additional service as and when needed from the cloud computing vendor without having to pay for additional hardware. The Best Fit Algorithm is used to manage the memory space very efficiently. Best Fit Algorithm automatically stored the data according to the receiving data. The user machines are installed with web browser and also connected with internet. The authorized users enter the username and password in web portal. The web browser retrieves the particular user database. The web browser is responsible for display the information about the vehicle.

V. Result

We tested and implemented the Alcohol detection in the vehicles. The result was shown in Fig..The system was tested with led's and a steeper motor. When the alcohol was detected the Led's will glow and the speed control was shown with the help of stepper motor.

Fig. 5: Experimental Result

VI. Conclusion

In this paper, we propose new tracking information system using both GSM and GPS have been discussed. The proposed tracking system based on cloud computing infrastructure The sensors are used to monitor the fuel level, driver conditions, and speed of the vehicle. All the data transferred to cloud server using GSM enabled device. All the vehicles equipped with GPS antenna to locate the place. To avoid the drunk and drive, the alcohol sensor are installed to monitor the driver status. The proposed technology significantly avoids the accident in highways.

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