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Cloud based tracking system for smart cities transport systems

Arockia Jaya J[1], Mahalakshmi K[2]

[1] *Associate Professor, Computer Science and Engineering, 1Idhaya Engineering College for Women, Kallakurichi, Tamil Nadu*
[2] *Professor, Computer Science and Engineering, Kalaignarkarunanidhi Institute of Technology, Coimbatore, Tamil Nadu*
Corresponding Author Orcid ID : 0000-0003-2241-2551

ABSTRACT
The advancement of satellite communication technology has made it simple to locate vehicles. The common man now uses this technology in his daily life thanks to vehicle tracking systems. These days, GPS-equipped fleets, police cars and ambulances are common sights on the roads of developed nations. The location and status of the vehicle can only be tracked using the available technology. The use of cloud computing and centralised web services has not produced such a tracking system. The proposed technology is based on cloud computing infrastructure, GSM, and GPS technology. Specialised embedded devices, GPS, and GSM-capable devices are all installed in the vehicles. A GSM-capable device is used to send this stimulus data to the cloud server. The GPS system used to track the locations of the vehicles A centralised server that is kept in the cloud houses all of the data. Each owner of a registered vehicle can use a web portal to access the cloud. The user can access all the real-time data from the web portal. The suggested system might enable a tracking system to be stable, balanced, resource-efficient and usable.
Keywords: GPS, GSM, sensors, cloud infrastructures, web portal

1. Introduction

The main objective of this project is to reduce road accidents caused by drunken drivers. Most of the accidents occurred daily is of drunken drivers caused by their own beverages. Drinking alcohol causes not only illness to health but also may lead to road accidents to death. Drunken driving has been recognized as a worldwide menace, based on the statistics which reveal that road accidents cause 1.2 million deaths and 50 million injuries around the world each year. In India, drunken driving is customary in commercial vehicle drivers. It affects the unknown people in the accidents who have not drunk. These include driving at very high speeds over the optimum speed limit as desired, presence of alcohol and drugs in the blood stream of the driver, fatigue and sleeplessness, distracted driving through use of cell phones, visibility issues, road and vehicle related factors. The impact of crash severity is influenced by presence or absence of certain protective mechanisms such as use of airbags, use of safety devices like helmets in the case of motorcycles, seat belts in case of four-wheelers and use of child-restraints for infants. 50% of these accidents are said to be due to drunken driving. Car owners who attend dinners / parties tend to get drunk, indulge in rash driving and are unable to control the vehicle and meet with accidents. About 60% to 65% of accidents are being caused by drunk drivers of cars and two wheelers during night and early hours in the morning. There is not a single stretch of highway in India where no accident takes place during 24 hours. The basis for this technique is the measurement of Blood Alcohol Concentration (BAC). Blood Alcohol content is usually expressed as a percentage defined by amount of alcohol present in the blood.

It is very essential to develop a system which actively monitors the drunk state of the driver and decides, whether the ignition of the vehicle should be turned ON or OFF. We have designed a low-

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power alcohol detection system which detects the presence of alcohol in the breath of the driver. The response time of the system is as low as 5 seconds. The system prevents the car from being started by holding a lock on the ignition switch. Sensors are to be mounted on the steering wheel and analysis is carried out periodically. A perspiration analyzer is mounted on the steering wheel along with a heating element which is incorporated to induce perspiration of the palms. The most obvious and glaring disadvantage of the above design is that the driver can switch off his/her mobile phone before driving the vehicle. The effectiveness of the system becomes null if the mobile phone is switched off.

The above defect has been overcome in our project by using centralized web service for making user to view live updating about the vehicle status. The modules involved in this project are Alcohol sensing with ignition ON/OFF, indicating Fuel level, tracking the location name where the vehicle is, predicting the arrival time. Now we have implemented the module of Alcohol sensing with ignition control. In spite of the above module an additional gas sensing system is made for sensing any gas leakage inside the vehicle it also leads to ignition control of the vehicle.

2. Existing System

Abid khan et all [1] proposed work is an attempt to design a tracking unit that uses the global positioning system to determine the precise location of an object, person or other asset to which it is attached and using GSM modem this information can be transmit to remote user. It can provide tele-monitoring system for inter-cities transportation vehicles such as taxis and buses. This system contains single-board embedded system that is equipped with GPS and GSM modems along with ARM processor that is installed in the vehicle. During object motion, its location can be reported by SMS message. A software package is developed to read, process, analyze and store the incoming SMS messages. The use of GSM and GPS technologies allows the system to track object and provides the most 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 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. It is completely integrated so that once it is implemented in all vehicles, then it is easy to track vehicles any time.

Disadvantages:

- GPS cost is high.
- No online updation.
- No fuel level updation.
- Development cost is high.

Ashish Shrivastava et all [2] proposed work is an attempt to design a tracking unit that uses the global positioning system (GPS) to determine the precise location of a vehicle to which it is attached and using Global System for Mobile Communication (GSM) modem this information is transmitted to a user. A software package is developed to read, process, analyze and store the incoming messages. A password is sent by the owner and it automatically stops the vehicle. The purpose of this system is to design a system which is integrated with GPS-GSM to provide following features: a) Location information, b) Real time tracking using SMS, c) Track bus driver activity, d) Communication is instantaneous therefore a running report is quickly received. It is completely integrated so that once it is implemented in a vehicle, it is easy to track the vehicle at any point of time.

Disadvantages:

- Poor Visibility of GPS satellites.
- No online updation.

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- Not possible to find fuel level through GPS satellites.
- Not also to find driver activity.

Kamal Jain1 et all [3] proposed Intelligent Vehicle tracking systems (IVTS) are used for the purpose of tracking and navigation of vehicles. The paper describes the implementation of Global positioning systems (GPS) in IVTS systems. Further a critical GPS based low cost IVTS architecture has been described. The first part of the paper describes the need and the basic architecture of a general GPS based IVTS system. The three IVTS units (i.e. In-Vehicle unit, Communication link and Base station) are described individually. Further the paper describes how and why cost plays a major role in popularizing an IVTS system. The modification that should be carried out in the individual units to obtain a low-cost GPS based IVTS system which suits the present dynamic urban environment are explained. The modifications carried out in IVTS units also help in finding a reliable and accurate plan metric solution in case of poor visibility of the GPS satellites, which usually is common in urban environment. The GPS based low-cost intelligent vehicle tracking system can be successfully designed and applied in the urban environment of a developing country like India. This if implemented in a well-planned manner will bring significant revolutionary enhancement in the Indian transportation industry.

3. 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 has 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 other method consists of modules through which the data can be sent to a different place having a database by using GSM and GPS systems. This provides real time data to avoid delays and data redundancies which is important from security point of view.

The alcohol breath sensor used to identify whether the driver is drunk or not. In case the sensor detects the alcohol, the device automatically produces 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.

3.1 Alcohol and gas 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).

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The figure 1 depicts the proposed system bird's 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.

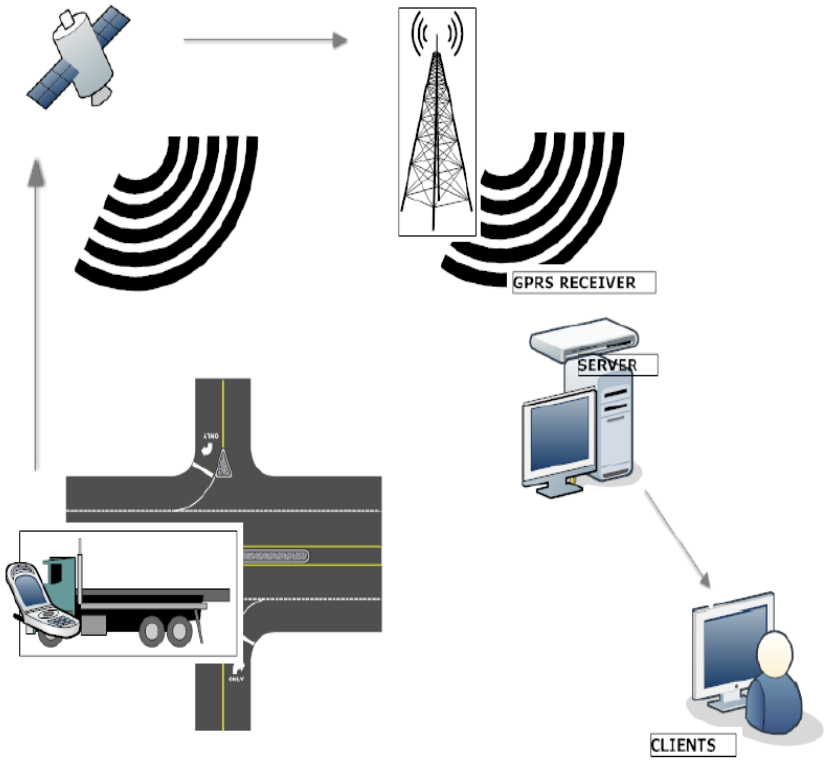

Figure 1: Proposed System bird's view

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 has 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 CO2 emission. The proposed architecture effectively utilizes the memory space.

3.2 Architecture of Proposed System

The proposed device architecture mainly divided in to two parts 1). Vehicle side 2). User side. Figure 2 display the architecture of proposed system.

3.3 Vehicle Side

The Gas and Alcohol sensor is fitted with vehicle. The transmitter sends the data to processing unit. The processing unit receives the data. The sensing level of the alcohol or is more than the threshold, then the device automatically produces the alarm sound and vehicle speed reduced step by step.

3.4 User View

The specialized web application to view the status of the vehicle.

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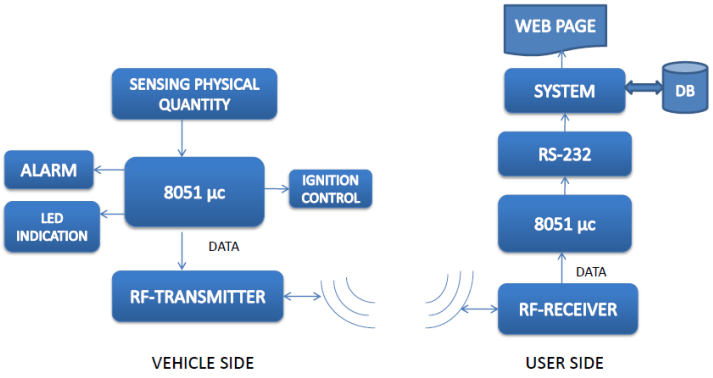

Figure 2: Proposed System Architecture

3.5 Hardware Development

The simulation of the device was developed using protes software. The simulation circuit of searching the alcohol is shown in figure 3.

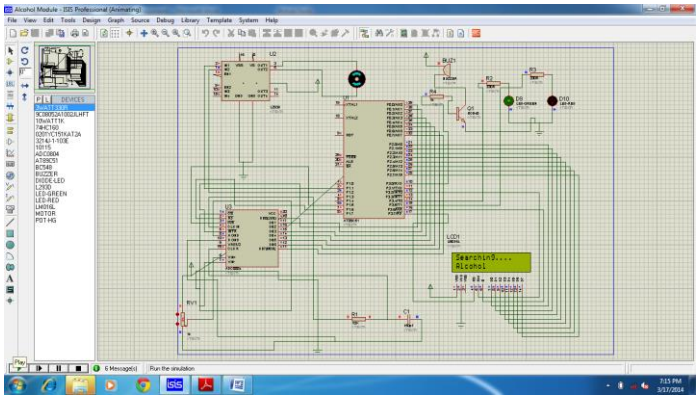

Figure 3: Searching Alcohol

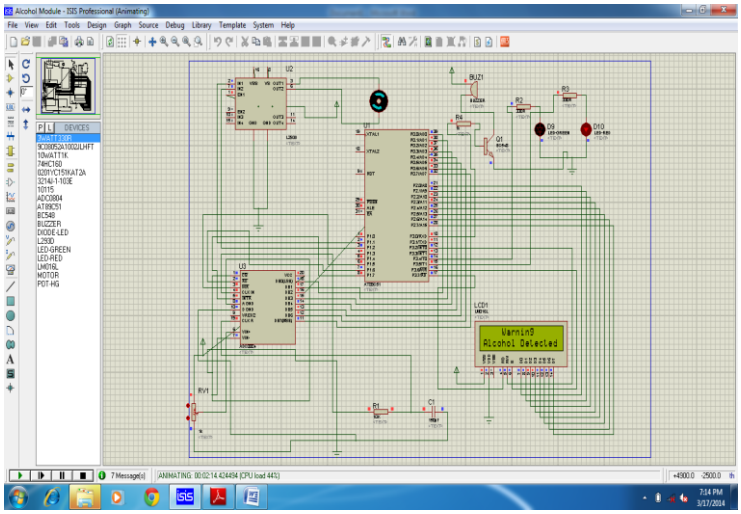

Figure 4: After detecting the alcohol

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4. Result

We tested and implemented the Alcohol detection in the vehicles. The result was shown in figure 5. 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.

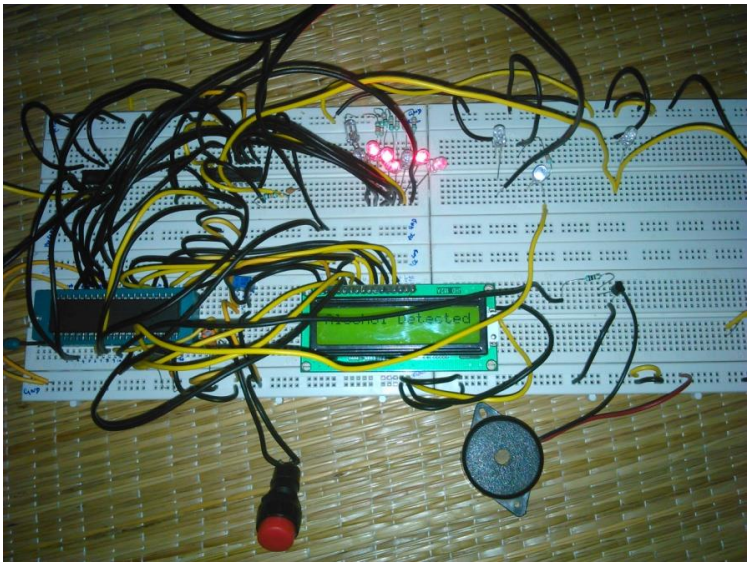

Figure 5 Testing with LED's and a steeper motor.

5. References

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