

## IP BASED VEHICLE MONITERING AND CONTROL SYSTEM USING .NET APPLICATION

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**Abstract:** The project is designed to find out the exact location of any vehicle and intimate the position to the concerned authority about through an SMS and IP Based Monitoring system. A system is implemented for vehicle theft and accident case using an embedded system occupied with a Global Positioning System (GPS) and a Global System of Mobile (GSM). The client interacts through this system with vehicles and determines their current locations and status using Google Earth at any time. The proposed system made good use of a popular technology that combines a Smart computer and mobile application like java .Net and android with a ARM(LPC2148) microcontroller. This system is very safe, inexpensive and efficient to report emergency situations as crash reporting or engine failure. The device is embedded inside a vehicle whose position and controlling in real-time. An ARM microcontroller is used to control the GPS, GSM/GPRS modules and breaking system of the vehicle. The vehicle tracking system uses the GPS module to get geographic coordinates at regular time intervals. The GSM/GPRS module is used to receive and transmit commands from the user and update the vehicle location to a database by sending geographic coordinates to the user and server section. A computer application which is developed using .NET is used for vehicle location identification using Google maps. The Google Maps API is used to display the vehicle on the map in the .NET application. Adopting this technology will be highly useful to transport companies to keep tracking their vehicles. This paper presents experimental results of the IP based vehicle monitoring and control system some experiences on practical implementations.

**Keywords:** ARM7(LPC2148), GPS, GSM, vibrationsensor, motor, .NET application.

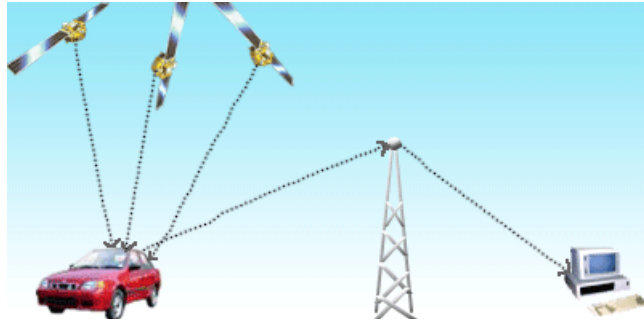
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### I. INTRODUCTION

The real-time vehicle monitoring and control solution enables real-time tracking to provide complete visibility of vehicles. With the comprehensive information on the location, status and use of the vehicle, action can be taken to save time and money and to plan business better. In this modern, fast moving and insecure world, it is become a basic necessity to be aware of one's safety. Maximum risks occur in situations where in an employee travels for money transactions. Also the Company to which he belongs should be aware if there is some problem. What if the person traveling can be tracked and also secured in the case of an emergency?! Here's a system that functions as a tracking and a security system. It's the intelligent vehicle control for critical remote location application. This system can deal with both pace and security.

This can be useful in soldier monitoring, tracking of the theft vehicle and various other applications. The system is microcontroller based that consists of a global positioning system (GPS) and global system for mobile communication (GSM). This project uses only one GPS device and a two way communication process is achieved using a GSM modem. GSM modem, provided with a SIM card uses the same communication process as we are using in regular phone. SMS process is convenient and low cost, accessible way of transferring and receiving data with high reliability. In this process wireless data transmission, GSM, GPS and SMS technology are commonly used.

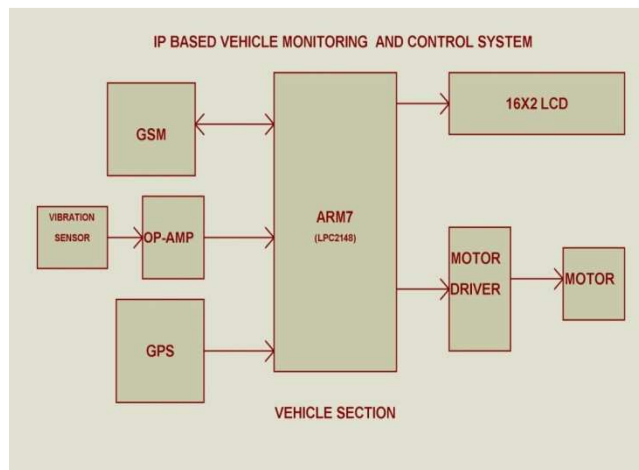
The basic purpose of the vehicle tracking system is to track a specific target vehicle or objects. Most of the tracking system consist of an electronic device as usually installed in-vehicle and can be used for tracking motors cycles, buses, and trains. The ability to accurately detect a vehicles location and its status is the main goal of automobile trajectory monitoring systems. & also the high demand of automobiles has also increased the traffic hazards and the road accidents. This is because of the lack of best emergency facilities available in our country this design is a system which can detect accidents in significantly less time and sends the basic information to first aid center within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. These systems are implemented using several hybrid techniques that include: wireless communication, geographical positioning and embedded applications.



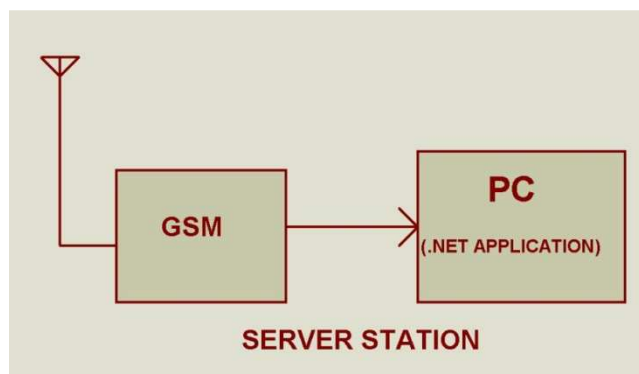
**Fig -1:** Vehicle tracking system

Vehicle tracking systems are used around the world in many fields such as vehicle position tracking system, vehicle anti-theft tracking systems, fleet management systems, and intelligent transportation system. There are different types of GPS vehicle tracking systems. i.e. mobile phone based tracking, wireless passive tracking, via satellite in real time.

## II. SYSTEM ARCHITECTURE



**Fig-2:** vehicle section



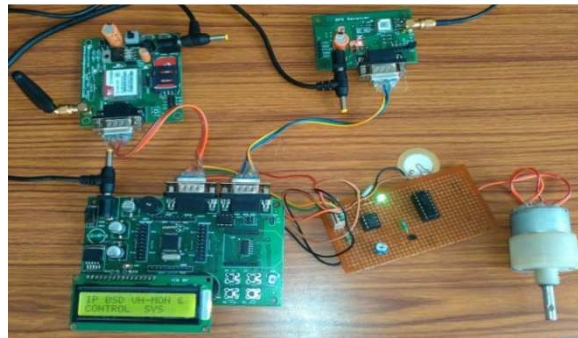
**Fig-3:** sever Section

The vehicle monitoring and control system development of both hardware and software design techniques are needed. The system mainly co-operated of two sections. When data is received and reacts to the related information that is called vehicle section. When send the data to require operation can be formed is called sever section.

**Vehicle Section:** The vehicle section mainly operated in ARM7(LPC2148) microcontroller and used to control the vehicle tracking system. It is the brain of the vehicle system. LPC2148 microcontroller is based on 32-bit with real-time emulator and embedded trace support, high-speed flash memory range from 32KB to 512KB. AT commands are instructions used to control a modem. An AT command set is specific to the GSM technology, which includes SMS-related commands. GSM module(16) is responsible of establishing connection between an vehicle section and sever station for transmitting the vehicle location information, accident condition. GPS

module has the GPS receiver with antenna. GPS receiver to trace the vehicle position through the antenna and LAT and LONG values will be present. Vibration is used to identify the accident cases. Motor works on the concept H-bridge circuit which allows the voltage to be flow in either direction. LCD display is used to display the information.

**Server Section:** In this section GSM is to receive the latitude and longitude values and connected to the PC through the serial port. The system open the GOOGLE MAP and located the vehicle position. .NET is used for vehicle location identification using Google maps. The position information or the coordinates of each visiting points are stored in a database, which later can be viewed in a display screen using digital maps. However, the users have to connect themselves to the web server with the respective vehicle ID stored in the database and only then s/he can view the location of vehicle traveled.



**Fig -4:** IP based vehicle monitoring and control system

### III. HARDWARE DETAILS

**GSM:** GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. It operates at either the 900 MHz or 1800 MHz frequency band.



**Fig-5:** GSM Modem

**GPS:** The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides reliable location. GPS devices provide latitude and longitude information. GPS Receivers commonly used in most of Vehicle tracking systems can only receive data from GPS Satellites. They cannot communicate back with GPS or any other satellite. GPS technology is found in everything from cell phones and wristwatches, to shipping containers and ATM's. The system boosts productivity in almost every aspect of society and across a wide swath of the economy, to include farming, construction mining, surveying, supply chain management and more. Major communications networks, banking systems, financial markets, and power grids depend on GPS and the technology is embedded.



**Fig-6:** GPS Board

**VIBRATION SENSORS:** Sensors are used to identify the accidents cases. They are different types of sensors is needed. A vibration sensor which can detect accidents in significantly less time and sends the basic information to first aid center within a few seconds covering geographical coordinates, the time and angle in

which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives.



**Fig-7 :** vibration sensor

**ARM7 (LPC2148):** LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer. The 16/32-bit ARM7TDMI-S in a tiny LQFP64 package. 8KB to 40KB of on-chip static RAM and 32 to 512KB of on-chip flash program memory.

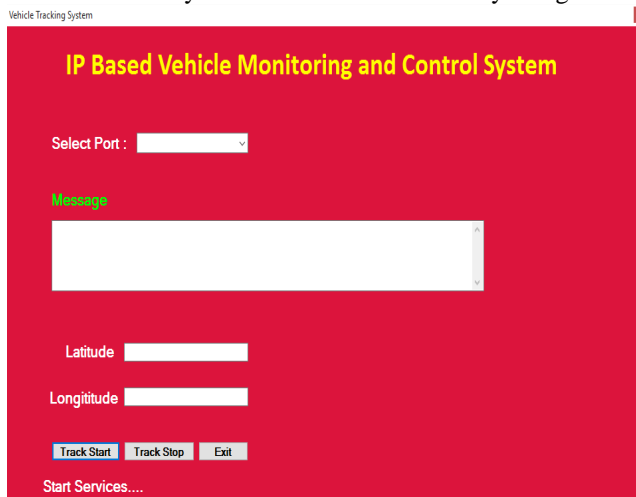


**Fig-8 :** LPC2148

**IV. SOFTWARE DESGIN**

The software programming is done in 'C' language. Data (co-ordinates) received by GPS from the satellites is defined in the software. Decoding the NMEA (National Marine Electronics Association) protocol is the main purpose of developing this software. The mobile number of the user should be included in the software programming in order to receive the location values from the SIM card which we are using in GSM modem. The NMEA protocol consists of set of messages. These messages are ASCII character set. GPS receives data and present it in the form of ASCII comma – delimited message strings. '\$' sign is used at the starting of each message. The locations (latitude and longitude) have the format of date. i.e. degrees minutes and decimal minutes. The software protocol consists of the GGA (global positioning system fixed data) and GLL (geographic position latitude/longitude). But in this system we are using CGA only.

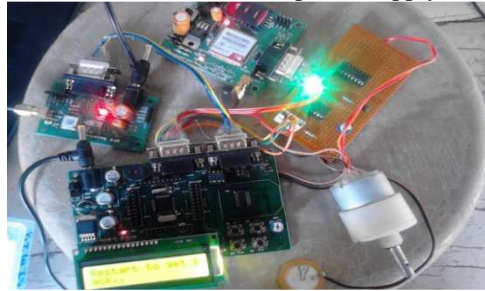
We are also using .NET based application another way of approach to vehicle tracking. In this we also monitor vehicle condition and automatically trace the vehicle location by using GOOGLE MAPS.



**Fig-9:** Using Software application in PC.

## V. RESULTS

First of all we can connect the devices properly. Combine ARM processor, GSM Module and GPS Module and you can placed SIM card of any network and then connect to the power supply.



**Fig-10:** Vehicle section

To store the personal phone number. First we can send a message to that SIM which is placed in GSM module with any character or letter, etc., and then the mobile number was registered.



**Fig-11:** store mobile number

After we can track the vehicle you can send a message as '\*' to the GSM module. The GSM module send to information GPS system and GPS module send the LATITUDE and LONGITUDE.



**Fig-12:** Tracking condition

We can stop the vehicle you can send the message as 'b'. Automatically to the stop vehicle.



**Fig-13:** Breaking condition

To destroy our vehicle system to send the message as '#'. Automatically boom is activated





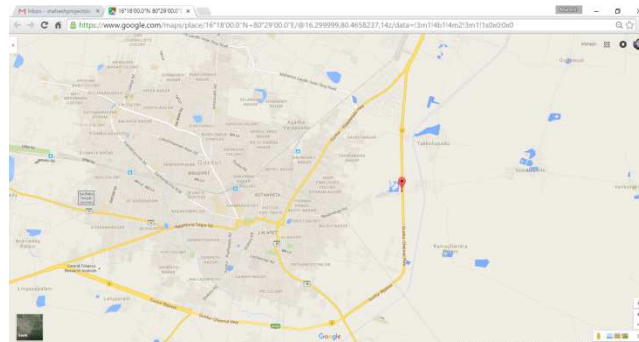
**Fig-14:** Boom condition

When accident is occurred, the vibration sensor transfers the information to the ARM processor and then sends to the message our phone.



**Fig-15:** Accident condition

After receiving the information and connected to the PC through the serial cable, automatically open the GOOGLE map to view the vehicle location



**Fig-16:** Indicated the vehicle location

## VI. CONCLUSION

In this paper, a real-time automobile tracking system via Google Earth is presented. The system included two main components: a transmitting embedded module to interface in-vehicle GPS and GSM devices in order determine and send automobile location and status information via SMS. The second stationary module is a receiving module to collect and process the transmitted information to a compatible format with Google Earth to remotely monitor the automobile location and status online. The transmit location of the vehicle has been filtered using Kalman filter to achieve accurate tracking.

This project can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the vehicle instead to check it on PC, which would be more convenient for the user to track the target.

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