

A Survey Paper on Smart Vehicles

*Sahil Inamdar¹, Ajit Shete², Akshay Ghatage³, Jaydeep Gholap⁴, Ashitosh Atnurkar⁵,
Sujata Pardeshi⁶*

Student^{1,2,3,4,5}, Teacher⁶

Department of Computer Science and Engineering

Sanjay Ghodawat Group of Institutions, Atigre (India)

Corresponding Author's email id: ajitshete1008@gmail.com

Abstract

Vehicles play a vital role in human life, it helps them to travel long distance with ease and comfort. Maintenance of the vehicles are inevitable from the start of transportation history; it evolves around technology periods from the Iron Age to information age. Now, we are heading towards automation age in which the vehicle maintenance needs technology up-gradation. Imagine that if you can predict faults and failures of parts in your vehicle before it even happens, sending real-time data of your vehicles health to your service centers, having information of your vehicle on your palm. Smart cities administrations ranges from open well-being and movement administration to carry road lighting and water treatment. The principle point is to accomplish zero disappointment foundation for the general public. The World Health Organization's (WHO) give an account of Road Safety states that the assessed GDP misfortune because of street car accidents is 3% for India.

Keywords: - GPS module, GSM system, Power Supply Unit, Microcontroller.

INTRODUCTION

Traffic congestion leads to long and unpredictable times, environmental pollution and fuel wastage. These negative effects are more in developing countries like India, where infrastructure growth is slow because of cost and bureaucratic

issues. Frustration and irritation with the traffic lights results in an increase in accidents from cars moves when the traffic light, signals them to stop. Out of many various reasons for traffic congestion, vehicles waiting for a longer time at a signal lights also contribute significantly

for the same. Emergency vehicles blocked by such reason of huge traffic can put one's life in danger. In case of such emergency, currently there is no such mechanism available for the clearance of traffic. The most of the existing systems of manual control of traffic or pre-defined time for change of traffic lights are inefficient. With respect to this, in the past few years, traffic accidents & congestions have increased enormously and rapidly. Though the vehicle volume has more increased exponentially, the road infrastructure has not been improved proportionately. This in turn leads to increased traffic congestion and road accidents. Different technologies are there to detect traffic congestion and to make congestion management more efficient, but these technologies have several drawbacks and problems, such as installation problems, complexity, cost, etc.

So, the proposed system will work with the aim to provide a smart solution to solve the traffic congestion problem for emergency vehicles on a priority basis in an attempt to reduce the problem related to traffic & improve the traffic discipline. In this system, the smart devices such as RF transmitters and the RF receivers will be used which are always, anywhere and

anytime connected with each other for sending and receiving some information which can further be processed to generate meaningful results. The RF receivers are mounted on the traffic signal lights to generate a signal for an emergency vehicle which will be stuck in traffic and afterwards, such vehicles will continuously monitor using smart devices and wireless energy signal transmitters and receivers. During this monitoring, an automatic penalty will be incurred for violation of any of the traffic rules for a vehicle driver as per the RTO rules. Therefore, through this proposed system we aim to provide a system which will continuously monitor the vehicles using wireless energy signal transmitters and receivers to automatically incur a penalty for violation of any of the traffic rules.

LITERATURE SURVEY

To propose the system and to identify the problem, the following papers are referenced and their brief review is specified as follows:

1. "Real time vehicle monitoring system using GSM and GPS technology" by Kunal Mourya, Mandeep Singh, Neelu Jain [Department of Computer Science] : In this paper, the authors have proposed an Anti-theft Real time vehicle monitoring system using GSM and

GPS technology. This system can be used to track the vehicle with the device that being developed for wildlife tracking, asset tracking and in stolen vehicle recovery. For this purposes, the authors has a plan to propose and develop intelligent tracking system by providing a server to identify the vehicle route and to store the required information. The sensors are used with a vehicle to send and store the vehicle information on a server. By means of GPS, it is possible to determine the location of any place while travelling, so it may be have an advantage to track the stolen vehicle using GPS receiver. Vehicle tracking systems are commonly used by fleet operators for fleet management functions such as routing, dispatch, on-board information and security. In the paper, the authors has discussed the working of GPS technology, GSM Technology, Microcontroller and design of the proposed system.

2. "Smart vehicle controlled system" by Sneha Singhate, Y. V. Chavan: The authors has used ARM7 controller as the core controller which is a PIC transmitter to control the human interaction with the vehicle using the voice recognition technique. As the

desire commands are given to control the vehicle by the human beings, then these signals will be received by the controller at the receiver end which is placed on the vehicle for controlling the mainly four operations of the vehicle as moving forward, left, right and stop the vehicle. The IR sensors are used to detect any obstacle and to provide feedback at the receiver end to maintain safety of a vehicle along with this, in this paper, the authors has used ucos-ii to provide real time operations to enhance the performance of the system.

3. "IOT based implementation of vehicle monitoring and tracking system" by Boddapati Venkata Sai Padmaja, Venkata Ratnam Kolluru, Syam Sai Kota : while reviewing this paper, it is observed that, vehicle monitoring and tracking system is developed to monitor the drivers behaviour to avoid the accidents like eye blinking, alcohol consumption and vehicle parameters like engine temperature, the distance between the vehicles and tracking of the live location of the Vehicle. The different sensors are used like Ultrasonic sensor that is placed in front of vehicle to identify the distance between two vehicles and if two

vehicles are closer then alert message is generated and sent to the mail through the Blynk application. The temperature sensor is used to detect the temperature of the engine and if it is cross the predefined limit the alert message is generated and sent to the mail. To check the physical condition of the driver, eye blink and alcohol sensors are used.

INTRODUCTION OF PROPOSED SYSTEM

The proposed system mainly focuses on two points which are:

1. the vehicles which may require emergency exit
2. vehicles have a less time to reach to the required destination and in hurry to reach their destinations at the earliest.

So in the first case, we plan to provide the detection of emergency vehicles which will be waiting in the traffic junction or place by keeping green traffic signals turns to green as long as the emergency vehicle exit from the traffic jam place. As the emergency vehicle passes through certain place, then signal turns to red and therefore, Smart vehicle with GSM alert

system is proposed and need to develop to change the routine traffic signal turn on and off time based on the number of the emergency vehicles and feasibility of the root and track and monitor the driver's behaviour. In the proposed system we will be implementing the following objectives and based literature survey, the architecture of the system is given in figure number 1 and described in the following sections.

- 1) To provide security and continuously remote monitoring of vehicles.
- 2) To provide road tracking and detection by applying easy to handle ways.
- 3) To send current location of a vehicle to all predefined numbers like User and RTO, automatically, in case of emergency.
- 4) To search alternate path in the case of accident.
- 5) To stop a vehicle at any speed, at any location or place.

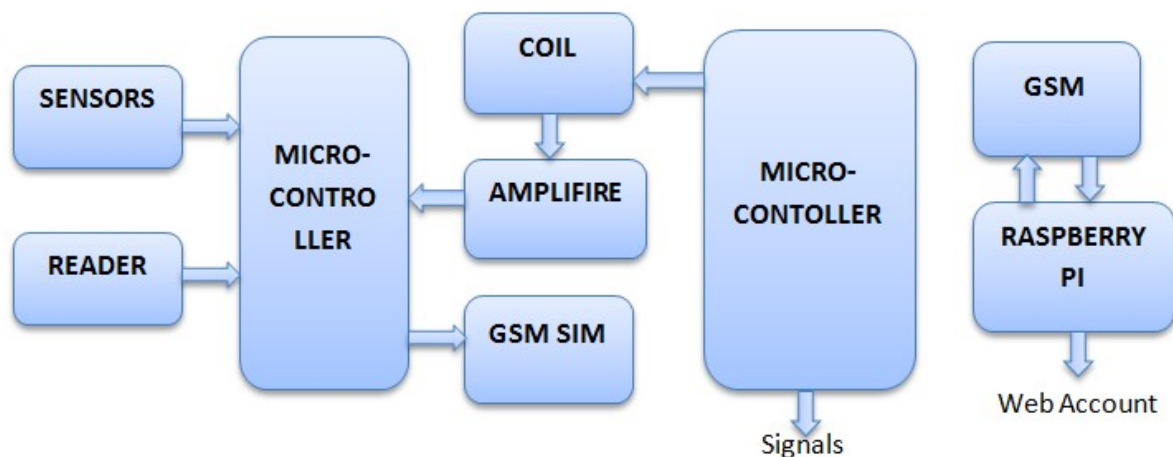


Figure.1. Smart Vehicle System Design Architecture.

The implementation of the above objectives are divided by implementing the following parts of the system:

- 1) Smart vehicle with GSM Alert System
- 2) Smart vehicle controlled system
- 3) IOT based implementation of vehicle monitoring and tracking system
- 4) Design and implementation of smart vehicle monitoring system
- 5) Smart vehicle protecting system

Part - I - Implementation of Smart vehicle with GSM Alert System: In this part of the proposed system, a “Smart vehicle with GSM Alert System” will be developed in which the vehicle’s position

or location is tracked using GPS module. The Microcontroller and GSM will be used to identify the real time position or place of the vehicle and send an alert to the owner’s mobile. In case of vehicle theft, the engine of stole vehicle can be shut down by sending command or SMS to the controller. To handle this part, GPS module, Microcontroller, GSM module, Accelerometer sensors are used, whereas, GPS module will send SMS to the Microcontroller and then Microcontroller sends this data to the user in text message containing longitude and latitude of the location or place though GSM module. By this, it will be possible for the vehicle owner to get continuously updates about vehicle location.

Part 2 - Smart vehicle-controlled system:

In this part of the system, as given in reference [2], voice Recognition system will be implemented. As today's technologically manufactured, high costly cars have the facility of controlling it by means of voice command. Thus, based on this existing system, we plan to provide low cost sub part of the system to have voice interaction with the vehicles.

Part 3 - IOT based implementation of vehicle monitoring and tracking system:

This part of the system will provide IOT based implementation of vehicle monitoring and tracking system by using different sensors as mentioned by the authors [3] and implemented to track the vehicle in the different aspects such as blinking of eyes, alcohol consumption of driver and other vehicle parameters such as the distance and temperature.

Part 4 - Design and implementation of smart vehicle monitoring system: In this part of the system, the ATMEGA 2560 type microcontroller will be used to get the input from alcohol sensor, vibration sensor, ultrasonic and toxic gas sensor, relay driver to constantly or continuously watch the moving vehicle and report and send the status to authenticated resources on demand. So, the different sensor

devices are used to monitor the car driven condition and vehicle condition in terms of its position or place.

Part 5 - Smart vehicle protecting system:

This part of the system will be designed and developed to prevent and reduce the accident and to inform emergency about an accident that has been occurred. The system contains sensors like Alcohol sensor, temperature sensor, Ultrasonic sensor and Pressure sensor connected to GSM and GPS system which detects the accident to the vehicle and inform about the accident to predefined number with the actual location where the accident got happened.

TECHNOLOGIES REQUIRE FOR IMPLEMENTATION OF PROPOSED SYSTEM

Therefore, the proposed system needs two voltages viz., +12 V & +5 V, as working voltages. Hence specially designed power supply is this constructed to get regulated power supplies. This is a GPS receiver is used by the receiver for the GPS module. It can be interfaced with normal 5V 89C52 MC with the help of the in-built 3V-5V converter. A GSM modem is a special type of modem which accepts a SIMs card, and operates over a subscription to a mobile operator, just like mobile phones. System

which is used for tracking and positioning of any vehicle by using GPS and GSM. Microcontroller is used for interfacing with various hardware peripheral devices. Microcontroller is interfaced serially to a GSM Module and GPS Receiver. A GSM modem or module is used to send the position (Latitude and Longitude) of the vehicle from a remote place.

The working of the proposed system is distributed in the following modules:

1. GPS system-

A GPS unit is a device normally used by a moving vehicle or person that uses the Global Positioning System (GPS) to track the device's movements and to determine its location or place. The recorded location data can either be stored within the tracking/following unit or transmitted to an Internet-connected device using the cellular mobile phones (GPRS or SMS), or satellite modem embedded in the unit. This allows the location to be displayed against a map backdrop either in real time system or when analyzing the track later, using GPS tracking software. Data tracking software is available in smartphones with GPS capability.

GPS tracking is the system of location through use of the (GPS) Global Positioning System use to track the

location and place of an entity or object remotely/ automatically. The location tracking via GPS and a vehicle with a tracking device, a wireless network, and GPS servers. The vehicle's GPS device transmits a wireless signal through provider. The data receives at a server, which allows you to access the information from a tablet, smartphone, or computer.

2. GSM module-

A Global System for Mobile Communication (GSM) Module is used to enable communication between a microcontroller (microprocessor) and the GSM Network. GSM is a mobile communication modem. A GSM digitizes and reduces the data, then sends it through a channel with two different streams of client data, each in its own particular time slot. GSM is an open and digital cellular technology used for transmitting and sending mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access technique for communication purpose.

3. AT89C52 Microcontroller-

The AT89C52 is the low-power and high-performance CMOS 8-bit microcontroller

with 8K bytes of Flash programmable and erasable read only memory (PEROM). This smart device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system. The Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control system applications.

CONCLUSION

In this paper, we have proposed system which can be used to track a vehicle with the proposed device and can also be used in wildlife tracking, asset tracking prevent road accidents. In the future there will be an opportunity to integrate other related devices in a vehicle such as sensors to track and monitor vehicle. In the proposed system, a server can be used to store and locate the vehicle route and other information and the sensors will be installed in a vehicle to report the vehicle data or information which will be saved to server that will be resulted into an intelligent tracking vehicle system.

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