

Smart Vehicle Assistance and Theft Prevention (S.V.A.P)

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Abstract: Vehicle theft is a common issue around the world which needs to be cured. It is also important to keep a track of places visited by the vehicle, monitoring the fuel, calculating the average fuel consumption of the vehicle. If any unauthorised user tries to start the vehicle and the vehicle takes any unexpected unusual route compared to everyday the hardware sends quick notification to mobile phone of registered user. The user can monitor every single activity of the vehicle Thus Smart Vehicle Assistance and Theft Prevention (S.V.A.P), a hardware module will perform all the task and update the user with the recorded data about the vehicle in real time

Keywords: Vehicle theft, track, fuel consumption, Theft prevention.

1. Introduction

As per the survey in India, the number of motor theft in India has increased from 80,682 in 2004 to 165,690 in 2013 growing at an average annual rate of 8.47 %. Most of these thefts occur at peak timing during evening or night. Thus, it is obvious that there is a need to implement such a system which prevent theft of vehicle, which can be done using vehicle tracking. It requires a reliable hardware module to determine where each vehicle was at any given time and for how long it travelled [1]. It is a concept for determining the geographic location of a vehicle and transmitting the latitude and longitude to a remotely located server.

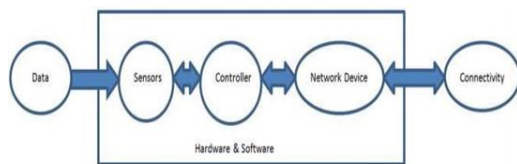


Fig. 1. Architecture of S.V.A.P

The location is determined using GPS and transmission mechanism could be a satellite, terrestrial radio cellular connection from the vehicle to a radio receiver, satellite or nearby cell tower. After capture, the tracking data can be transmitted. The proposed security system in this paper is designed to track and monitor vehicles of users that are registered with the proposed system, also to stop the vehicle if

stolen and to track it online for retrieval, this system is an integration of using any choice of cellular or wireless communications systems [3].

2. System requirement

In this section we describe the system requirements of the Smart Vehicle Assistance and Theft Prevention (S.V.A.P). The proposed system needs to show the current location of the vehicle, top speed, notification for impact of vehicle, total distance travelled, tilt sensitivity, and user dashboard.

Development Board (NodeMcu): The Development Kit based on ESP8266, integrates GPIO, PWM, IIC, 1-Wire and ADC all in one board. Power your development in the fastest way combination with NodeMcu Firmware!

GPS Module: The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, you can monitor the status of the module. Thanks to the data backup battery, the module can save the data when the main power is shut down accidentally.

Sensors:

- Accelerometer
- Vibration Sensor
- Temperature Sensor

USB Cable: USB A to Micro USB B

Jumper Cables:

- Male to Male
- Male to Female

3. System used in transportation

Despite of various technologies that have been introduced in recent years to detect vehicle theft, the rate of vehicle being stolen has significantly raised. There are also number of tracking system to assist the user to track the vehicle from anywhere and anytime.

- **GPS Tracking devices for vehicles:** These systems provide Geographic location of vehicle in real time. In case of thefts, these systems will not be able to stop the vehicle because these systems can only provide the

GPS co-ordinates of the vehicle in real time. There is no program for theft detection or a circuitry involved in the system to stop the vehicle. One of such tracking devices that is used in India is called Map My India and which costs INR 15000

- *GPS tracking along with Central Locking and Immobilizer:* These systems provide GPS tracking as well as mechanisms to stop the vehicle theft by using a central locking and immobilizer mechanism. These systems have the circuit to implement theft detection and to prevent the theft from happening. The most widely used GPS tracking along with Central Locking and Immobilizer are AutoCop which costs INR 16000 and 3Dtrack which costs INR 18000. These systems are the most widely used systems worldwide and are not used much in India because of the high cost. Luxury Sports companies that manufacture cars like BMW, Mercedes, Lamborghini, Porsche etc. have pre-installed anti-theft and tracking systems. All common car companies do not have such systems.

Considering all the literature survey and the Market survey the system developed should have improved efficiency, reduced power consumption, reduced cost and size, improved accuracy, user-friendly and easy to use and installable in all vehicles (with fuel injectors) over the existing or theorized systems available [4].

4. Anti-theft System

The main objective of proposed System is to prevent the vehicle from theft. If the ignition is off and any unauthorized party tries to start the vehicle with any sort of duplicate key, other than the pair of original keys, an immediate notification will be sent to the application which is currently used by the user. The Hardware part of the system need to be compact so that it can be placed inside the vehicle (well hidden). The user can track the vehicle in real-time. There is a provision where user can complete lockdown the vehicle through the application, so even if the user tries to start the vehicle, the vehicle will not start. In order to start the vehicle, the user will have to unlock the vehicle through the android application. If in case the user forgets to unlock the vehicle or the vehicle is stolen the user can cut off the engine power and the vehicle will stop. The user can then track down the vehicle

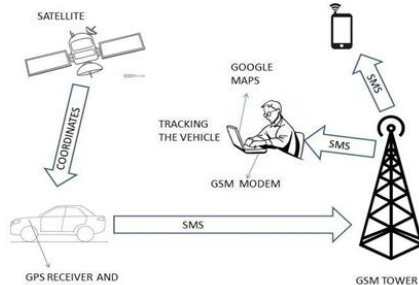


Fig. 2. Internet of Things in Transportation

The scope of the study as follows:

- To implement system to provide vehicle tracking in real time.
- Design a mechanism to detect theft and notify user of theft [4].

To Implement this system in a real time a GPS module Ublox Neo 6M is used, A GPS tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle, person, or other asset to which it is attached and to record the position of the asset at regular intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location data base, or to internet connected pc, using a cellular (GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or when analyzing the track later, using GPS tracking software. [5] To detect the tilt of the two-wheeler bike/ moped if the bike falls a tilt sensor is used.

If the vehicle met with an accident the impact to a certain extent can be calculated with a vibration sensor. All these components are interfaced with a development board Node Mcu ESP8266 which is a Wi-Fi enabled development board which transmits data via open Wi-Fi connection. The GPS module Ublox Neo 6M gathers the data from satellite in the form of co-ordinates, these co-ordinates are then transferred to the Node Mcu which then transmits the data to the server via Wi-Fi connection. And the data can be received by the authorized user through the server on the user application.

If the vehicle is met with an accident the impact is immediately detected by the vibration sensor which sends the response to the Node Mcu and the user's relative as well as the nearest Police station as well as the ambulance or the emergency service providers of the state is informed. If the vehicle (two-wheeler) tilts down beyond a certain safe angle, the relative of the user as well as the authorized user is notified with a pop up on user application.

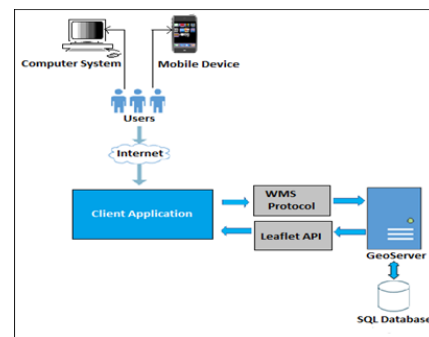


Fig. 3. System Architecture

5. Algorithm for theft detection

For theft detection the algorithm shown in Fig 4.

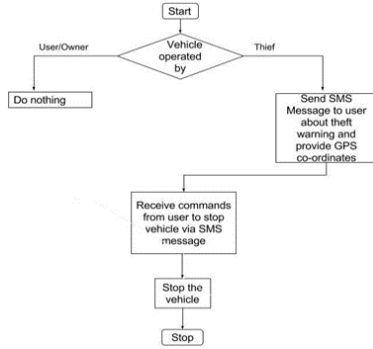


Fig. 4. Algorithm for theft prevention

6. Result

The proposed system is an IOT based framework that is capable of showing precise location of vehicle. The system is capable of preventing the vehicle from theft, as well as notify the authorized user about all the necessary updated via user application on the mobile phone. The online framework empowers client to scan area track on guide through created android application with Google Map embedded and interface with database server for vehicles track subtle elements. The area is acquisitioned from satellite utilizing GPS receiver area coordination sent through GPRS, the GSM system will pass the data to the objective server [5].

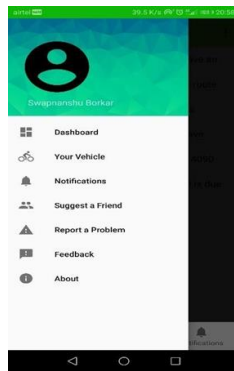


Fig. 5. Navigation Bar of Android Application



Fig. 6. Satellite View

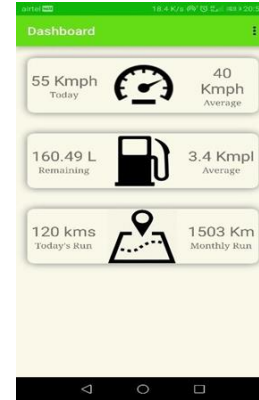


Fig. 7. Dashboard



Fig. 8. Speed Reference of Vehicle

7. Conclusion

This paper presented the implementation of smart vehicle assistance and theft prevention.

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