RESEARCH ARTICLE   OPEN ACCESS

Real Time Vehicle Detection System Based on IOT

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Abstract:

Technological advancements and the availability of low-cost open source hardware systems are ushering in a new era of system design. The use of technologies such as the Internet of Things (IOT) can make data collection and analysis easier. The main goal of this paper is to describe a system that can monitor or track the location and vehicle parameters of various test vehicles from a centralised location for research and development purposes, as well as to store data of those vehicles' testing parameters on the server for further analysis and records. The system design will be generalised to monitor various parameters such as location, vehicle speed, engine compartment temperature, fuel consumption, and so on. For data transfer, the proposed system employs an open source controller and a GPS/GSM/GPRS module.

Key words: Arduino, vibration and ultrasonic sensors, GPS, GSM, vehicle accident and theft detection.

I. INTRODUCTION:

Vehicle tracking systems are popular among people as a retrieval device and a means of preventing theft. The main advantage of vehicle tracking systems is that they provide security by monitoring the vehicle's location, which can be used as a protection strategy for stolen vehicles by sending its position coordinates to the police centre as an alert for the stolen. When a police station receives a stolen vehicle alert, they can take action to prevent the theft. Nowadays, it is used as a replacement or addition to car alarms to protect them from theft, or as a monitoring system to keep track of the vehicle in real time. As a result, many applications can be used to block.

Research Survey:

The proposed system is a collision detection and tracking system based on Arduino. Such a system allows vehicles to check their distance from nearby vehicles and provide audio/visual warnings to the driver, allowing them to take the necessary action to avoid a collision. In some cases, if an accident occurs, medical assistance should be provided immediately. Most of the time, people who are injured in an accident do not receive immediate medical attention, either because they do not judge the severity of their injuries or because proper and

legal procedures are involved in an accident. SVMTS can also be used to remotely disable a vehicle after it has been stolen. The vehicle's location can also be tracked from anywhere in the world. The system includes the following components in order to carry out this action.
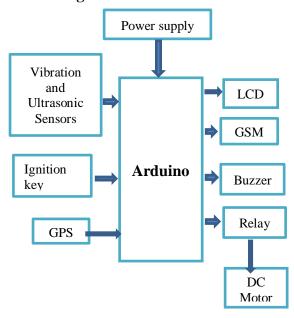
Components of the System:

Arduino:

The ATmega328-based Arduino Uno is a microcontroller board (datasheet). It has 14 digital buttons. 6 analog inputs, 6 input/output pins (of which 6 can be used as PWM outputs), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button It comes with everything you need to support the microcontroller; simply connect it to a computer via USB or power it via an AC-to-DC adapter or battery to get started.

The Arduino Uno can be powered via USB or by an external power supply. The power source is automatically selected. Using pin Mode (), digitalWrite(), and digitalRead(), each of the Uno's 14 digital pins can be used as an input or output.

Block diagram of Arduino:

Vibration Sensor:

Vibration sensors, also known as piezoelectric sensors, are versatile tools for measuring a variety of processes. These sensors make use of the piezoelectric effect, which converts changes in pressure, acceleration, temperature, strain, or force to an electrical charge.

A vibration sensor can also be used to detect aromas in the air by measuring resonance and conjugation at the same time.

Ultrasonic Sensor:

Ultrasonic / level sensors, as the name implies, use ultrasonic waves to measure distance. The sensor head sends ultrasonic wave modules and the message to the receiver via GSM module. It measures the distance by converting the sounds reflected from the target into an electrical signal. The ultrasonic sensor is used in this module to measure the distance between the vehicles in order to avoid a collision.

Global Positioning System (GPS):

The Global Positioning System tracks signals using satellite technology. It operates on the 2D trilateration principle. When an object sends signals to satellites, the satellites respond by sending feedback signals back to the object. The time required to send the feedback signal is calculated to determine the object's geographical location. GPS tracking systems use the Global Navigation Satellite System network to pinpoint a vehicle's exact location. There are two types of vehicle tracking systems: passive and active systems. A passive tracking system monitors and stores data, whereas an active tracking system monitors and sends data to a central tracking portal.

It has a serial port for communicating with the microcontroller. The GPS receiver transmits location data to the controller. The controller receives the data and transmits it to the user via GSM.

Global System for Mobile Communication (GSM):

GSM stands for Global System for Mobile Communication. It is a serial communication device used to connect computer systems over a network. The GSM module is linked to the microcontroller. The microcontroller's receiver pin is wired to the GSM modem's transmitter pin, and the microcontroller's transmitter pin is wired to the GSM modem's receiver pin.

GSM modem

It uses attenuation commands to select the mode, transfer and receive messages, make calls, and so on. It includes a SIM card holder that is used to insert the SIM card for user operation. It employs time division multiple access (TDMA) technology.

Collision Avoidance:

Detection of Vehicle Collisions and Auto Accidents, as well as the SOS Service Accident detection systems, in conjunction with vehicle speed monitoring systems, can be used to detect accidents on highways. This could be improved by placing several sensors on the road that can detect the location and timing of the car. The system could be modified to send vehicle data to rescue centres to

alert them to the need for immediate assistance. When a collision is imminent, an ultrasonic sensor and other components will assist in generating a warning signal. The distance between the vehicles is divided into three zones: i. zone 1 (no warning), ii. zone 2 (warning, pay attention), and iii. zone 3. (necessary action required)

Fig 1: Different Zones

Fig 2: Distance Greater than 80 unit

If the distance between the vehicles exceeds 80 units, the system will not generate a warning signal to the driver.
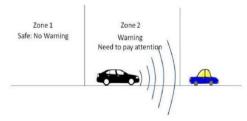

Fig 3: Distance equal to 50 units

If the distance between the vehicles is greater than 50 units, a red LED will illuminate to alert the driver.
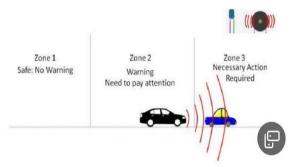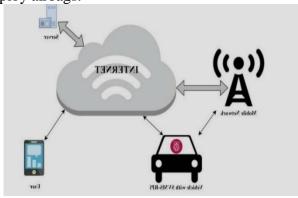
Fig 4:Distance less than 50 units

If the distance is less than 50 units then blue LED glow and buzzer sound rapidly to alert the driver.

Accident Detection:

Change in the acceleration in any direction is detected by vibration sensor. The vibration sensor continues to monitor the vibrations when it exceeds above certain level or the sensor is tilted more than a certain degrees, it detect it as an accident and deploy airbags.

The proposed SVMTS is also equipped with GSP and GSM module. The location of an accident can be detected and notification message will be send to predefined numbers in the system along with the information about location of the accident. As one of the numbers will be of the medical emergency so that medical assistance can be provided timely

Vehicle Theft Detection:

Global Positioning System (GPS) is a method of tracking for detection of the exact location of the stolen vehicles in terms of the latitude along with the longitude after that it transfers the detail through GSM module in text form or SMS, which is directly received by vehicle's owner. Here Tx pin of GPS module is directly connected to digital pin number 10 of Arduino. By using Software Serial Library, serial communication is allowed on pin 10 and 11, these pins work as Rx and Tx respectively and left the Rx pin of GPS Module open. By default Pin 0 and 1 of Arduino are used for serial communication but by using Software Serial Library, 12V voltage supply is connected with GPS Module.

CONCLUSION:

A vehicle tracking system is a technology that is used by many companies and individuals to track a vehicle in a variety of ways, such as GPS, which uses satellites and ground-based stations, or other approaches that rely on cellular mobile towers. The vehicle unit, which is a hardware component attached to the vehicle, is programmed to receive signals from the cellular mobile tower and send them to the web server, which uses Google maps to represent the location on the map in real time. It is critical to consider some hardware specifications in order to achieve a satisfactory result.

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