

IoT Based Vehicle Accident Detection and Tracking System Using GPS Modem

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Abstract-- Transportation has great importance in our daily life and it's development has made many of our chores much easy. IoT based vehicle accident detection system using GPS and WIFI has gained attention. When accident occurs, this system sends short message to WhatsApp of a mobile number via Wi-Fi over internet. Message will give longitude and latitude values. From these values location of accident can be determined.

Keywords- Raspberry Pi, GPS, Vibration Sensor, L293D Motor Driver, Wi-Fi, Python.

I. INTRODUCTION

The Internet of Things (IoT) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. Typically, IoT offers advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is implemented in nearly all fields of automation enabling advanced applications like a Smart Grid. The term things in the IoT refers to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, or field operation devices that assist fire-fighters in search and rescue. Current market examples include thermostat systems and washer/dryers that utilize Wi-Fi for remote monitoring.

In this project we describes about "IoT BASED VEHICLE ACCIDENT DETECTION AND TRACKING SYSTEM USING GPS TECHNOLOGY". We are using Raspberry pi in our project. When the system is switched on, LED will be ON indicating that power is supplied to the circuit. The vibration sensors that we are using in our project sense the obstacle, and then it sends interrupt to Raspberry Pi. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through a WhatsApp message. This

message will be received using internet present in the circuit. The message will give the information of longitude and latitude values. Using these values the position of the vehicle can be estimated. Modem performs modulation during transmission and performs demodulation during reception.

II. LITERATURE SURVEY

Many researchers carried out their studies on accident detection system. Aishwarya S.R explained an IoT based vehicle accident prevention and tracking system for night drivers .In this paper provides Eye Blink Monitoring System (EBM) that alerts the subject during state of drowsiness.[1] Sadhana B have explained Smart helmet-intelligent safety for motorcyclist using raspberry pi and open CV. The idea is obtained after knowing that there is increased number of fatal road accidents over the years. This project is designed to introduce safety systems for the motorcyclist to wear the helmet properly.[2] Sarika R. Gujar explained advanced Embedded System of Vehicle Accident Detection and Tracking System. The main objective of this system is to first detect the accident location and call for the emergency services. Vehicle accident detection is possible with the help of sensors. A GPS and GSM module helps to trace the vehicle. [3] Shailesh Bhavthankar explained Wireless System for Vehicle Accident Detection and Reporting using Accelerometer and GPS. In this paper, Accelerometer sensor is used to detect crash and GPS give location of vehicle. In case of any accident, the system send automated message to the preprogrammed number such as family member or emergency medical services via GSM. [4] Jagdish A.Patel explained Raspberry Pi based smart home. This paper aims at designing a basic home automation application on Raspberry Pi through Interfacing camera as security purpose and the algorithm for the same is implemented in developed in python environment which is the default programming environment provided by Raspberry Pi.

III. BLOCK DIAGRAM

The block diagram of the proposed system consists of the following components: Raspberry Pi, vibration sensor, GPS Modem, L293D motor drive, led, buzzer, power supply (12v DC).

The above components are integrated as per the block diagram given in Fig 1

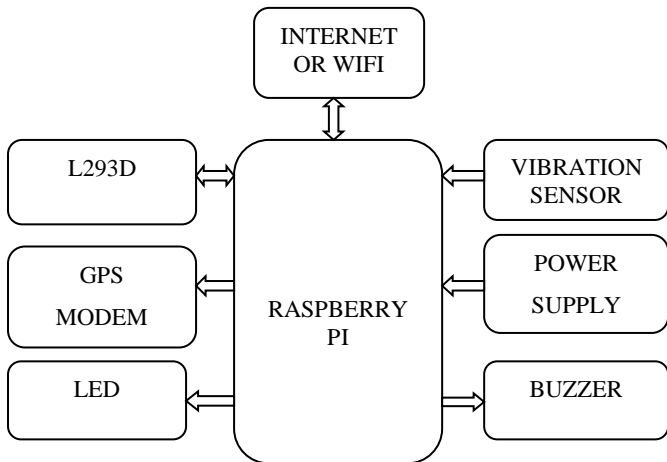


Fig 1: Block diagram of implemented system.

A. RASPBERRY PI

The Raspberry Pi is a credit card-sized single-board computer. Raspberry Pi has a Broadcom BCM2835 system on chip (SoC), which includes an ARM1176JZFS 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. Pi 2 Model B runs 6X Faster than the B+, and comes with 1GB of RAM--that's double the amount of RAM of the previous model.

B. Vibration Sensor

Despite the advances made in vibration monitoring and analysis equipment, the selection of sensors and the way they are mounted on a machine remain critical factors in determining the success of any monitoring program. Money saved by installing inferior sensors is not a prudent investment since the information provided about the machine of interest often is not accurate or reliable.

C. L293D Motor Driver

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, hence H-bridge IC are ideal for driving a DC motor.

D. GPS Device

The Global Positioning System (GPS) is a space based global navigation satellite system (GNSS) that provides reliable location and time formation in all weather and times anywhere on the globe. The GPS satellites act as a reference point from which receivers on the ground detect

their position. The fundamental navigation principle is based on the measurement of pseudo ranges between the user and four satellites.

IV. HARDWARE IMPLEMENTATION

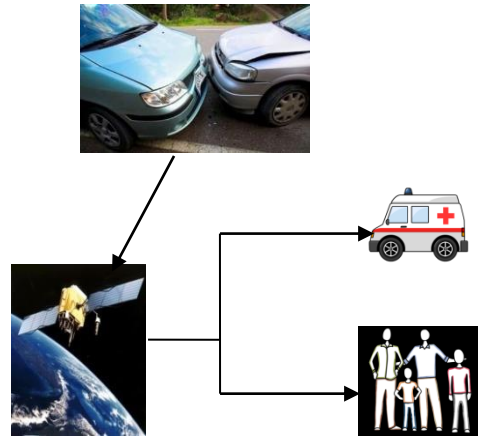


Fig 2: hardware implementation of system.

A. Working Principle

In this project we are using a Raspberry Pi3. When the system is switched on, LED will be ON indicating that the power is supplied to the circuit. When the vibration sensor senses any obstacle, they send interrupt to Raspberry Pi.

The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through WhatsApp message. This message will be received using internet present in the circuit. This message will give the information of longitude and latitude values. Using these values the position of the vehicle can be estimated. The received data is given to the Raspberry Pi. Correspondingly it gives an acknowledgement in the form of an WhatsApp message to the mobile phone. LED used in the circuit displays the reception of messages. The Raspberry Pi interfaced to GPS modem via an internet, where the devices are activated using select lines internally built in the internet. Internet is interfaced to Raspberry Pi via transmit and receive pin. LED is interfaced to any ports of Raspberry Pi; it is used to display the current status of the GPS modem, whether data is being read from GPS.

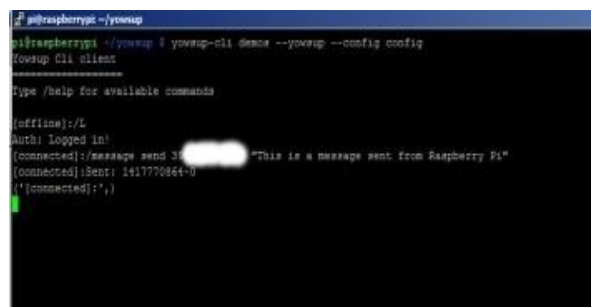


Fig 3: Python program

Fig 3: Shows the python program to interface the raspberry pi. Python is widely used high-level programming language for general purpose programming. Fig 4: shows the working of the system.



Fig 4: Working of the system.

V. ADVANTAGES

- We can monitor the speed of the vehicle.
- We can find the location of the vehicle.
- Alert message to mobile phone for remote information.
- Mobile number can be changed at any time.

VI. LIMITATIONS:

- Costlier.
- Sending data not secure.
- This system is not applicable for poor network connection places.

VII. APPLICATIONS:

- Automotive and transport vehicles.
- Security, remote monitoring and transportation and logistics.
- This system also can be interfaced with vehicle alerting system.

VIII. CONCLUSION:

The proposed system uses the IoT for vehicle accident detection and alarming the authorities regarding accidents, vehicle tracking using GPS Modem. In this project we have designed IoT based vehicle accident detection and tracking system using GPS Modem. Hence IoT can revolutionize the way the system interact and respond for the variety of applications especially in case of traffic control.

IX. FUTURE SCOPE:

This system can be interfaced with vehicle airbag system that prevents vehicle occupants from striking interior objects such as the steering wheel or window. This can also be developed by interconnecting a camera to the controller

module that takes the photograph of the accident spot that makes the tracking easier.

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