

# COLLISION AVOIDANCE & DRIVE SAFE SYSTEM

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## Abstract:

*Now a days we often see or come across many road accidents on highways and as in many cities, some might be small, but many accidents prove to be fatal. The accidents happen due to different factors, mainly OVER SPEEDING, DRUNK DRIVING or sometimes even DRIVER FATIGUE can lead to accidents. There are many technologies budding up for the development of safety kits for detecting driver fatigue and also to avoid accidents. This project is mainly for cars, for making them more intelligent and provides a better drive safe system. By using Raspberry pi 3 this system becomes more reliable, effective and efficient for avoiding accidents on roads. There are very few systems that are developed for detection and controlling the vehicle without the involvement of human. In this paper we are proposing a prototype which controls the vehicle speed by recognizing the speed signs that are setup along the roads and also continuously monitor various parameters that lead to accidents. The main components of this system are Raspberry pi3, Pi Camera and few sensors like Alcohol, Gas, Infrared and a Vibration sensor, Gsm module and a GPS receiver to find out the location of the vehicle.*

**KEY WORDS :** Raspberry pi 3, GSM module, GPS Module, Vibration Sensor (SW-420), Gas sensor (MQ-2), Alcohol Sensor (MQ-5), Infrared Sensor.

## 1. INTRODUCTION

Road traffic accidents (RTAs) had become an important factor in public health and development problem in India. RTAs involve high percentage of damages in human life in various levels. Although there are various measures had been taken to reduce accidents. A survey by ministry of road transport; highway in 2015 reports around 5 lakh accidents in India in which 1.3 lakh people were dead and 5.2 lakh were injured. RTAs Kill almost 1.2 million people a year and injuring or disabling between 20-50 million people around the world. This clearly shows the importance of a crash prevention and avoidance systems in today's automotive industry. This project aims to create a low cost, retrospective solution that can be implemented in large scale to help reduce a significant number of accidents. This is by no means a fully autonomous system as it is, but an effective driver assistance system which helps the driver use an automobile in a safe way without getting into a crash situation from which the driver may find it hard to get out of. The system can also help a panicking driver to safely get out of the crash scenario. This

system contains two levels of assistance, the first level being a driver alerting system followed by a controlled braking process.

One of the major causes of road accident in the world is driving too fast, recent studies shows that one third of the serious road accidents are due to inappropriate speed, as well as change in road way (like presence of road work or unexpected obstacles). So in order to avoid such kind of accidents and to alert the drivers and to control their vehicle speed in such kind of places the highway department have placed the signboards. But sometimes it may not be possible to view that kind of signboards and there is a chance for accidents. So there is an utmost need to design a system which can control the speed of vehicles. Here we are designing a speed control system for vehicles which can intimate the driver about the zones and limit speed of the vehicle automatically.

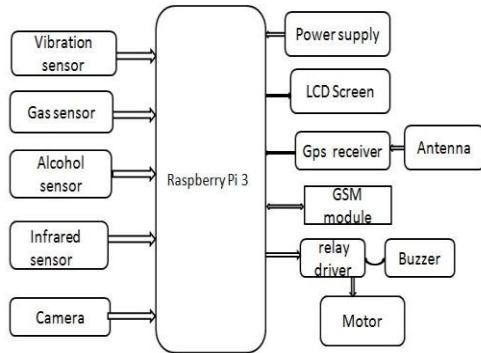
In our project we can monitor the vehicle speed and implements an action when the vehicle is detected to be exceeding the speed displayed in the speed display (sign) boards. The speed display boards are working as per the highway speed limiting protocol. The driver should take great attention on the speed of the vehicle especially when driving through busy junctions, railway crossings, school and college zones etc. The citizens are ought to obey the speed enforcement rules in order to avoid the accidents, any violation in this are considered as a greater offence. Traffic Police are authorized to check every vehicle and take actions against the violation. We also monitor the gas leakages, vibrations and also the alcohol level of the driver and make the vehicle stop if any of the above parameters are detected. We have also implemented an GSM system in order to respond immediately through an SMS service by including the location of the vehicle using GPS.

## 2. LITERATURE SURVEY

The main motive behind this paper is to reduce these reckless accidents for which we propose a system that governs and controls the speed of the vehicle without any direct inconvenience to the driver. There are instances where the speed of the automobile is beyond the expected speed limit or the driver does not obey the traffic signals. Thus we are using optical character recognition algorithm by placing a camera inside the vehicle and this camera will recognize the speed signs along the roads, and thus compares the vehicle speed and control the speed of the vehicle if it does not obey the speed limits or exceeding the speed. With India reporting as many as 1.34 lakh fatalities in road accidents every year, a vast 70 per cent of them being due to drunken

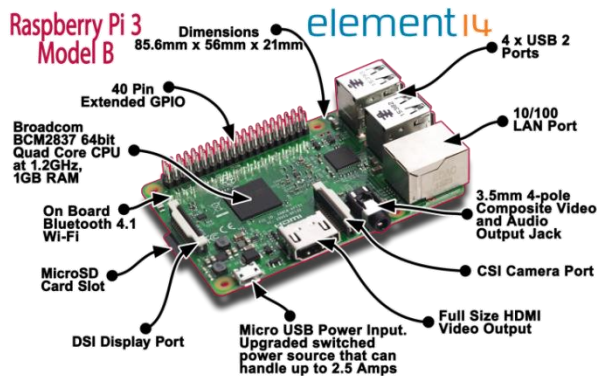
driving, questions are now being raised on whether the mushrooming growth of liquor vendors along the highways is responsible for costing precious lives in an untimely manner. 14% of accidents are due to gas leakages. So in order to monitor all these from inside a car, Our project mainly includes real time sensors like GAS, ALCOHOL, IR and Vibration sensor. These sensors are used for continuous monitoring of the alcohol levels or gas leakages if any inside the car.

### 3. BLOCK DIAGRAM



### 4. HARDWARE DESCRIPTION

#### 4.1 RASPBERRY-PI-3



#### TECHNICAL SPECIFICATION

- Broadcom BCM2837 64bit ARMv7 Quad Core Processor powered Single Board Computer running at 1.2GHz.
- 1GB RAM
- BCM43143 Wi-Fi on board.
- Bluetooth Low Energy (BLE) on board.
- 40pin extended GPIO.
- 4 x USB 2 ports.
- 4 pole Stereo output and Composite video port.
- Full size HDMI.
- CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display.
- Micro SD port for loading your operating system and storing data
- Upgraded switched Micro USB power source (now supports up to 2.4 Amps) Expected to have the same form factor as the Pi 2 Model B, however the LEDs will change position

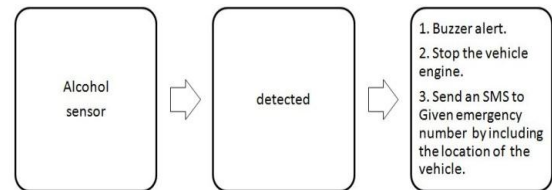
#### 4.2 POWER SUPPLY

Power Supply: The input to the circuit is applied from the regulated power supply. The microcontroller voltage is of 5V. The A.C. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating D.C voltage. So in order to get a pure D.C voltage, the output voltage from the rectifier is fed to a filter to remove any A.C components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage. We are using an IC 7805 as voltage regulator to get a 5V output Voltage.

#### 4.3 ALCOHOL SENSOR (MQ6):

The MQ-6 LPG - Isobutene - Propane Gas Sensor is a semiconductor gas sensor that detects the presence of LPG, Isobutane, and Propane gas at concentrations from 300 ppm to 10,000 ppm, a range suitable for detecting gas leaks. The sensor's simple analog voltage interface requires only one analog input pin from your microcontroller. The MQ-6 LPG - Isobutene - Propane Gas Sensor detects the concentration of gas in the air and outputs its reading as an analog voltage. The concentration sensing range of 300 ppm to 10,000 ppm is suitable for leak detection. The sensor can operate at temperatures from -10 to 50°C and consumes less than 150Ma at 5V. High Sensitivity to LPG, isobutane, propane. Small sensitivity to alcohol, smoke.

#### WORKING :

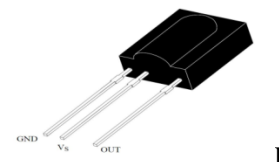


#### 4.4 INFRARED SENSORS:

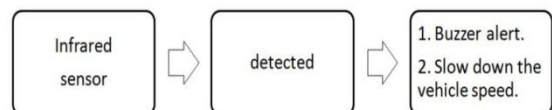
##### IR LED:

The IR LED receives 35 KHz frequency or 0 Hz frequency from modulator via driver transistor, BC 547. the output of IR LED is an IR light produced while receiving Bit 0 from PC. The 35 KHz frequency modulated with data from PC. The data width is decided by Baud rate mentioned in the PC. Here, we have transmitted the data at the rate of 300 Bps.

##### IR Receiver:



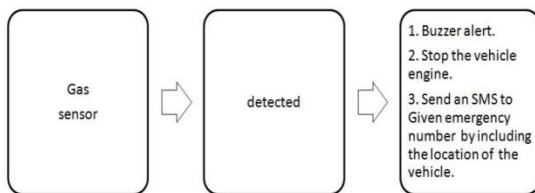
#### WORKING :



#### 4.5 GAS SENSORS

Gas Sensor(MQ2) module is useful for gas leakage detecting(in home and industry). It can detect LPG, i-butane, methane, alcohol, Hydrogen, smoke and so on. Based on its fast response time. Measurements can be taken as soon as possible. Also the sensitivity can be adjusted by the potentiometer. MQ-2 Semiconductor Sensor for Combustible Gas: Sensitive material of MQ-2 gas sensor is SnO<sub>2</sub>, which with lower conductivity in clean air. When the target combustible gas exist, The sensors conductivity is more higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different application.

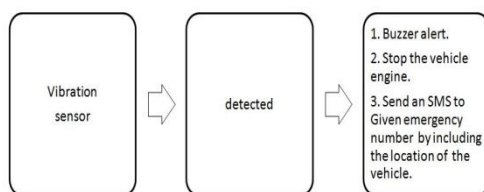
#### WORKING



#### 4.6 VIBRATION SENSOR

The Vibration sensor SW-420 and the comparator LM393 are combined and used to detect if any vibration beyond the threshold level . This threshold level can be adjusted using an onboard variable resistor.when there is no vibration the output of the module will be low and only if any vibrations are detected the output logics will become high and the LED glows.The driving ability of the comparator can be 15mA and the rated voltage is 3.3V -5V .The output of the module can be directly connected to the microcontroller.

#### WORKING



#### 4.7 GPS RECEIVER

Global Positioning System (GPS): The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals. Using GPS technology one can determine location, velocity and time, 24 hours a day, in any weather conditions anywhere in the world for free. GPS was formally known as the NAVSTAR (Navigation Satellite Timing and Ranging). The basis of the GPS technology is a set of 24 satellites that are continuously orbiting the earth. These satellites are equipped with atomic clocks and sent out radio signals as to the exact time and location. These radio signals from the satellites are picked up by the GPS receiver. Once the GPS receiver locks

on to four or more of these satellites, it can triangulate its location from the known positions of the satellites. It is a higher performance, low power satellite based model. It is a cost effective and portable system which accurately detects the location. This GPS is used to track the position of the vehicle after any kind of accident is occurred.

#### 4.8 GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM):

Global System for Mobile Communications is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. GPS is an open, digital cellular technology used for transmitting mobile voice and data services. GSM networks operate in a number of different carrier frequency ranges, with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. The longest distance the GSM specification supports in practical use is 35 kilometers (22 mi).

#### 5. REAL TIME APPLICATIONS

- Can control Over speeding vehicles on roads
- Can stop Drunk drivers.
- Can detect any kind of internal gas leakage in cars.
- Can detect any obstacle and avoid collisions.

#### 6. RESULTS

We will limit the speed of the car according to the sign boards that are placed on the roads and also continuously scan for various parameters like alcohol, gas and also scan for any obstacles and stop the vehicle if any accident occurs, we also send a SMS alert .

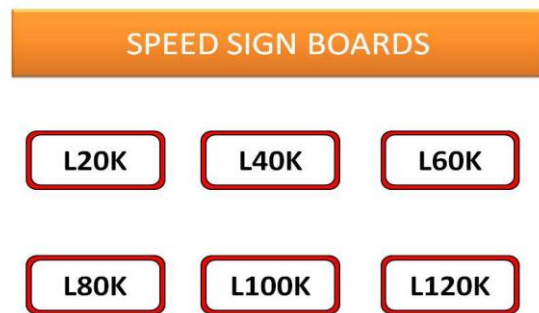


FIG : Speed signs designed for the Project.

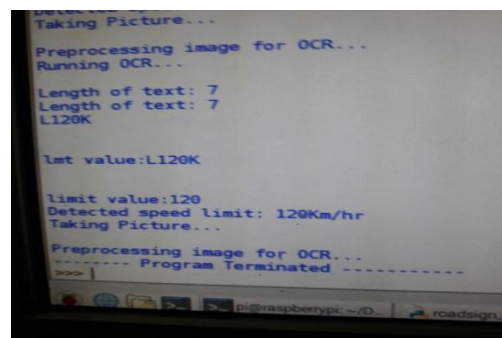




FIG : Speed limit 120 kmph detected

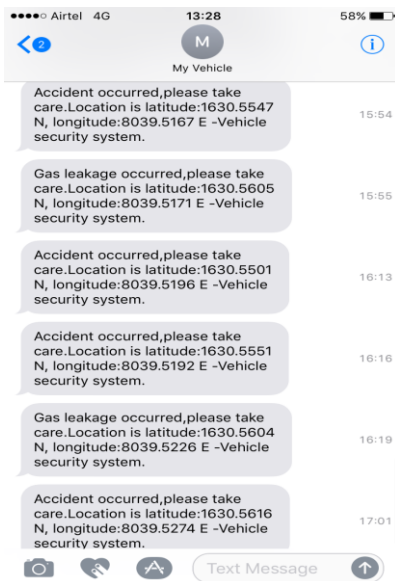
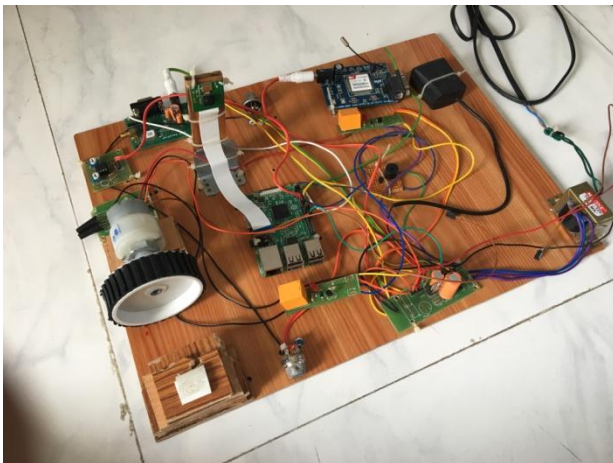


FIG : SMS ALERT FOR ACCIDENTS.

## PROJECT KIT



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