

VEHICLE BLACK BOX SYSTEM USING IOT

Abdul Mueid Hajeeb¹, Mohammed Huzafa Qazi², Shiva M Naik³, Prof. Abdul Tawab⁴

^{1,2,3}Anjuman Institute of Technology and Management, Bhatkal

⁴Under the guidance of (Professor of Computer Science and Engineering department AITM, Bhatkal)

Abstract - Vehicle black box is a system which, in case of accident will records all the parameters and also help us to prevent any accident to happen in certain extends The project is developed to record informational data, such as: temperature of the engine (30 seconds before), alcohol level, gas leakage level, etc. to revolutionize the field of motor vehicle accident investigation. It can also use for vehicle mapping and accident alert with the help of GPS and internet connectivity module. When the vehicle met with an accident the vehicle details and the position of the car will be send to the nearby rescue team for help.

Key Words: Car black box, Crash recovery, Collision sensor, Sensor networks, GSM.

1. INTRODUCTION

Vehicle black box is a system which, in case of accident will records all the parameters and also help us to prevent any accident to happen in certain extends The project is developed to record informational data, such as: temperature of the engine (30 seconds before), alcohol level, gas leakage level, etc. to revolutionize the field of motor vehicle accident investigation. It can also use for vehicle mapping and accident alert with the help of GPS and GSM technology.

2. Hardware Requirements

2.1 . Microprocessor

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.



Fig1 Raspberry Pi

An SD card inserted into the slot on the board acts as the hard drive for the Raspberry Pi. It is powered by USB and the video output can be hooked up to a traditional RCA TV set, a more modern monitor, or even a TV using the HDMI port. Because, it keeps its operating system, documents and programs. If your raspberry pi did not come with an SD card, then the min size you should get is 4GB. Advantages of the raspberry pi is, it is small, and it works as a normal computer at low cost server to handle web traffic.

Although Raspberry Pi is as small as the size of a credit card, it works as if a normal computer at a relatively low price. it is possible to work as a low-cost server to handle light internal or web traffic. Grouping a set of Raspberry Pi to work as a serveries more cost-effective than a normal server. If all light traffic servers are changed into Raspberry Pi, it can certainly minimize an enterprise's budget.

2.2 . MQ135 Gas Sensor

Sensitive material of gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustibile gas exists, the sensor's conductivity is higher along with the gas concentration rising. Please use simple electro circuit, convert change of conductivity to correspond output signal of gas concentration. Gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustibile steam, it is with low cost and suitable for different application. Sensor composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless-steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-3 have 6 pins ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

High sensitivity to alcohol and small sensitivity to Benzine. Fast response and High sensitivity. Stable and long life. Simple drive circuit. They are suitable for alcohol checker, Breathalyzer.

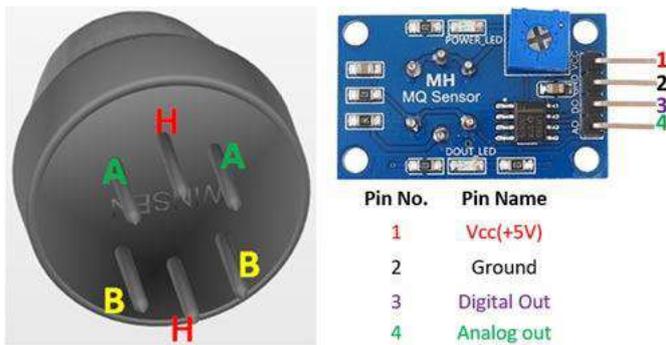


Fig 2 MQ135 Gas Sensor

accelerometers that measure gravitational force changes, with rapid changes and high forces indicating an impact from an unexpected collision.



Fig 4. Collision Sensor

2.3. LM35 Temperature Sensor

Engine temperature is the important in engine control unit if this value goes to abnormal, some unwanted gases exhaust from vehicles due to improper combustion. In this project in order to obtain the vehicle engine temperature, we have used LM35 temperature sensor this temperature sensor continuously read the engine temperature and fed to the microcontroller. It converts temperature value into electrical signal. Its temperature sensing range is -55 to +150 °C.

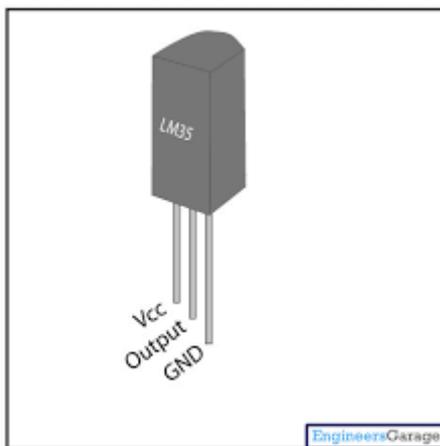


Fig 3. LM35 Temperature Sensor

2.5. Ultrasonic Sensor

The ultrasonic sensor is to measure the minimum distance from the vehicle. Ultrasonic sensor generates high frequency sound wave and evaluate echo which is received back by the sensor. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head.

2.4. Collision Sensor

A collision sensor is a piece of electronic safety equipment that detects an impact through vibrations. Collision sensors are also known as impact sensors. Collision sensors are used in many industrial settings, including manufacturing and utilities. The sensors are also used in consumer goods, such as in collision avoidance and detection systems in cars. Impact sensors are similarly used in many types of robots to prevent damage to products, tools and the robot itself. In many settings, quick detection of collisions with unexpected objects can reduce damages, costs and injuries. In environments where humans and robots work together, collision detection is particularly important for safety. They may also use



Fig 5. Ultrasonic Sensor

2.6. Motor Driver

Motor drives are circuits used to run a motor. In other words, they are commonly used for motor interfacing. These drive circuits can be easily interfaced with the motor and their selection depends upon the type of motor being used and their ratings (current, voltage). The major motor drive components for DC motors are: a controller, a motor driver IC or a motor driver circuit, the desired DC motor being used, power supply unit and the necessary connections to the motor.

Servo motor is a type of actuator device that consists of a motor and a sensor to control velocity, acceleration etc. The major motor drive components for a servo motor are a controller, power supply unit, servo motor and the necessary connections with the motor.



Fig 6. Motor Driver

2.7. Camera Module

The Raspberry Pi Camera Module is an official product from the Raspberry Pi Foundation. The original 5-megapixel model was released in 2013, and an 8-megapixel Camera Module v2 was released in 2016. For both iterations, there are visible light and infrared versions.



Fig 7. Camera Module

2.8 . LCD

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.



Fig 8. LCD Diagram

3. System Design

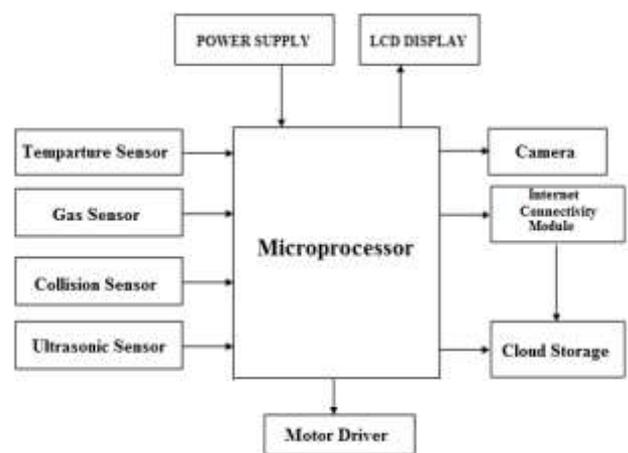


Fig 9. Block Diagram

Our Black Box System design consists of a black box hardware and a sensor subsystem. The black box consists of hardware to prevent data failure, secure data, resist external factors, wirelessly request data, and perform normal operations.

The system consists of cooperative components GPS device and Internet connectivity module. In the event of accident, if any injury happened to the car driver or passengers so maybe there will be loss of lives due to delay in medical help. Keeping this idea in our mind, we are proposing a system where car itself intimates the concern emergency service for immediate reaction in case of accident or any emergency. After the accident, this wireless device will send mobile phone short message indicating the position of vehicle by GPS system to family members, nearest police station and hospitals.

4. CONCLUSION

The proposed system based on microprocessor is found to be more compact, user friendly and less complex, which readily be used in order to perform several tedious and repetitive tasks. As various sensors are used to continuously monitor the various vehicle parameters which can create mishap and remedies if accident occurs, by sending a message along with the GPS coordinates to the rescue team for help. This project also uses a cloud storage to continuously store the details obtained from the sensor like temperature value, alcohol content in the cabin, gas leakage content. Though it is designed keeping in mind about the need for industry, it can be extended for other purposes such as commercial & research applications.

5. REFERENCES

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BIOGRAPHIES



Abdul Mueid Hajeab

Department of Computer science and Engineering, Anjuman Institute of Technology And Management ,Bhatkal



Mohammed Huzafa Qazi

Department of computer science And Engineering, Anjuman Institute of Technology And Management, Bhatkal



Shiva M Naik

Department of computer science And Engineering, Anjuman Institute of Technology And Management, Bhatkal