

# Car Safety and Fuel Monitoring System Using IOT

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**Abstract** - Now a days we use different type of vehicle but most of vehicle running with, the help of fuels so we should have a perfect meter for indication of the level of fuel Today, in the existing vehicles we face a common problem of fuel meters not showing accurate results. all things are connected in smarter way by using Internet of Things. The aim of connected vehicle technology is to solve some of the major issues in the transportation in the area of safety and environment. This paper proposed a system for people safety where in accident of the person automatic message will be received to the nearest police station and, also the nearest ambulance. In this project even, the exact amount of the fuel can be shown in the car. While filling the fuel in petrol bunks, people may not know whether the fuel is filled to the correct level for the amount given by them and gets cheated by the staffs who are in the bunk at sometimes, during the travel, maximum people are not aware of the distance covered for the rest of fuel present in a vehicle. Environmental pollution is one the major problems that affects biodiversity, ecosystems, so we must be responsible by not emitting much harmful gases like CO<sub>2</sub> NO<sub>2</sub> which will harm the environment we have keep a check on the emission of the car and it is achieved by using IOT.

**Index Terms** - Arduino Mega 2560, GPS Module, ADXL 335 Accelerometer, Temperature Sensor LM35, ESP 8266 WI-FI Module.

## I.INTRODUCTION

As fuel consumption is excess and almost everyone use fuel it's become an essential part of life. Seeing this much huge demand many petrol bunks try to exploit from people so when the customer gets to know whether he got the right amount of fuel then there will be a transparency. And day by day pollution in the whole world has become a major concern many countries do not maintain the pollution control of each cars it becomes hard for tracking. So, the amount of pollutants has been increased. Accidents are more common nowadays and many are not getting help at the right time, so this project will be helping them at their emergency period.

## II. PRPOSED SYSTEM METHODOLOGY

Step 1- Connecting Arduino to accelerometer sensor and then when the accelerometer sensor is triggered it sends the GPS location to the nearest ambulance and police station

Step 2 – Connecting Arduino to pollution sensor like MD6 MD 7 and check the pollutant level emitted by the car.

Step 3 – Connecting the Arduino to Mass Sensor and connecting a temperature sensor we will calculate the exact amount of fuel in the car by using some formulas.

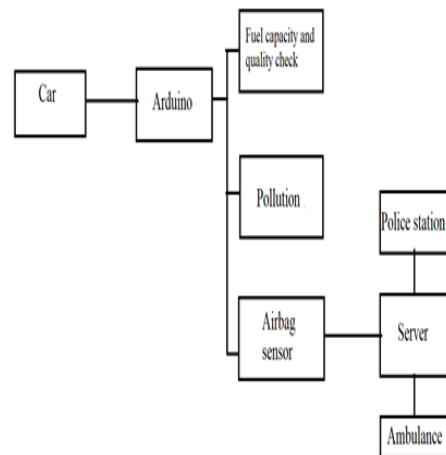


Figure 1: The whole block diagram

### A. To Calculate Fuel in Car

We are converting that analog fuel detection meter into the digital display where the level of the fuel will be detected and shown for the people who are travelling in that vehicle. With the help of fuel level which has been sensed by the sensor the mileage of the vehicle will be calculated and displayed in the LCD. This helps the person to know the distance which will be covered by the vehicle.

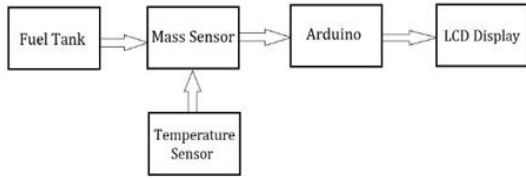


Figure 2: Fuel detection block diagram

In this system a mass Sensor is placed, and a temperature sensor is placed in the fuel tank. We will be measuring the tank when the fuel is filled and only the tank weight when fuel is not present.

Mass= tank mass with fuel - tank mass at zero fuel (in Kg)

Temperature is measured using temperature sensor

Temperature= (in degree Celsius)

Density of the fuel is calculated based on temperature chart.

Now By using formula we can calculate the exact volume

$$VOLUME = MASS / DENSITY$$

### B. Car Safety

When an accident occurs, there will be bursting of airbag, it happens when the accelerometer sensor senses a crash at that point of time airbag produces a gas which makes to inflate the airbag in 30msec. At this point the Arduino will sense that sensor is on then the GPS will be triggered in the Arduino and then the location is sent to the server and then the message will be sent to nearest police station or control room and ambulance. Then the person in the car can be hospitalized.

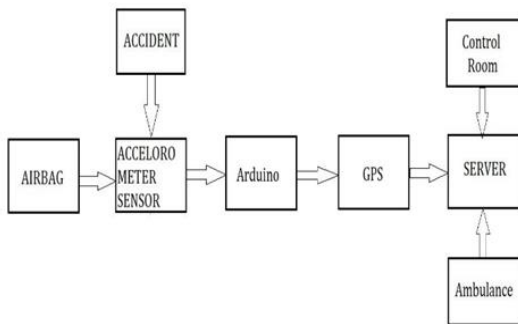


Figure-3 Car Safety working Block Diagram

### C. Fuel Emission

At the silencer there will be sensors like carbon dioxide and nitrogen dioxide Sulphur detection sensor using this sensor the content of emission of

combustion gas is found out and Arduino will be set to the maximum limit where the car emits the pollutant. Then it compares the emitted pollutants with the permissible emission, if it exceeds the given limit then a warning is shown in the LCD display and then also the content of pollutants emitted from the silencer.

Figure-4 Fuel emission testing integration block diagram

## III. COMPONENTS REQUIRED

### A. Arduino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.



Figure-4 Arduino Mega 2560

### B. GPS Module

The NEO-6MV2 is a GPS (Global Positioning System) module and is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high-performance u-blox 6 positioning engine. These flexible and cost-effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package.

### C. GPS MODULE

The SIM800A Quad-Band GSM/GPRS Module with RS232 Interface is a complete Quad-band GSM/GPRS solution in an LGA(Land grid array) type which can be embedded in the customer applications. SIM800A support Quad-band 850/900/1800/1900 MHz, it can transmit Voice, SMS, and data information with low power consumption.

With tiny size of 100 x 53 x 15 mm, it can fit into slim and compact demands of custom design. Featuring and Embedded AT, it allows total cost savings and fast time-to-market for customer applications.

### D. Load Cell

A load cell is a transducer which converts force into a measurable electrical output. Although there are many varieties of load cells, strain gage-based load cells are the most commonly used type. Except for certain laboratories where precision mechanical balances are still used, strain gage load cells dominate the weighing industry. Pneumatic load cells are sometimes used where intrinsic safety and hygiene are desired, and hydraulic load cells are considered in remote locations, as they do not require a power supply. Strain gage load cells offer accuracies from within 0.03% to 0.25% full scale and are suitable for almost all industrial applications.

### E. ADXL335 Accelerometer

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of  $\pm 3$  g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis. The ADXL335 is available in a small, low profile, 4 mm  $\times$  4 mm  $\times$  1.45 mm, 16-lead, plastic lead frame chip scale package.

### F. Temperature sensor LM35

LM35 is a precision Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which

can be used to measure temperature anywhere between  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ . ... There will be rise of 0.01V (10mV) for every degree Celsius rise in temperature

### G. Ultrasonic Sensor

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules include ultrasonic transmitters, receiver and control circuit.

### H. Gas Sensor

A gas sensor is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated.

### I. ESP8266 WiFi Module

ESP8266 is a 3V Wi-Fi module very popular for its Internet of Things applications. ESP 8266 maximum working Voltage is 3.6V and its very important to note. You must know how to power it, how to serial-connect it with Arduino safely, how to ping and many other things. You should use software like Circuito.io, Tinker cad, Fritzing to simulate and work with the board safely. You should also use Logic Level Controller to use with ESP8266 module.

### J.LCD Display

What is LCD Liquid crystal display is the used for displays the data. LCD is polarizing filter film with horizontal and vertical axis to block or pass the light. Reflective surface to send light back to viewer. LCD display use to display the data. LCD display composed of pixel made up of Liquid crystal. LCD is the thin flat panel that can let light go through it or can blocked the light. LCD consist of 16 pins. Some common LCD's connected are 16X2 and 20X2.Lcd uses power supply of 5v.

### K. Arduino IDE Programming

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino

hardware to upload programs and communicate with them.

#### L. Things Speak

ThingSpeak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics.

#### IV.CONCLUSION

From this Project exact measurement of the Fuel will be determined by which a person can know still how much fuel left in car to refuel the tank. Whenever the person in the car tries to refuel, he will be getting to know the exact amount of fuel intake in the fuel tank, so that the cheating of the petrol bunks can be found out easily without testing it manually. And also, the quality of the petrol is tested, whenever the emission of the fuel takes place if more impurities of the combusted air present a warning symbol is given to the driver then the driver gets to know that fuel is mixed with impurities so that he can avoid going to that petrol bunk during the next refuel. And if there is a major accident in remote area where no is available on road or near to that accident no one is there to help at that point of time this device helps to send a automated message to the nearest ambulance and also police station with the exact GPS location of the accident.

#### V.RESULT

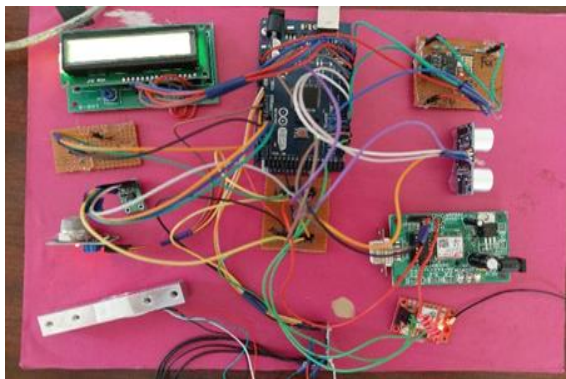


Fig5- Whole system image

#### At Point of Accident

When the accident occurs, the Arduino sends a message to the mobile saying the exact location of the place at which accident occurred. In which there will be a google maps link when we click the link it directs to Google Maps.

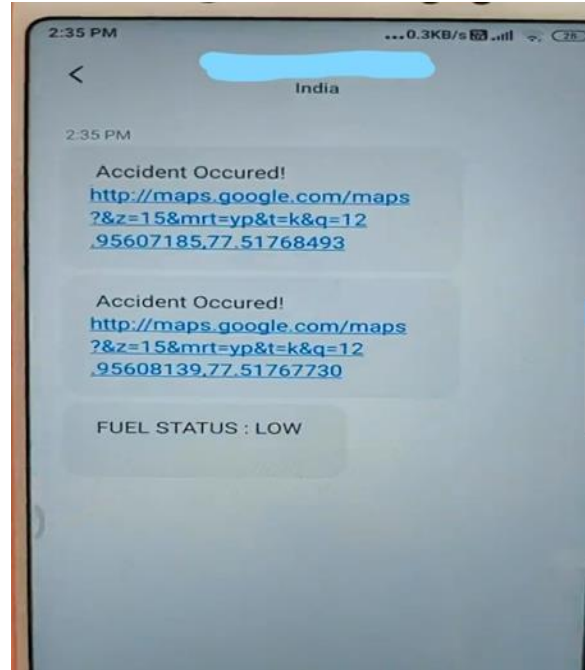


Fig 6- Accident occurred message alert in mobile

#### Fuel Weight

The weight of the fuel found out will be displayed on the LCD display and if the fuel weight is less it send alert to the mobile phone saying that the fuel level is low the vehicle



Fig 7- Fuel weight

#### Gas Pollutant

If the percentage of gas exceeds 80% then it shows a message on LCD display stating that the gas is polluted, if its below 80% it shows that “gas is not polluted”



Fig 8: LCD display about Gas Polluted

### Things Speak platform result

Here the temperature and gas values are uploaded by a Wi-Fi module to this platform. Now the values taken will be plotted to a graph with respect to date and time in x axis and temperature in the y axis for temperature graph next the gas values are shown in graph with respect to x axis as date and time and y axis as gas polluted.

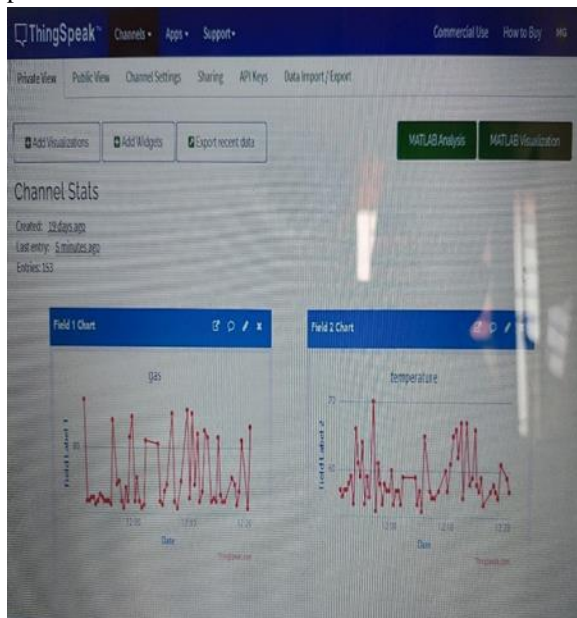


Fig 9: Graph of temperature and gas

### REFERENCES

[1] Alok Pithora, Gaurav Gupta, Mohit Goel, Mohit Sinha “Traffic Light Priority Control for Emergency Vehicle using RFID”, International Journal of Innovations in Engineering and Technology (IJJET) published on 2019function

networks, IEEEET rans on Neural Networks, vol. 4, pp.570-578, July 1993.

[2] Dr. B. Anuradha, B. Priyadarshini, A. Yuvasri, M. Yamuna “Fuel Level Indication and Mileage Calculator using IOT” 2019 5th International Conference of Advanced Computing and Communication systems (ICACCS).

[3] Kalpanaseelam, Ch. Jayalakshmi, K. Prasanti “Smart Vehicle Connectivity for Safety Applications using IOT”, International Conference on Inventive systems and Control (ICISC 2019), IEEE Xplore Part Number: CFP1906-ART, ISBN: 978-1-5386-3950-4.

[4] Chen Xianlei, Shi Haolei, Hao Huadong, Wu Zenan, Wang Jian, Shen Zhenggian “Research on Algorithm of cross-section area of Oil Storage Tank Capacity based on Point Cloud Data”, 2019 4th IEEE International Conference on Electronic Measurement and Instruments (ICEMI 2019).

[5] Chengui Yang “Using Median Surface Method to Measure Tank Capacity Equivalent”, 2017 the 2nd IEEE International Conference on Cloud Computing and Big Data Analysis.

[6] Dasari Vishal, H. Safiq Afaque, Harsh Bhardwaj, T.K. Ramesh “IOT Driven Road Safety System”, 2017 International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT).

[7] A. Anusha, Syed Musthak Ahmed, “Vehicle Tracking and Monitoring system to enhance the safety and security driving using IOT”, 2017 International Conference on Recent trends in Electrical, Electronics and Computing Technologies.