

# Vehicle Monitoring System with Digital Display & Map Navigation based on IoT

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**Abstract**— In the present world, if the fuel marker in the vehicles is inuence automated, by then it to will help us to know the right measure of fuel available/\_lled in the tank. The above certainty is considered in this task. Likewise the client need to know current measure of fuel in vehicle in exact way to choose the goal using Map Navigation and subsequently \_ll the fuel. The right measure of fuel open in the tank will be demonstrated precisely by making the usage of Ultrasonic sensor. The temperature of vehicle engine responds the condition of the engine, which is a vital parameter of running ordinary or not. So detection of engine temperature is considered in venture. In everyday life there is increment in air contamination because of the exhaust from vehicles. This prompts Global warming and other medical problems as well. So the project has considered the issue and takes the readings from vehicle exhaust of CO<sub>2</sub> gas and on the o\_ chance that it produces overabundance sum the vehicle must be adjusted or scrapped by client. And for simple utilization of these sensors and information the network is given to android app.

**Key words:** Raspberry Pi, Ultrasonic Sensor, MQ-2 Sensor, DHT11 Sensor, LCD Display, GPS Module, Embedded System, Cloud Storage

## I. INTRODUCTION

The proposed System will help a person to detect the Fuel level give the digital display of exact amount unlike the analog which do not specify exact amount of fuel. If the amount of fuel is detected less than decided threshold value then the buzzer will indicate the user by making a sound. And then if person do not know the area well the Map navigation will help him to find nearby fuel station .Also the project holds the idea of detecting the temperature of engine as engine is vital part in ordinary working and also has to be maintained for smooth working of vehicle. As the pollution is serious topic, the idea is to detect the combustion CO<sub>2</sub> that comes from vehicle exhaust. If combustion is polluting in greater amount user has to service his vehicle or scrap it. For easy access of vehicle parameter data the idea of user friendly android app is generated.

Now a days the use of vehicles has grown to a greater extent. The person has a lot of work to do in life and in that process the people may forget to check the level of fuel in tank and may suer from various problems like low fuel, check the fuel station nearby, and then this may lead to loss of time. Hence the proposed System is motivated to help people to detect the level of fuel, if low fuel level then they can be indicated by buzzer sound and digital display of exact amount of fuel and also map navigation system shows nearby fuel station which indirectly saves a person's time. Engine, which is a vital parameter of vehicle running ordinary or not, it is important to manage and maintain its sustainability by

managing temperature.CO<sub>2</sub> detection from vehicle will help to detect and help user to maintain PUC.

## II. OBJECTIVES

The framework is intended for testing of vehicles which will enable innovative work to group in car businesses for plan approval of the vehicles. Proto vehicles need to experience distinctive tests as indicated by car models including indoor and open air testing. These tests are vital for steady enhancements and configuration change of the vehicles. The proposed framework will be utilized for open air testing of vehicles.

The following table shows objectives of proposed system:

Test performed on vehicle	Observed parameters
Fuel level and map navigation	Digital display of fuel volume and location of vehicle and nearest fuel station
Temperature detection	Engine temperature display
Combustion detection	Amount of CO <sub>2</sub> expelled from bike.

## III. MATHEMATICAL MODEL

### A. Algorithm & Computational Complexity

The insight and judging limit will be putted in the gadget as a software or firmware (specific in the event of a microcontroller). The software takes an averaging calculation to process the amount of fuel introduce in the tank. The approach goes in two routes relying upon the kind of info catching sensor. Initial one adopts an added substance strategy while the second approach goes the subtractive usage of calculation considering the fuel and the sensor utilized. The computational necessity of the calculation is low, as the information is taken from single occurrence basic leadership structures; which speeds the execution of the framework.

A problem is in NP-Hard class if an already proved NP-Hard problem reduces to it. NP-Complete is a complexity class which represents the set of all problems X in NP for which it is possible to reduce any other NP problem Y to X in polynomial time. As compared to other systems our system is going to reduce the time and human efforts. Therefore, our system is of type NP-Complete class problem.

### B. Mathematical Model

S= {I, S, DD, NDD, F, F1, F2, F3}

I= initial stage

S= successful output of the system as per requirement is achieved.

F= failure of the system. Unable to produce output according to the requirement.

NDD= non deterministic data  
DD= deterministic data  
F1=Ultra sonic Sensing Function  
F2=MQ2  
F3=DHT11  
F4= successful output displaying Function.

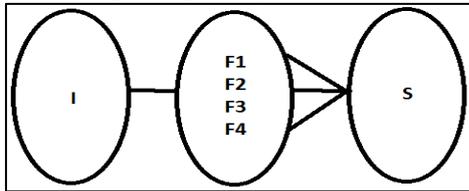


Fig. 1: Venn Diagram

#### IV. PROPOSED SYSTEM ARCHITECTURE

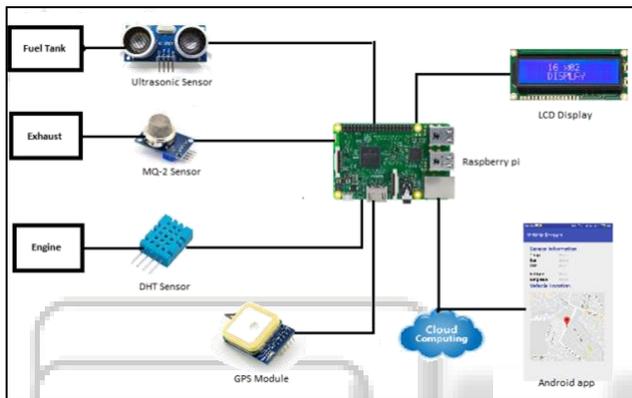


Fig. 2: Proposed System Architecture

##### A. Ultrasonic Sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back.

##### B. MQ-2 Sensor:

The MQ-2 is an ammable gas and smoke sensor detects the concentrations of combustibile gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of gas of 300 to 10,000ppm.The MQ-2 gas sensor is sensitive to smoke.

##### C. DHT11 Sensor

The DHT sensors are made of two parts, a capacitive humidity sensor and a thermistor. There is also a very basic chip inside that does some analog to digital conversion and spits out a digital signal with the temperature and humidity.

##### D. Cloud Storage

It is used to store real time data which will be fetched by android app.

##### E. GPS Module

It gives current location of user and can give connectivity to the Map.

#### V. WORKING

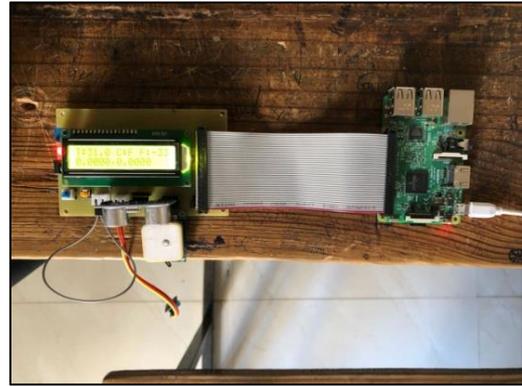


Fig. 3: System Connections

- 1) Step 1: Vehicle Monitoring System Starts when given power supply.
- 2) Step 2: The level is detected and digitally displayed on seven segment display.
- 3) Step 3: If threshold level of fuel is detected by sensor then the user will get indication by the buzzer.
- 4) Step 4: Temperature sensor senses the Engine temp and displays on digital seven segment and also the combustion detection is done and displayed on LCD.
- 5) Step 5: As we start the system, it gives live location of vehicle.
- 6) Step 6: The Raspberry pi fetches the data from sensors and updates on cloud and are displayed on Android app & also the map navigation is present in the app to give nearest fuel station information.
- 7) Step 7: The system will update sensor information for every 2 secs, which makes it real time system.
- 8) Step 8: Exit.

#### VI. RESULT & VALIDATION

##### A. Testing Cases

Test ID	Functionality to tested	Test Procedure	Expected Result	Actual Result	Pass /Fail
1	To verify functionality of the search result	Click on search button For retrieving results	List of URLs should be displayed related to query	List of URLs displayed related to query	Pass
2	To verify all the operations which user can use	Click on the operation which user wants to use	System should display the related window	System displayed the window using particular URL	Pass
3	To verify login entries by admin	Click on the operations accessed by admin only	It should display the related window	It displayed the operations along with window for admin only	Pass

Table 1: GUI Testing

Test ID	Functionality to tested	Test Procedure	Expected Result	Actual Result	Pass /Fail
1	To verify whether JDK is installed	Java environment checked	Java should be installed	JDK installed	Pass
2	To verify the existence of Raspbian OS	MicroSD card and Raspberry pi environment checked	Raspbian OS should be installed	Raspbian OS is installed	Pass
3	To verify existence of Android Studio 2.1.1	To check the installation of Android Studio	Android Studio should be installed	Android Studio is installed	Pass

Table 2: System Testing

**B. Result**



Fig. 4: LCD Display

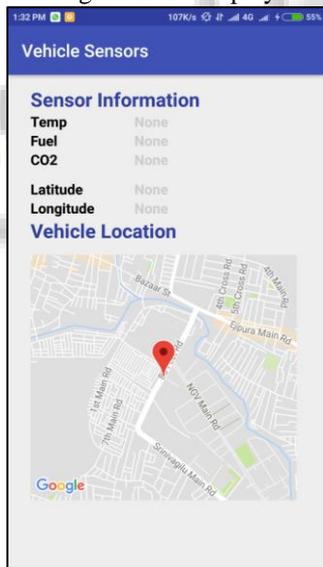


Fig. 5: Android App Display

**VII. CONCLUSION**

The proposed thought comprises of ultrasonic technique for fuel estimation that gets the deliberate fuel level and sends to the display unit which is available on the dash board. The information gained from the sensor is given to the microcontroller. The processor forms the information by guring the litter esteem that send to the display unit. In the event that the fuel level all of a sudden abatements at the point when the bike. The framework will help Drivers to persistently keep a watch on the fuel stock and get hint if there should arise an occurrence of underneath save level and if low

fuel level then shows the nearest Fuel Station through Map Navigation. Also the Other sensors like MQ-2 and DHT11 collect information about parameters of vehicle and send to microcontroller which later displays result on LCD andthe Android app too.

**VIII. FUTURE SCOPE**

Project can be improved in terms of performance and also in terms of different UI instances, also various other parameter of vehicle can be measured by adding required sensors. Ex: Tyre pressure detection, Fire Detection etc.

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