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IOT Based Smart Vehicle System

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Abstract: Today in this world, if the fuel indicator in the automobiles is also made digital it will help to know the exact amount of fuel in (ml) available in the fuel tank and if the pollution indicator is also provided in the automobiles it will help to know the accurate amount of Pollutants level in vehicles. This work introduces by Mq7 Sensor, UV sensor in the two wheelers. The above furnished fact is considered in our Paper and we found out a proper solution for indicating the accurate availability of fuel in the tank digitally and one will able to check the emission rate in the frequent interval and can take remedial action. This will prevent degrading the environment from pollution. In our Paper the main blocks are Two Wheeler, Tank, Battery, micro controller unit, fuel level sensor, Carbon monoxide Sensor and LCD Display. These sensors are placed at certain place to find out the fuel level and Harmful gas Emission Level and the signal is sent to the micro controller unit for further operations. In today's market the available fuel level information is in terms of percentage but our proposed method will displayed it in terms of exact fuel level(In The Form Of Digits) and these information are preprogrammed according to the sensor positional values .In this Paper a ultrasonic sensor is mounted within the fuel tank the variation of the fuel can be observed with the help of UV Sensor .Carbon Monoxide Sensor will sense the exhaust from the silencer by coming in contact with the emissions in presence of these harmful gases, the sensor conductivity increases depending on the gas concentration in the exhaust air .A simple electrical circuit can convert the change in conductivity into output signal which corresponds to the gas concentration level. The voltage drop between the resistances (Rl) is the output of the sensor circuit. This voltage gets converted into carbon monoxide particles rate and is shown in the display.

Key Word*:* Fuel Indicator; UV Sensor; MQ7 Gas Sensor, LCD display.

I. Introduction

In this paper we are going to apply IOT technology and using that we are going to find out the current amount of fuel entering into the fuel tank of the bike. Today in this digitalized world, if the fuel indicator in the automobiles is also made digital it will help to know the exact amount of fuel available in the fuel tank. Another important concern for two wheelers not only in India but also all around the world is the Pollution caused by the bikes. Motorcycles emit substantial quantities of hydrocarbons (HCs), carbon monoxide (CO), and particulate matter (PM). These pollutants have significant adverse health effects and deteriorate environmental air quality. To address these serious pollution problems caused by two-wheel vehicles, which is growing in number of countries of the world there should be an indicator present in the two wheelers so our work introduces carbon monoxide indicator in the two wheelers.

Components of the System

1) ARDUINO UNO RS - 328(IDE)
2) Proteus 8
3) Arduino (IDE)
4) Liquid Crystal Display (LCD)
5) MQ7 Sensor
6) UV Sensor

Problem Definition

- In the recent world we are constantly hearing about petrol pump frauds. Most of the petrol pump today have manipulated the pumps such that it displays the amount as entered but the quantity of fuel filled in the customer's tank is lesser than the displayed value .So to tackle this problem we are using UV sensor to calculate the amount of fuel in tank.
- Pollution and especially air pollution has always been serious threat to the environment. There is need here to limit these amount harmful gases emissions so one of the way of doing this is to keep the vehicle serviced. This can be done with the help of regular check of PUC of the vehicles but this method has proved to be a failure when undertaken by government authorities. With the help of this system the random PUC checking can be done. Awareness regarding PUC can be created.

Objectives

- Design & develop a device which will display the emissions from motorbike.
- Create awareness among people about pollution under control norms given by the government.
- To create awareness among people of tuning their vehicle in the periodic interval so harmful gas emission gets decreased.
- Design & Develop a smart digital fuel indicator for the motorbike.
- To prevent common people by fraud at petrol pumps, where they may be getting less fuel against what they paid for.
- To develop a device which would determine amount of fuel left in the fuel tank.
- To develop a device which would show the distance the motorbike would travel in remaining amount of fuel.

Methodology in Proposed System

- Fuel Level Sensor
  Automatic Fuel Management System (AFMS) consists of basic electronic components which are mounted on tank for the purpose of measurement and monitoring of its volume .The proposed system aims in the measurement of the fuel in the vehicle tank using ultrasonic sensor It has one membrane which produces sound and the other has receives echo. The sensor detects the fuel level by the reflection of the echo. It is Non-contact distance measurements sensor. It can be varied according to the height of the tank.

- Pollution Detection sensor
  To address the serious pollution problems caused by two-wheel vehicles, MQ-7 gas sensor can be used to detect amount of harmful CO emissions out of bikes .It makes detection by method cycle of high and low temperature. The sensor's conductivity is much higher along with the gas concentration rising. To create awareness among people we have given the buzzer system which follows government norms for Co emission. If the co emission go higher than government guidelines then it gives you indication that your emission is high so user can do the needful.

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II. Literature Review

Mandar Milind Gijre. (Smart Fuel Level Indication System (6 May 2018))
The smart digital fuel indicator is very advance type indicating system in this world. The main advantage of this system is that it can gives accurate value of remaining fuel as well as the vehicle running capacity in kilometer. The accuracy level is estimated to be up to 70% to 75% because of advance type C.P.U. is preferred and used in this Paper. This project is able to show that simple hardware and technology can be used to construct a robust fuel level monitoring system. The ultrasonic sensor directly connected to the fuel tank of the vehicle. Accordingly the ultrasonic sensor will be find the output that is the Fuel Level in tank in liters.

B. P. Kulkarni. (Automatic PUC Detection System (3 March 2018))
By using this Paper we reduce the speed of the vehicle if the values of CO and CO2 sensor goes beyond to the predefined value. If the values of the CO and CO2 sensors are maintained within the predefined limit the vehicle moves in the normal speed. The values of the CO and CO2 gases will be continuously display on the LCD. This comes under the car automation that's why another sensor model is added which is rain sensor. When the water drops on the sensor the motor gets ON and rotate in clockwise and anticlockwise direction.

Gokul.LS. (**Digital Indication of Fuel Level in Liters in Two Wheelers (30 march 2017)**
The objective of this paper is eliminate the conventional of fuel level indication in two wheelers which uses float sensor to indicate the fuel level. The elimination of float sensor is due to their low accuracy in fuel indication. In this competitive world, everyone wants greater accuracy than the previously proposed ones. In order to increase the accuracy, they have used ultrasonic sensor and flow sensor to display the results of fuel level indication. The experimental analysis of our project yielded us satisfactory results over the conventional methods he deployment of flow sensor as well as ultrasonic sensor in fuel level indication have yielded satisfactory results over the conventional fuel level indication. The accuracy has been increased to 94% with a tolerance of ±0.1 liters. This method will yield accurate results while driving on plane surfaces or on the roads and the accuracy will reduce while driving on slopes or the hills. The entire system is more economical and reliable

S. D. Sawant. (Online Real Time Puc and Engine Parameter Monitoring In Vehicle Using Wireless Sensor Modem (2 Feb 2017)
At any R.T.O. authorized P.U.C. center, the concerned officer has to manually enter the vehicle number and CO2 value emitted by the vehicle. This manual process may be result in some hindrances. And for cooling purposes, temp. Sensor can be install in vehicle. Result is that online database can be maintained, by implementing the fan, it can easy to cool down the temperature of engine. We can set the threshold value easily to maintain the engine efficiency. The superiority of this work is compared in terms of area, parameter, and communication methodology. The advantage of this method is as follows simplicity, efficiency. It can be remove the noise. Identification as well as accountability of on road vehicles. Future application is that in software part, the online real time PUC can developed by using web technology, one alert SMS can be send to the customer, so that those persons having PUC Expiry date is near and kindly checked or renew it as early as possible result is that it can checked PUC regularly

III. Design and Experimental Analysis

Circuit connection for UV Sensor

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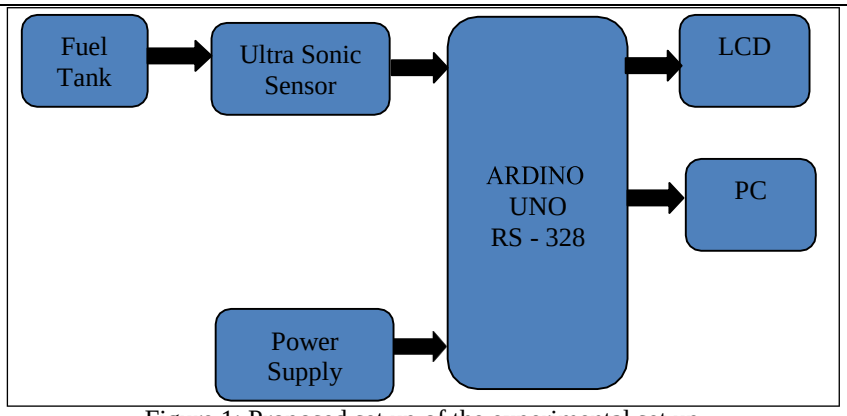

Figure 1: Proposed set up of the experimental set up

Working of UV sensor-:

The UV Sensor is mounted in the tank which produces waves which gets reflected back from the upper level of fuel and is received by other membrane. These data is given to Arduino which calculates and converts the given data by using the code which is fed by using computer to the Arduino. Then this data has send to LCD which displays it on the screen.

Results Analysis:

Input Parameter for UV Sensor Measurement:

For example, if the object is 20 cm away from the sensor, and the velocity of the sound is 340 m/s or 0.034 cm/µs the sound wave will need to travel about 588 micro seconds. But what you will get from the Echo pin will be double that number because the sound wave needs to be travel forward and bounce backward. So in order to get the distance in cm we need to multiply the received travel time value from the echo pin by 0.034 and divide that value 2.

Formulae Used:

- V (Speed of Sound) = 340m/s = 0.034cm/us
- D (Distance) = 20 cm
- T (Time = Distance (D) /Speed(V)) = 20/0.034 = 588us
- Distance = T X 0.034 /2

Simulation of UV Sensor Using Proteus

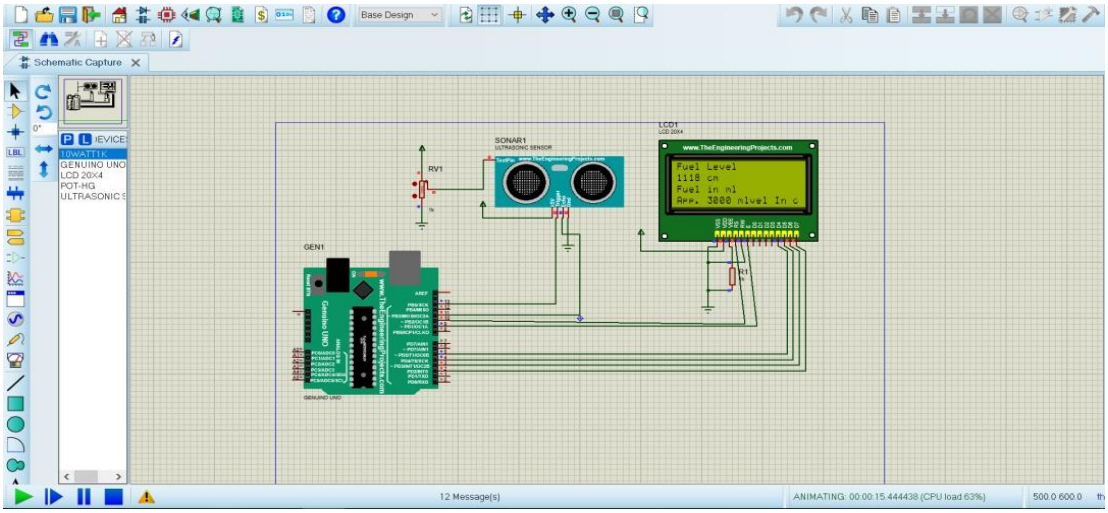

Fig 4: Displays the simulation of uv sensor

Figure 3: Fuel level display

Reading No.	Potentiometer Reading (%)	Fuel Level (ml)	Distance Measured(cm)
1	0-1%	Low fuel	4cm-25cm
2	2-8%	250ml	26cm-103cm
3	9-19%	500ml	104cm-204cm
4	20-27%	750ml	205cm-305cm
5	28-36%	1000ml	306cm-405cm
6	37-45%	1250ml	406cm-506cm
7	46-54%	1500ml	507cm-606cm
8	55-63%	1750ml	607cm-707cm
9	64-72%	2000ml	708cm-804cm
10	73-81%	2250ml	805cm-905cm
11	82-90%	2500ml	906cm-1005cm
12	91-99%	2750ml	1006cm-1106cm
13	99-100%	3000ml	1107cm-1118cm

Table 2: Simulation results of proposed system

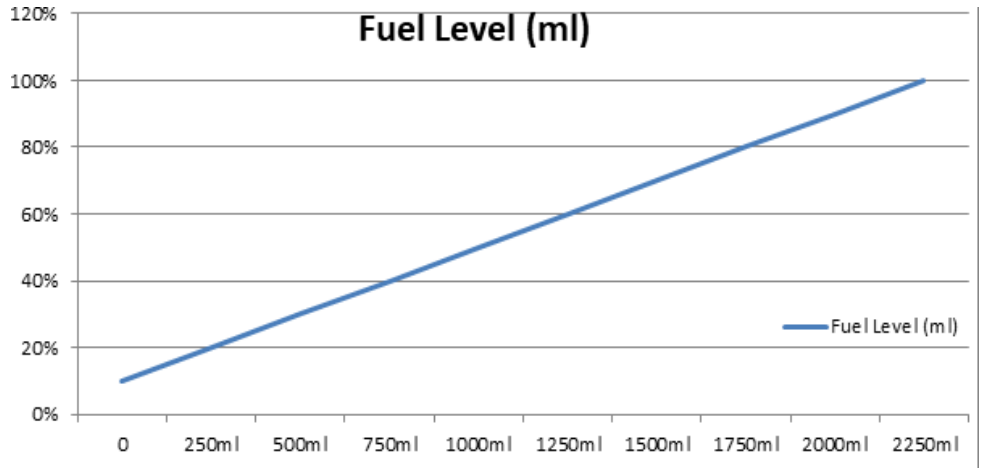

Figure 5: Variation of Fuel level in (ml) vs distance measured in cm

Position of PUC sensor to be mounted

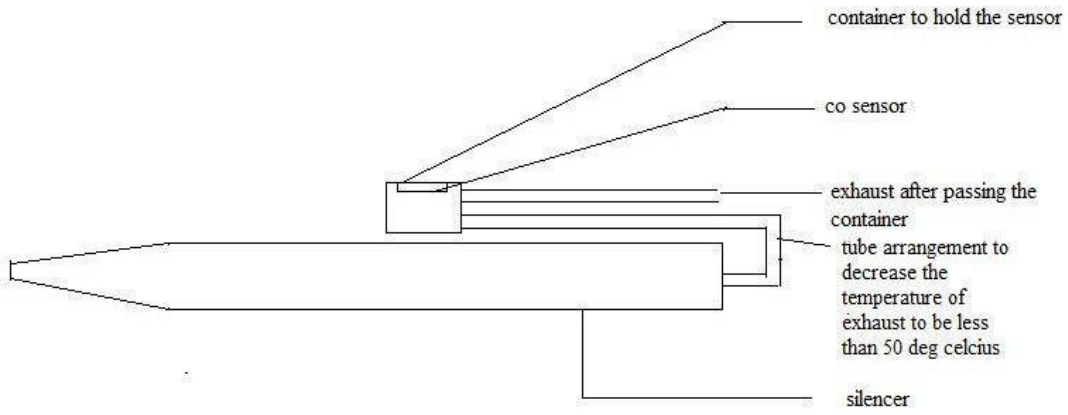

Figure 6: Mounting of PUC sensor

- Temperature effect

- Temperature has effect on pollution measuring device.
- Temperature and concentration is directly proportional to each other

Circuit connection for MQ7 Sensor

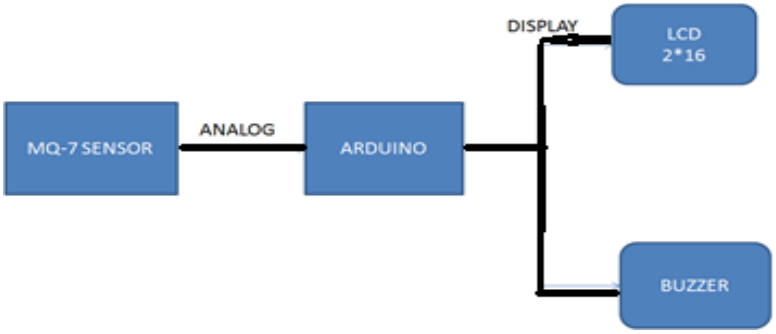

Figure7: Circuit connection for MQ7 Sensor

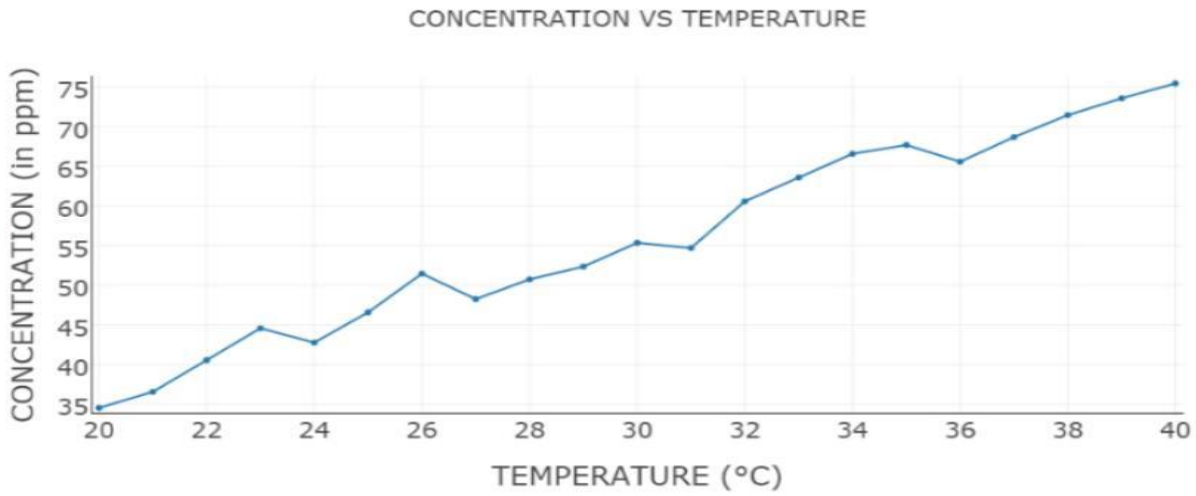

Fig 8: graph of concentration vs temperature

Working principal

- In this circuit lcd is interfaced with 8 bit mode. If RS is low then lcd detects it as command.
- Else if RS high lcd detects it as command
- MQ7 gives analog output which is fed to analog input of Arduino
- Arduino analog set up 2 resisters are available, each of 8 bits/ 1byte
- 10 bits are used for ADC combination we made is 1024
- V max = 1024= 5V, V min = 0 = 0V
- Result (v) = X*5/ 1023
- If ADC greater than 2.5 voltage then lcd will be on
- Else LCD will stay off.

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Simulation of PUC Sensor Using Proteus

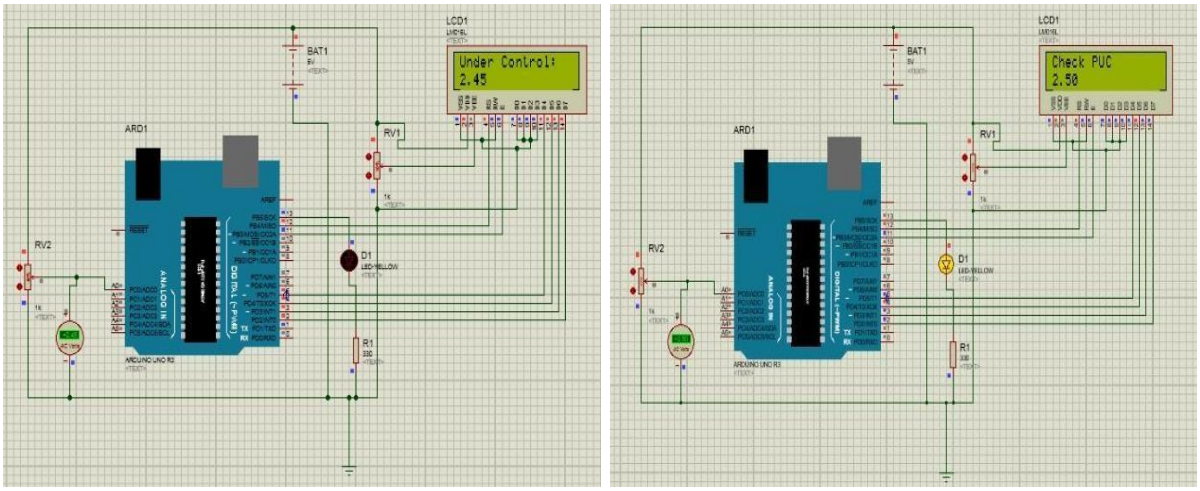

Figure 9: PUC indication circuit showing on Emissions

Conclusion and Future Scope

- In this Paper, we have created a working simulation model for checking fuel level and indicating PUC parameters and successfully integrated the two parts of a two-wheeler which are responsible for the safety and awareness of the rider.
- To avoid frauds by the petrol pumps the amount of fuel filled will be seen on the LCD in the real time so in case of fraud we would have proof of the same.
- We have presented a pollution indicating device and digital fuel level measuring device. The pollution indicating device shows about whether the two-wheeler is fit to be driven and is under the pollution norms.
- This work helps to know about the amount of carbon monoxide emitting from the two wheeler. This made people to think that they are degrading the environment. This helps to remind the people that they should tune the vehicle in periodic interval.

Future Scope

- At present, the automobile industries are using indication for fuel level is analog and no vehicle has pollution indicating device on them. There is a immense scope for research in this field as just the indication is not enough to ensure the safety of the environment since most of the time these warnings are ignored. So more research in field of controlling pollution needs to be done to keep the efficiency intact or even higher if possible.
- There is a scope in providing level and PUC data in exclusively on the app, which may also show location of nearest petro pump and servicing center in the area.

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