

Automation in Automobile : Fuel Analysis

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Abstract: In today's digitized world, if the fuel icon in the car has been prepared in additional quantities It would be well known for fuel consumption in fuel tank. Here, we are calculating fuel in the tank in liters. This will be calculated in numerical digits (ex: 1.2 Lt. , 1.3Lt. and 1.4 Lt.). These days the fuel pointer framework for the bikes are computerized yet they do not show the correct measure of fuel available in the tank i.e. they demonstrate the measure of fuel as far as not in dots or bars but in numbers or digits like liters. So this issue is corrected from our work of building up the computerized (numeric) fuel pointer framework which indicates correct measure of fuel regarding Liters (L).In addition, our system provides an notification to owner). "This project aims to provide facility of Smart detection of actual amount of fuel as well as calculating the distance can be traveled with available fuel"

Keywords: Raspberry pi,Water Flow sensor.

I. Introduction

In this project we will going to apply IoT technology and using that we are going to find out and display the current amount of fuel entering into the fuel tank of the bike. According to that we can find out the amount of fuel which is burnt and how much is left in the tank at the moment.further we will apply the machine learning algorithm to find out how much distance the bike will travel.For this project we have used the Iot technology.The sensors we will be using are flow sensor YF-S201[11]. This project helps to avoid a lot of problems like fuel bunks at fuel stations, fuel theft and prevents us from getting into situations where we have to push our vehicles due to assumptions of the level of fuel. Nowadays the fuel indicator system for the two Wheeler's are digital but they don't display the exact fuel which is available in the tank i.e. they show the amount of fuel in dots and bars but not in numbers or digits like Litre[12].

II. Literature Review

A. Paper-1

Title:-Smart fuel level indication systemThe methodology for the smart fuel indication contains

- 1) Fuel indicator system which shows exact amount in liters.
- 2) vehicle running capacity can be shown in km[13].
- 3) Pressure sensor is used for high accuracy.

A. Fuel Gauge

Gauge (or gas gauge) is a device used to indicate the level of fuel contained in the tank. Generally used in cars, they can also be used for any tank with underground storage tank. There are two important parts in the system

If the sensing unit normally uses float-type sensor to measure the fuel level, then how much does the electric current flowing through the indicator system unit and indicates the fuel level. There are various techniques for sensing execution and display of the system[14]. Traditional Float Type Measurement Techniques and Microcontroller-Based Fueling Techniques

B. Various Techniques used for Sensing and Indicating

- 1) Resistive Float Type

Currently, the most common and conventional fuel indicator system uses a float type sensor to measure the fuel level in the tank and this system has two units which are responsible for the number of fuel units measured in the tank for measuring the fuel level, the gauge will be responsible for displaying the fuel level measured for the presentation[13].

Limitations

- 1) sensor failure, the operation of the indicator system will be disturbed.
- 2) Less accurate result

B. Paper-2

Title:-Fuel Level Management in Automotive System: Solving Fuel Sloshing Issues
amount of fuel in the tank, with some disadvantages depending on the type of fuel.

Objectives of this system is measure the amount of remaining fuel in the tank and display digital values for the same. To prevent the petrol thefts at the fuel stations. To suggest the commuter about low fuel to refill the fuel. To make the device cost effective without compromising on the accuracy of measurement.

- 1) Input: Data collected from the users using sensors.
- 2) Output: The detected fuel level will be the output of the built system. The system will also prevent the petrol thefts at the fuel stations. It will also suggest the commuter about low fuel to refill the fuel.
- 3) Functions: The two sensors used will be the objects in the project. The respective functions for the sensors is to keep the record of the fuel entering the tank and the fuel present in the tank at any given time in the dynamic memory of the Arduino[13].
- 4) Success Conditions: Taking input from the sensors and displaying the accurate value of fuel irrespective of sensor being chemical resistant, should not vary with physical orientation, independent 2 of shape and size of the tank will result in success conditions. These will be the ideal conditions.
- 5) Failure Conditions: Taking input in conditions other than ideal conditions will result in failure conditions

limitation

- 1) The system has to feed with different setting if ultrasonic sensor is used for different type of fuel.

C. Paper-3

Title:- SMART DIGITAL FUEL INDICATOR SYSTEM

Methodology is as follows

- 1) The operation time taken is very less.
- 2) All the equipment's have long life, durable and quality material.
- 3) This project is able to show that easy-to-use hardware and technology can be used to create a fuel-level control mechanism.can be used to construct a robust fuel level monitoring system.

The ultrasonic sensor is installed in the tank to sense the level of the petrol. And the Hall Effect sensor is used to count the rotation of the wheel. The GPS is used to get the location of the user[14]. The working of the system is, the ultrasonic sensors which are installed in the tank use to sense the level of petrol and send it to the controller, the controller will show that level in digital (numeric) form like (1.2, 2.2, 5.4etc) on the 20*4 LCD display. are going to implement the Advanced System as we consider the previous analog system. In our system we are looking for digital fuel meters and theft. Displays the amount of fuel in the tank in liters in the digital fuel meter[11]. This value in liter is numeric (1 lit. 1.5 liters, 2 liters).Also the rotation of the wheel is counted by the Hall Effect sensor using magnet which is place over it and these pulse are given to the controller.According to that, the LCD which is connected to the controller shows the speed, mileage, fuel level and estimated distance is displayed on the LCD.

The additional GPS circuitry is used to provide location of user, by using latitude and longitude of corresponding area of user. GPS fetching the latitude and longitude value of the user location and send it to the system[13]. The Apache Software is used to fetch the latitude and longitude values and MY SQL software is used to store the data of the user location in the web server, and display on the map.

Limitations

- 1) Complex setup
- 2) Less efficient

D. Paper-4

Title:-An Intelligent Online Mileage Indicator for new generation Automobiles

Methodology is as follows

- 1) The system performance is found more accurate and perfect based on the output obtained under different conditions of the vehicle.
- 2) The developed system able to keep eye on mileage effectively even for increased speed range due to high response frequency of the proximity sensors.
- 3) The device able to indicate the driver to utilize the fuel in efficient way.
- 4) The system indirectly shows the maintenance of the vehicle.

Main blockers are micro-controller units, fuel level sensors and LCD display units. Fuel level inspection circuit is used to find the quality of fuel in the tank. Sensors are installed in some places to find the fuel level and the signal is sent to the micro-controller unit for the next operation. To understand the fuel level the sensor is mounted in the fuel tank and the exact level signal is sent to the signal micro-controller unit to determine the information. When the fuel level reaches a higher level sensor, it means that the tank is full and the user will be indicated by the maximum tank level and the level information will be shown by the LCD. The LCD connected to the vehicle shows the current fuel level of 2.1 liters and the distance can be within 105 kilometers.

Limitations

- 1) Traffic condition.
- 2) lower gear may have an adverse effect
- 3) Require more time
- 4) Less efficient

III. Methodology

Our methodology is based on the data acquired by the sensors and processing that gathered data with the help of the algorithm and displaying the results of the processed data. The main steps of are as follows

- 1) SENSOR PLACEMENT
- 2) GATHERING DATA
- 3) THE CALCULATION PHASE
- 4) DISPLAYING THE AMOUNT

It is Raspberry pi based system . The system senses input from different sensors attached to the vehicles fuel tank and monitors those parameters. The system will examine the parameters of vehicle and sends the notification to the users mobile.. So , the user can easily notified about whats happening in vehicle. The main work of this program is to take data from sensor and notify about it to the user in a simple and efficient way.

List Of Modules Included in Project are:

Raspberry Pi 3B :-

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.

I. Water flow sensor:-

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal.

A. Sensor Placement

The sensors are connected in the order one is connected to the inlet from where the fuel can be inserted and the fuel is collected in the tank. The another sensor will be connected to the outlet which calculate the amount of fuel exited the tank.

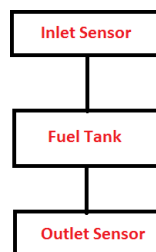


Fig. 1 placement of sensor.

B. gathering the data.

The two sensors which are connected in the order inlet and outlet they concurrently will measure the fuel passes from them. The inlet sensors which is connected to the entry point where the fuel will be inserted from above entering directly into the one flow sensor which is connected to the tank (inlet sensor).

The data which is collected from inlet sensor this data is the amount of fuel which is entered in the tank. The data is gathered by the rotations of the flow meter with the flow of the fuel entering in the tank [13].

The fuel which is filled from the inlet sensor is collected in the tank. After that the second sensor which is connected to the outlet of the tank that gathers the data of how much fuel is got out of the tank and how much is burnt resulting in the total amount of fuel left in the tank [14].

This is how the data from the two sensors is gathered.

C. The Calculation Phase

Here are the three elements that enter into the calculation Phase.

- 1) inlet fuel amount.
- 2) outlet fuel amount.
- 3) Total fuel in the tank.

The calculation is done on the sensor data which is gathered from the two sensors connected in order as inlet and outlet

To calculate the fuel which is available in the tank the amount of fuel which is inserted is collected from inlet sensor and the amount of fuel which is exited from tank is subtracted from the inserted fuel amount. This is how we can achieve the actual amount of fuel which will be present in tank.

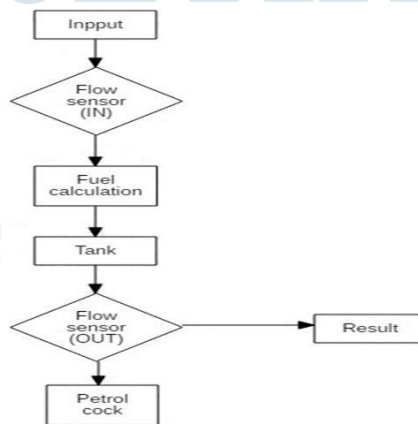


Fig. 2 Flow chart.

1. Fuel calculation :-

In this phase we will calculate the fuel i.e. inserted fuel can be calculated from inlet flow sensor and from outlet fuel going in the engine. From outlet sensor we are calculating the actual fuel present in the tank.

- 1) Data Acquisition : In this step we will collect the readings of mileage and from that we predict the remaining distance the vehicle can travel.
- 2) Clustering and Classification of data for Training
- 3) Splitting data into Training and Testing

2. Training and Testing Classifier:-

In this phase actual coding work for the prediction for the remaining distance the vehicle can travel w.r.t. fuel present in tank and Try to increase accuracy of prediction

3. GUI module:-

it consists of

- 1) Making user friendly interface for end users After completing all the important functionality we will work on the GUI for the user friendly interaction.

4. System Testing :-

Testing the final system: In this phase we will test our prediction for the maximum accuracy.

The gathered and calculated result will be displayed on the screen. the result which is calculated with the help of the algorithm is displayed over here in this phase.

IV. Result

In this project we have.

- 1) calculated the amount of fuel entered and burnt.
- 2) We have used the two flow sensors for the same one for inlet and other for outlet.

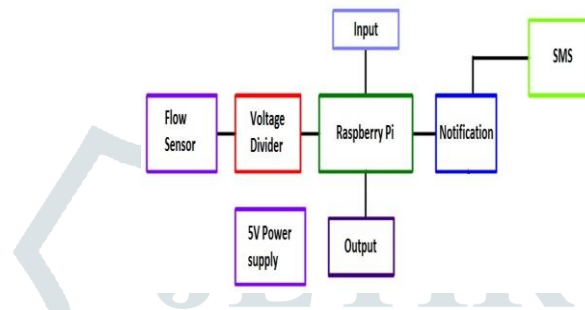


Fig. 3 Operation diagram

- The system will examine the parameters of vehicle and sends the notification to the users mobile. The user will be able to be notified about what is going on in vehicle. The system receives data from different sensors attached to the vehicle's fuel tank and observes those parameters. Our model will yield promising output as compared to current system.

The Outout is come out as shown below.

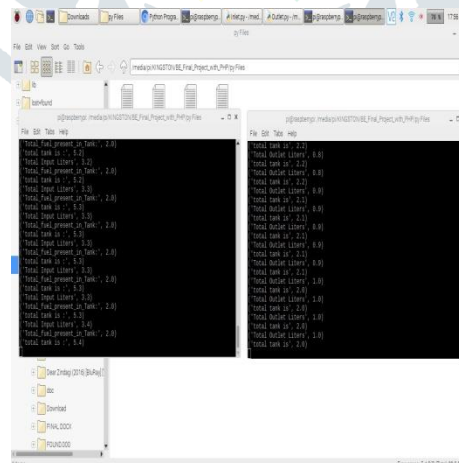


Fig. 4 figure displaying output on terminal.

The notification will be received by the user through SMS.

V. Conclusion And Future work

A. Conclusion.

Our system has successfully measured the amount of fuel which is entered in the tank and exited from tank and accordingly the number of fuel left in tank and with the help of machine learning algorithm we can find out the distance which is the bike can travel with the current amount of fuel in the tank.

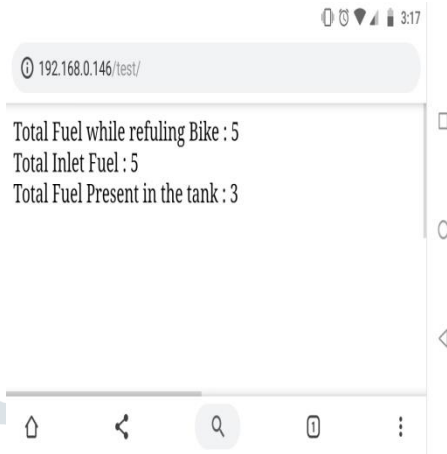


Fig. 5 figure displaying result.

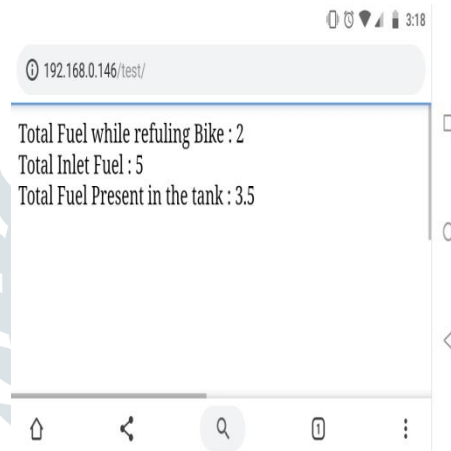


Fig. 6 figure displaying result after refueling.

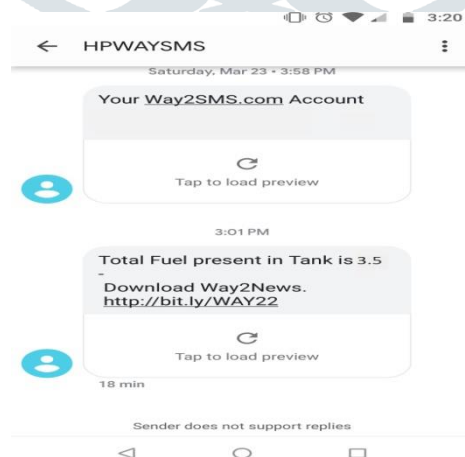


Fig. 7 SMS is sent.

The smart digital fuel indicator is very improved type of fuel indicating system. The important advantage of this system is that it can gives correct error less value of fuel left as well as the vehicle running distance left in km.

This project will be able to show that simple hardware and technology can be used to develop a robust fuel level measuring and monitoring system. The intended system can monitor the mileage by calculating the data provided by sensors. The notification is also given in this system about the fuel analysis.

B. future Work.

The system can be updated in the future to do the complete vehicle analysis which includes the engine performance and maintenance of engine to get to know the condition of the engine for servicing.

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