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Design and Analysis of Smart Two-Wheeler System

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ABSTRACT

In this 21st century almost everything has become digital, if the fuel indicators in the vehicles is additionally made advanced, we can determine the correct quantity of fuel available in the fuel tank. In this competitive world, everyone strives for greater accuracy than the previously proposed ones. In these project we additionally use the digital display system instead of mechanical arrangement and we use the displacement lever, Arduino board, display system to show the exact amount of the fuel present in the tank(in percentage).
A potentiometer transducer is used to find out the fuel level which is economic and also accurate. The added Feature in this fuel level indicator is that, the reserve condition is pre-informed to the user with an alarm, which helps to tune it to the reserve position before the engine stops and this helps to avoid knocking and engine damage. This project mainly concentrates about the indication of fuel level in irregular tanks (two-wheeler and four wheeler tanks). Various other features like the distance covered, mileage obtained, can be added with this arrangement which explains the clear performance of the vehicle and the fuel used. We can also predict the time for refueling the vehicle and also to check the amount while fueling can be done in future. By using this digital fuel level indicator device the amount of fuel available in the tank at any position of the vehicle is predicted.

Keywords: Float arrangement, Displacement lever, Flow arrangement, Arduino board (Uno), Display board (16*2), Bread board/PCB.

I. INTRODUCTION

At present, even after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pump frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank. Many of the times the fuel filled are less than the displayed value. So to overcome this problem we are design the digital fuel indicator which exactly shows the amount of fuel in percentage.
We are indicating the amount of fuel in the tank in mi this project deals with Development of Digital Fuel Meter for Vehicles. Proposed Digital Vehicle Meter is to give reading in real time units like in Milliliter's. Multiple Ultrasonic Sensors are used to sense depth of fuel in the Arduino Controller (ATMEGA328) will be used as the head of hardware system. Before hardware implementation we will design Simulink Model to simulate and validate output.

TABLE I

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II. PROBLEM DEFINITION

The objective of this project is to eliminate the conventional fuel level indication in two wheelers. Now days, after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pump frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank.

Development of on-board digital fuel gauge for automobiles fuel monitoring and fuel theft detection. Nowadays the fuel indicator system for the two wheelers are digital but they do not shows the exact fuel amount which is present in the tank i.e. they shows the amount of fuel in terms of bars and not in numbers or digits like liter or milliliter. So, this problem is taken into consideration for our project work of developing the digital (numeric) fuel indicator system for two wheelers which shows exact amount of fuel in terms of liter or milliliter. In this project at firstly we surveyed the existing fuel indicator system and fuel tanks of different bikes and scooters. But during this survey we examined that the design (shape and size) fuel tanks are in irregular fashion. But due to irregular shape of the tanks there were much complexities arises for the installation of the electronics kit and level sensor which are used for the calibration of fuel level/amount. So we redesign a tank as a conceptual model in a regular shape like rectangular by using design software like PRO-E. Hence due to this regular design the installation of electronics kit would became easier also this whole system will gives us the fuel amount in terms of liter or milliliter, for example 1L, 2L, 1.2L,500mL, 800mL.

III.LITERATURE REVIEW

Analog Fuel Meter

Now a day, after paying a huge amount of money at many of the fuel pumps, we don't get the exact amount of fuel as shown by the filling machine and also there is lots of news regarding the fuel pumps frauds which leads to corruption. In many cases it has been observed that there is dissimilarity between the amount of fuel displayed on the fuel filling machine and the fuel filled in the tank [1].

Figure1:Analog fuel meter

User having analog systems cannot find out the accurate and exact value of the remaining fuel in tank. Therefore, if the fuel indicator in the automobiles is made digital it will help to know the exact amount of fuel available in the fuel tank. The above mentioned fact is considered in our project and we found out a proper solution for indicating the exact avail of fuel in the tank digitally. Although contactless methods are more complicated than contact methods, there are lots of sensors available for the fuel level measurement [2].

IV. WORKING OF DIGITAL FUEL INDICATOR

As shown in fig (2) block diagram of digital fuel indicator, this project the system is works on the displacement sensor, Arduino board etc. The simple float arrangement is placed in the fuel tank. The float is works the depends on the level of fuel in tank. The level of fuel is increased so the float is displaced then the lever is displaced. This lever is connected to metal strip & this metal strip changes voltage base on contact area.

The sensed voltage is send to the Arduino, the Arduino convert the signal in the form of digital & the flow measurement sensor sense the amount of fuel transferred for engine. And subtract the indicating initial fuel level & flow rate. Thus the combination of both displayed the numeric form.

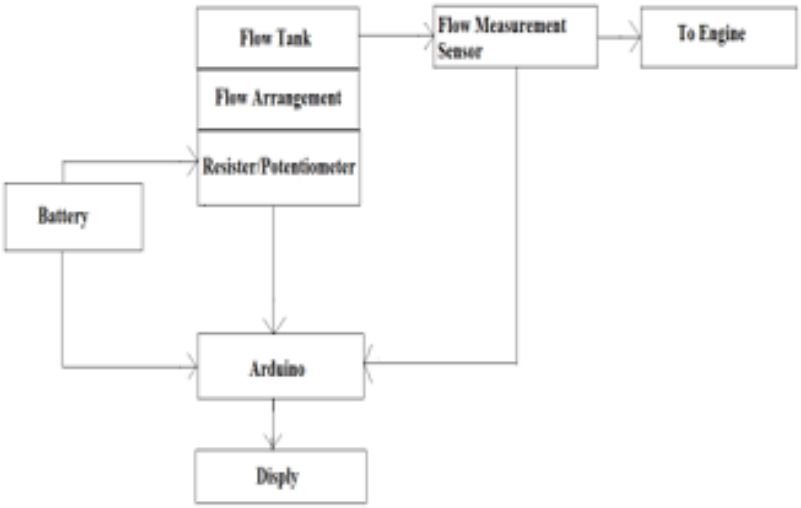

Figure2:Block diagram of digital fuel meter

Fuel indicator system consists of float with variable resistance, Microcontroller, LCD display and buzzer. All thiscomponents perform together to indicate the amount of fuel in tank. A float with variable resistance is installed in the tank at the base. Initially with no fuel in tank the float is at its lowest position. 5V supply from transformer is given to float rheostat.

When float is at its lowest position, rheostat offers maximum resistance and no current passes. As we start filling fuel in tank float starts rising up. Float is attached to a vertical column with fulcrum and supports rheostat. One end of the float is attached to the rheostat, as float rises up results in varying resistance, as resistance decreases flow of current increases. The output current from the rheostat is analog signal which is feed to the analog to digital converter i.e. ADC. ADC processes these analog signals into digital pulses. Output from ADC sends to the microcontroller. The Hall Effect flow measurement sensor sense the amount of fuel transferred to engine & output from flow measurement sensor send to the microcontroller. And subtract the

indicating initial fuel level & flow rate. Microcontroller further processes digital signals obtain from ADC and flow measurement sensor. Thus the combination of both displayed the numeric form that is in percentage.
Buzzer is also provided with system, this buzzer is activated when fuel in the tank reaches reserve level i.e. 15%. After every 3% reduction in fuel quantity periodic buzzer activates up to zero position. Also, indicator is provided with system, this buzzer is activated when fuel in the tank reaches reserve level i.e. 15%. After every time period of 10 seconds indicator blinks.

V. TESTING

A. Testing of LED

In this project the LED is required as indicating device. The main purpose of the LED is blink on the reserve condition as specific time period (delay).The testing or experiment done by the various delay time.

Figure3:Testing of LED

B. Testing of Buzzer

Buzzer is used in this project to create the sound on the reserve condition. The buzzer is on the reserve condition at specific or defined time & off, after some decrement of level of fuel we will also on.The Activation of the buzzer is done by using Arduino.

Figure4:Testing of Buzzer

VI. FUTURE SCOPE

In advancement of this system we can add GSM technique through which we get massage alert on theft of fuel from the vehicle.

We can link the GPS technology to the system which will show the nearest fuel pump when the level of fuel in the vehicle reaches minimum value.

The distance that the vehicle can travel also is calculated by programming the microcontroller by taking the input of present mileage with respect to speed of car and fuel levels.The density of fuel can also be calculated using this system.

VII. CONCLUSION

In future the proposed technique can be improved by adding fuel cells at different places of fuel tank to measure exact fuel levels at different conditions like day/night for particular densities at different altitude conditions of vehicle and a buzzer to announce the user about the abnormal conditions like low level, half level and full levels of the fuel tank to refill or warn themselves. The accurate distance to zero can also be done by programming the microcontroller by taking the input of present mileage with respective speeds and tank levels.

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