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A Paper on Installation and Testing of Alphanumeric Fuel Indicator System

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Abstract- Digital fuel indicator is the fuel gauge in modern trends. As in the existing fuel indicator system although they are digital but the value of amount of fuel available in tank of vehicle cannot be shows correctly(exact value of the fuel amount).The digital(numeric) indicator will be used for the indication of the amount of fuel in terms of numeric value i.e. in terms of digits or number. In this project we are going to installing and testing the actual setup made by us and we are keen to establish the modern fuel indicator system that gives us the exact suitable value of the fuel amount present in the tank. The design software like CATIA, Solid edge, PRO-E for the redesigning of fuel tank and electronics kit consisting microcontroller, ADC, LCD display for calibration of fuel amount in terms of numeric value we are going to be used.

*Keywords***:** Digital fuel indicator, microcontroller, ADC, fuel tank

1. INTRODUCTION

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, installed and test on actual fuel tank made by us. 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 is installing and testing by 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.

2. INSTALLATION

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

are 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 example500mL, 800ml,1000ml.

There are various devices for measurement of fuel level, e.g. Conductive Metal Rod, I.R. Sensor, Ultrasonic sensor, Float etc. But due to some restrictions we unable to installed these devices. If we use Conductive metal rod then there is current leakage problem in fuel tank. And if we use I.R Sensor, it is unable to detect the actual level of fuel in the tank, and ultrasonic sensor is so much costly, so we are unable to install above devices as a fuel level measurement device.

Hence, we are finally used the Float mechanism for measurement of fuel level in the tank, because it is light in weight, easy to sense fuel level and it is inexpensive as compared to other.

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.

After that we developed the electronics circuit kit, which consists of Transformer, Rectifier, Filter

Capacitor, Voltage regulator, ADC, Microcontroller, LCD Display and Buzzer. We, provide following diagrams which shows electronics kit and components, float arrangement system with variable resistor and fuel outlet valve.

First of all in the process, the tank is fabricated by GI sheet metal according to dimensions we specified as 300 mm length, 110 mm height and 150 mm width. The volume of tank is 4950 ml.
For inlet of fuel, hole is provided at the top of the tank, for outlet of fuel from the tank valve is provided at the bottom. For getting the total drainage of fuel from the tank tilting of 8 to 9 degree of angle is required. Float is installed within the tank at the bottom with the help of vertical column and float is free to move according to fuel level in the tank

2.1. Working

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 anolog signal which is feed to the anolog to digital converter i.e. ADC.
ADC: ADC processes these anolog signal into digital pulses.The ADC0808, ADC0809 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consume minimal power. These features make this device ideally suited to applications from process and machine control to consumer.
Output from ADC send to the microcontroller.
Microcontroller : A microcontroller is an integrated chip that is often part of an embedded system. It includes a CPU, RAM, ROM, I/O ports. uC further processes digital signals and send to the LCD display in the form of voltage .
This output voltage is calibrated in terms of volume of petrol filled in tank in terms of liter or millileter.
Buzzer : It is also provided with system. This buzzer is activated when fuel in the tank reaches reserve level i.e. 0.5 L or 500 mL.After every 100 mL reduction in fuel quantity periodic buzzer activates up to zero position.

3. Testing and Experimentation of Actual Model.

As we above discussed the design, fabrication and installation of our model, now we test and experimenting our project with the help of actual model.

While refilling the tank with 1 liter petrol the quantity of petrol shown on digital display is 900 ml. means 0.9 liter. For 2 liter petrol quantity shown is 1900 ml. i.e. 1.9 liter also for 3 liter we get reading of 2900 ml on digital display.

4. Diagrams of Actual Model.

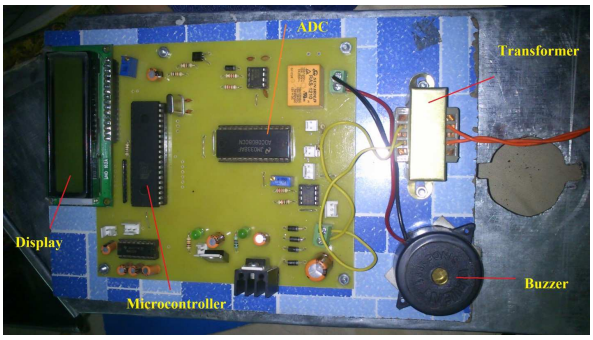


Fig1: Electronics circuitry and components

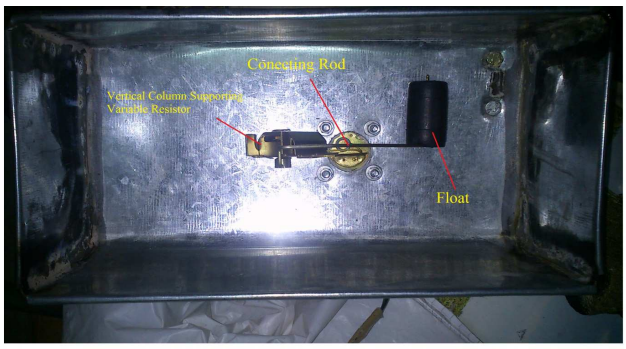


Fig2: Float arrangement system as a sensor.

5. Tables

Following tables are shown the actual readings while refilling the fuel in the tank with different quantity which is shown on digital display.

Sr. No.	Petrol Qty. filled in tank	Qty. of petrol shown on digital display
1.	1 liter (1000ml) 2 liter (2000ml) 3 liter (3000ml)	900 ml 1900 ml 2900 ml
2.	1 liter (1000ml) 2 liter (2000ml) 3 liter (3000ml)	950 ml 1950 ml 2950 ml
3.	1 liter (1000ml) 2 liter (2000ml) 3 liter (3000ml)	900 ml 1900 ml 2850 ml

6. Calculations

1. For 1st liter:

Average Qty. of petrol for 1 liter shown on digital display = 900+950+900 / 3
= **916.66 ml**

2. For 2nd liter:

Average Qty. of petrol for 2 liter shown on digital display = 1900+1950+1900 / 3

= **1916.66 ml**

3. For 3rd liter:

Average Qty. of petrol for 2 liter shown on digital display = 2900+2950+2850/ 3
= **2900 ml**

5.1. Avg. Qty. of petrol shown on digital display

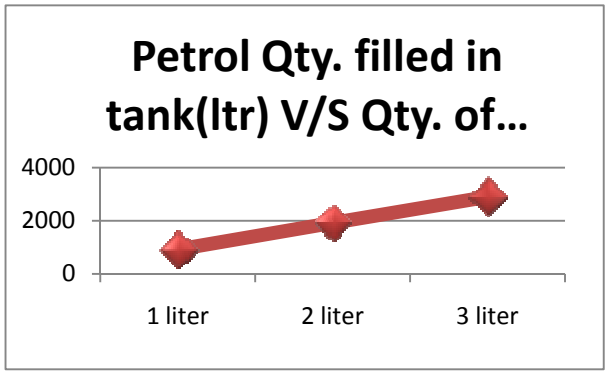
Following tables are shown the average readings while refilling the fuel in the tank with different quantity which is shown on digital display.

(i) Third item in the second level
(ii) Fourth item in the second level

Petrol Qty. filled in tank	Avg. Qty. of petrol shown on digital display
1 liter	916.66 ml
2 liter	1916.66 ml
3 liter	2900 ml

Table: Observation table for petrol quantity readings (Average) while refilling.

From this average reading, we draw the graphs of *Petrol Qty. filled in tank V/S Qty. of petrol shown on digital display*



While refilling the tank with 1 liter petrol the quantity of petrol shown on digital display is 900 ml. means 0.9 liter. For 2 liter petrol quantity shown is 1900 ml. i.e. 1.9 liter also for 3 liter we get reading of 2900 ml on digital display

While withdrawing the fuel from the tank the reading shown for 3 liter is 2900 ml, when level decreases up to 2 liters the display shows 1900 ml. and for 1 liter it shows 900 ml. When level decreases below 500 ml, the buzzer activates and digital display shows "THE FUEL LEVEL IS LOW".

Result:

After testing we come to know that there is small error while refilling 1st liter petrol and then as we increases amount of petrol it shows correct readings. While draining the fuel from tank, when fuel level

Falls below the 500ml the buzzer is activated so for this we assume 0.5 liter as a reserve quantity.

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