

# **Digital Indication of Fuel Level in Litres in Two Wheelers**

Gokul.LS<sup>1</sup>, Sivashankar.S<sup>2</sup>, Srinath.M<sup>3</sup>, Sriram Kathirayan.M<sup>4</sup>, Sudharsan.M<sup>5</sup>

<sup>1</sup>Assistant professor, Department of Mechanical Engineering, Bannari Amman Institute of Technology,  
Sathyamangalam, Tamil Nadu, India<sup>1</sup>

<sup>2,3,4,5</sup>Third year UG student, Department of Mechanical Engineering, Bannari Amman Institute of Technology,  
Sathyamangalam, Tamil Nadu, India<sup>2,3,4,5</sup>

**ABSTRACT:** The objective of this paper is to eliminate the conventional fuel level indication in two wheelers which uses float sensor to indicate the fuel level. The elimination of float sensor is due to its low accuracy in fuel indication. In this competitive world, everyone strives for greater accuracy than the previously proposed ones. In order to increase the accuracy, we 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.

**KEYWORDS:** Arduino board, ultrasonic sensor, flow sensor, liquid crystal display.

## **I. INTRODUCTION**

For the indication of fuel level, two major sensors are used. One is an ultrasonic sensor used to find the duration of ultrasonic waves transmitted and received between the sensor and the surface of fuel. The results are received by arduino board. And the arduino programming converts the duration into distance. The distance converted is again converted into litres. Other is a flow sensor used to calculate the discharge of the fuel from the fuel tank. There are two outputs from the flow sensor. The first output is discharge in terms of lit/min and the second output is the total litres of fuel discharged through the sensor. Only the second output from the flow sensor (i.e the total litres of fuel discharged) is required for final fuel level indication. The modified result of ultrasonic sensor and the second output from flow sensor are taken and the difference between these two readings gives the final accurate fuel level in litres.

## **II. COMPONENTS**

### **1. ARDUINO UNO BOARD:**

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

### **2. ULTRASONIC SENSOR:**

Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object.

**3. FLOW SENSOR:**

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

**4. LIQUID CRYSTAL DISPLAY:**

LCD (Liquid Crystal Display) screen is an electronic display module and finds a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments.

**5. BATTERY:**

A 12 volt 7Ah battery is used to give supply to Arduino board , sensors and an LCD.

**III. PROPOSED SYSTEM**

This project focuses on creating a device which can help to actively display the exact amount of fuel in a motorbike in real time. It involves the making of the system to provide a more accurate fuel level indicator which is reliable, easy to read and of dependable/compatible overall design. The system comprises of fuel tank, ultrasonic sensor, flow sensor, battery, arduino board with LCD display. The harmonious interactions of all these connections will yield the best possible results.

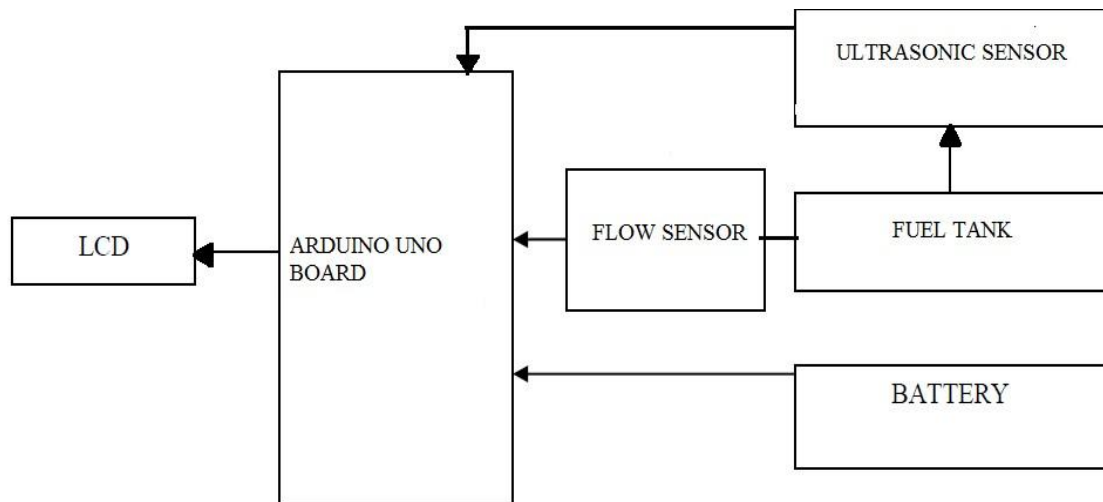


Fig 1: block diagram of the proposed system

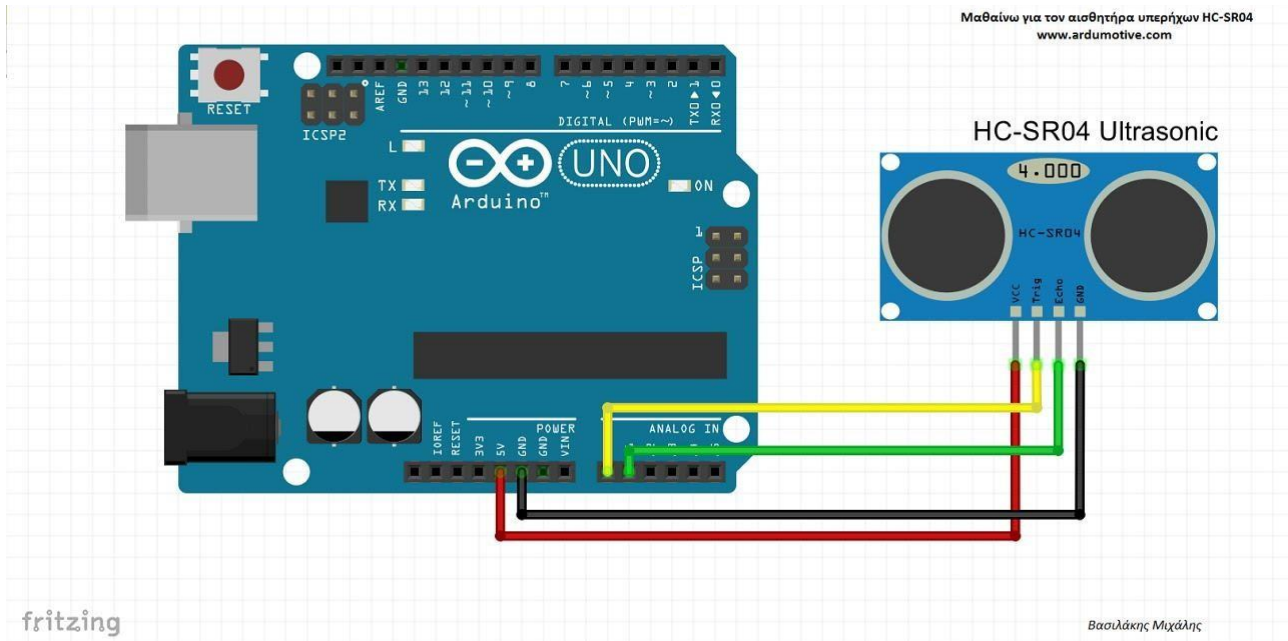


Fig 2: circuit connection of ultrasonic sensor with arduino board

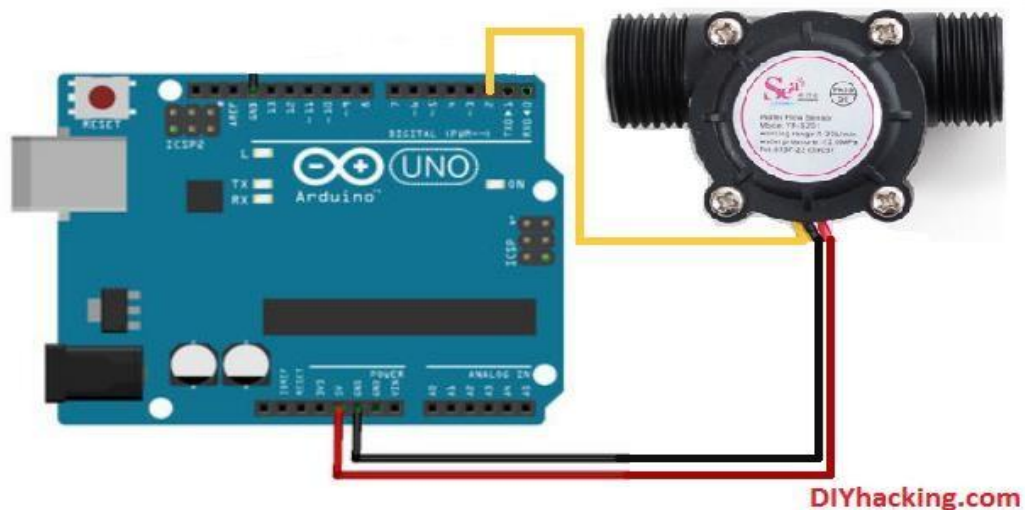


Fig 3: circuit connection of flow sensor with arduino board

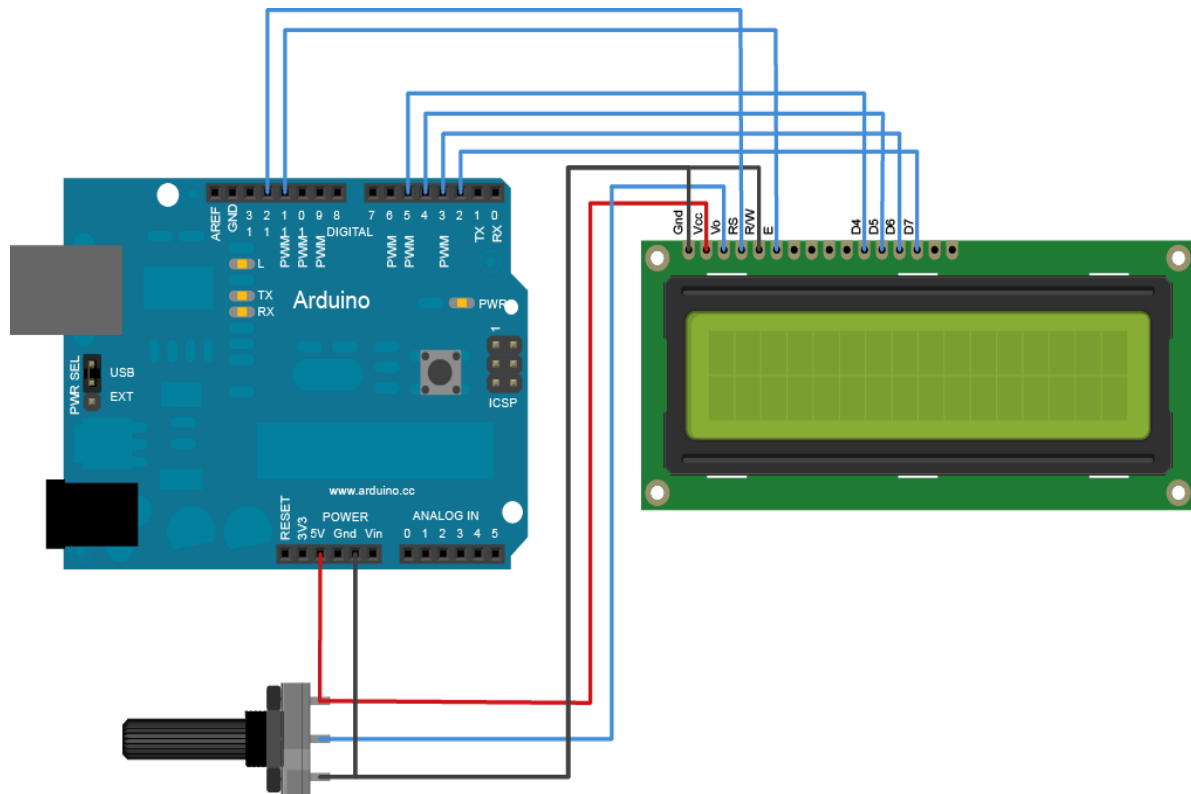


Fig 4: circuit connection of LCD with arduino board

#### IV. EXPERIMENTAL METHOD

When vehicle's ignition is turned ON, the battery will power the arduino board and the sensors. At first, the ultrasonic sensor will measure the duration of the ultrasonic waves transmitted and received between the sensor and the surface of the fuel. Now the program uploaded in the arduino board will convert the duration into distance using the formula ( $\text{distance} = \text{duration} * 0.034 / 2$ ) and again the distance is converted into litres by trial and error method. Note that the reading now calculated from ultrasonic sensor will not be changed until the reset button is pressed. The reset button should be pressed only when filling up additional fuel into the fuel tank.

Now the second output (total fuel passed through the flow sensor) from the flow sensor will be in terms of litres. The modified output from the ultrasonic sensor and the second output from the flow sensor is taken and the difference between these two values gives the final fuel level indication in litres which will be displayed in Liquid Crystal Display fixed near the instrument cluster.

**International Journal of Innovative Research in Science, Engineering and Technology**

An ISO 3297: 2007 Certified Organization

Volume 6, Special Issue 7, April 2017

5<sup>th</sup> National Conference on Trends in Automotive Parts Systems and Applications (TAPSA-2017)

30<sup>th</sup> & 31<sup>st</sup> March 2017

Organized by

Sri Krishna College of Engineering & Technology, Kuniyathur, Coimbatore-641008, Tamilnadu, India

The ultrasonic sensor will be positioned inside the fuel tank where the depth is maximum. The position should be identified such that the maximum duration of ultrasonic waves is possible between the sensor and the surface of the fuel. The flow sensor will be attached to the outlet tube of fuel tank to measure the discharge and the total fuel passing through the sensor.

| FUEL LEVEL IN THE TANK (L) | DURATION FROM ULTRASONIC SENSOR (s) | DISTANCE CALCULATED USING PROGRAM (cm) |
|----------------------------|-------------------------------------|--|
| 0.5                        | 0.408-0.391                         | 24-23                                  |
| 1                          | 0.34-0.331                          | 20-19.5                                |
| 1.5                        | 0.329-0.323                         | 19.4-19                                |
| 2                          | 0.289-0.272                         | 17-16                                  |
| 2.5                        | 0.255-0.246                         | 15-14.5                                |
| 3                          | 0.244-0.221                         | 14.4-13                                |
| 3.5                        | 0.219-0.204                         | 12.9-12                                |
| 4                          | 0.195-0.187                         | 11.5-11                                |

Table 1: sample experimental values conducted in TVS Fiero fuel tank

**Sample program:**

```
#include <LiquidCrystal.h>
#define trigger 9 #define
echo 10
LiquidCrystal lcd(12,11,5,4,3,2);
float time=0,distance=0,duration=0;
void setup() { lcd.begin(16,2);
```

## International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 6, Special Issue 7, April 2017

5<sup>th</sup> National Conference on Trends in Automotive Parts Systems and Applications (TAPSA-2017)

30<sup>th</sup> & 31<sup>st</sup> March 2017

Organized by

Sri Krishna College of Engineering & Technology, Kuniamuthur, Coimbatore-641008, Tamilnadu, India

```
pinMode(trigger,OUTPUT);
pinMode(echo,INPUT);
  lcd.print(""); lcd.setCursor(0,1);
lcd.clear(); } void loop() {
lcd.clear();
digitalWrite(trigger,LOW);
delayMicroseconds(2);
digitalWrite(trigger,HIGH);
delayMicroseconds(10);
digitalWrite(trigger,LOW);
delayMicroseconds(2);
duration=pulseIn(echo,HIGH);
distance=duration*0.034/2;
  lcd.clear();
    if(distance>23==1&&distance<24==1)
    {
      lcd.print("FUEL LEVEL:0.5L");
      lcd.setCursor(0,1);
delay(1000);
    }
    else if(distance>19.5==1&&distance<20==1)
    {
      lcd.print("FUEL LEVEL:1 L");
      lcd.setCursor(0,1);
delay(1000);
    }
    else if(distance>19.0==1&&distance<19.5==1)
    {
      lcd.print("FUEL LEVEL:1.5L");
      lcd.setCursor(0,1);
delay(1000);
    }
    else if(distance>16==1&&distance<17==1)
    {
      lcd.print("FUEL LEVEL:2 L");
      lcd.setCursor(0,1);
delay(1000);
    }
    else if(distance>14.5==1&&distance<15==1)
    {
      lcd.print("FUEL LEVEL:2.5L");
      lcd.setCursor(0,1);
delay(1000);
    }
    else if(distance>13==1&&distance<14.4==1)
```

## International Journal of Innovative Research in Science, Engineering and Technology

An ISO 3297: 2007 Certified Organization

Volume 6, Special Issue 7, April 2017

5<sup>th</sup> National Conference on Trends in Automotive Parts Systems and Applications (TAPSA-2017)

30<sup>th</sup> & 31<sup>st</sup> March 2017

Organized by

Sri Krishna College of Engineering & Technology, Kuniyathur, Coimbatore-641008, Tamilnadu, India

```
{  
    lcd.print("FUEL LEVEL:3 L");  
    lcd.setCursor(0,1);  
delay(1000);  
    } else  
{  
    lcd.print("");  
    lcd.setCursor(0,1);  
    delay(1000);  
    }  
}
```

### V. CONCLUSION

The deployment of flow sensor and 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  $\pm 0.1$  litres. This method will yield accurate results while driving on plane surfaces or roads and the accuracy will reduce while driving on slopes or hills. The entire system is more economical and reliable. The system requires less maintenance. As years passes, technology gets updated and different solutions arises for the same problem. And the usage of ultrasonic sensor and flow sensor to digitalize and indicate the fuel level in two wheelers is one such up-gradation to this problem.

### REFERENCES

- [1] Jaimon Chacko Varghese, Binesh Ellupurayil Balachandran "Low Cost Intelligent Real Time Fuel Level Indicator for Motorbikes" (IJITEE), Volume-2, Issue-5, April 2013
- [2] Deep Gupta, Brajesh Kr. Singh and Kuldeep Panwar "A Prototyping Model for Fuel Level Detector and Optimizer" page no 226- 229 - African Journal of Basic & Applied Sciences 4 (6): 226-229, 2012 ISSN 2079-2034
- [3] Daniel R. McGlynn, "Vehicle Usage Monitoring And Recording System", US Patent 4072850, February 1978.
- [4] Ti-Ho Wang, Ming-Chih Lua and Chen-Chien Hsu, 2009. "Liquid-level measurement using a single digital camera", Elsevier, Measurement, 42(4): 604-610
- [5] Farrell G. Butler, "Gasoline Mileage Indicator System," US Patent 3958453, May 1976
- [6] Betta, G., A. Pietrosanto and A. Scaglione," 1996. A digital liquid level transducer based on opticalfiber", IEEE Trans. Instrum. Meas., 45: 551-555.
- [7] Nitin Jade, Pranjal Shrimali, Asvin Patel, Sagar Gupta "Modified Type Intelligent Digital Fuel Indicator System"