# DIGITAL MILEAGE AND DISTANCE COVERAGE INDICATOR ON TWO WHEELERS

**Mohammed musthafa. P[1], madhu nirmal. D[2], mageshwaran. K3,karthic. s[4]**

[1,2,3,4,] *Student, Dept. of mechanical engineering, SKP engineering college, Tamilnadu, India.*

---------------------------------------------------------------------***---------------------------------------------------------------------

**Abstract -** *The use of two wheelers is more nowadays and the demand for fuel is high because of rapid growth of vehicle production and sales these turns into basic need in the human life and mileage plays an important role in every vehicle.*

*We can find the average of the vehicle with medium accuracy. The machine was tested and found to Work as expected. In this paper we concentrate on the design, necessary fabrication and fine assembling of each and every component, analysis of mileage, future scope etc. of complete assembled unit.*

*The whole concept is related with the Mechanical as well as Electronics Engineering, i.e. Mechatronics. The various mechanical and electronic components like load input, ultrasonic sensor, arduino UNO R3, mechanical fixtures, Battery, LCD etc. are used for assembling the complete unit. The unit Design and fabrication of digital mileage indicator based on load for two wheeler vehicles is intended to be employing at two wheeler service stations, as well as manufacturers.*

***Key Words***: **Arduino uno R3 microcontroller, Ultrasonic sensor HC-SR04, Manual load set 50, 80, 110, 140 kgs, Installed in hero HF dawn (motor cycle), LCD display 16×2**

## 1. INTRODUCTION:

This project was done on the hero Honda CD dawn bike. Mileage was tested with the person of weight 50kg at smooth surface road.

On experiment it was concluded that vehicle can give 59.85km/l mileage for 1litre of petrol at the weight of 50kg.

We are interfacing manual load setting board and ultrasonic sensor to (Arduino uno R3) microcontroller. Where signals are analysed and calculated and displayed in a LCD display.

- Ultra sonic sensor is a range finding device used to detect obstacles in its path it emits the 40 KHz sound waves which bounces off a reflective surface and returns to sensor. Here it detects the fuel level and gives signal to microcontroller.

- Manual load set contains series of buttons. Each buttons are programmed to show the manual weight. We are defining five weights such as 60, 80, 100, 120, 140KGs. This has to set by the user every time where he/she start the vehicle.

This project was based on the mileage. It is displaying of number of kilometres, fuel level and weight of the user in a LCD display. The calculation of number of kilometres was based on the fuel level and user's weight.

### 1.1 REPRESENTATION OF UNIT:

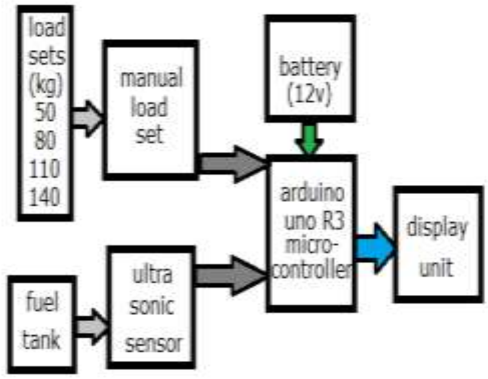


**Fig -1**: representation unit

### 1.2 METHODOLOGY:

1. Material selection-hero Honda CD dawn
2. Fixing on bike- load setting board
3. Ultrasonic sensor on fuel tank
4. Both are calibrated and connected to the microcontroller
5. Fixing and finalizing
6. Resulting

## 2. HARDWARE AND SOFTWARE DESCRIPTION:

- Arduino uno R3 microcontroller
- Ultrasonic sensor
- Manual load set
- Display unit

### 2.1 ARDUINO UNO R3 MICROCONTROLLER:

- board based on the ATmega328P
- 14 digital input/output pins
- 6 analog inputs
- a 16 MHz quartz crystal
- a USB connection
- An ICSP header and a reset button

**Fig -2:** microcontroller

### 2.2 ULTRASONIC SENSOR:

- Ultrasonic sensor-HC-SR04
- Detect obstacles using high frequency sound waves
- The sensor emits a 40KHz sound wave
- Measure distances from 1.5in to 115in

**Fig -3:** ultra sonic sensor

### 2.3 MANUAL LOAD SET:

- Due to improper variation of user load on bike. Load cell can‘t be implemented.
- Instead manual loads can be applied. They are 50, 80, 110, 140kgs.
- Users can set above load according to his weight.

**Fig -4:** manual load set

### 2.4 LCD DISPLAY:

- Using basic module 16x2 LCD display.
- Circuit is to receive input data given by microcontroller and processing it according to coding and displaying required output on LCD.

**Fig -5:** LCD display

### 2.4 TOTAL SET UP:

- Hero Honda CD dawn was used as the project vehicle.
- Ultrasonic sensor, manual load set and display are connected to microcontroller in series.

**Fig -6:** total set up

### 3. WORKING:

$$\text{mileage} = \frac{\text{fuel} \times \text{actual} \times \text{weight}}{\text{sample}}$$

- On experimenting the motor cycle the mileage for 1lit petrol and 50kg weight will be 59.85
- 0.15km/lit mileage will be reduced for every increasing of add on weight of each 1kg.

| WEIGHT(kg) | FUEL(L) | ACTUAL MILEAGE(km/l) |
|---|---|---|
| 50 | 1 | 59.85 |
| 51 | 1 | 59.70 |
| 52 | 1 | 59.55 |
| 53 | 1 | 59.40 |
| 54 | 1 | 59.25 |
| 55 | 1 | 59.10 |
| 56 | 1 | 58.95 |
| 57 | 1 | 58.80 |
| 58 | 1 | 58.65 |
| 59 | 1 | 58.50 |
| 60 | 1 | 58.35 |

**Fig -7**: mileage table

- In order to show kilometres run by the motor cycle. We need a common value to calculate.
- Here we named the common value as "SAMPLE"
- Inverting the experimental mileage to get the 'S'

$$s = \frac{\text{fuel} \times \text{actual} \times \text{weight}}{\text{mileage}}$$

Here it was used to find S value.

$$s = \frac{1 \times 60 \times 50}{59.85}$$

$s_1 =$ 50.11 kg

On next 1kg weight (i.e. 51kg) and variation on mileage 59.70 mileage

$$s = \frac{\text{fuel} \times \text{actual} \times \text{weight}}{\text{mileage}}$$

$$s = \frac{1 \times 60 \times 51}{59.70}$$

$s_2 =$ 51.25 kg

By solving (subtract) $S_1$ and $S_2$

**1.14=$s_1$-$s_2$**

The solution for the weight 50kg and the variation will be sample 50.12 and variation 1.14.

By knowing at weight above 50kg was the addition of 1.14 and remaining weight.

$$s = 50.12 + (1.14 \times n)$$

Where,

n= weight – 50

**4.0 For example:**

**1. Travelling in a bike user weight 85kg fuel level 2.5liters (Calculating distance)**

**Sol:**

n = weight -50

= 85 – 50

n = 35 kg

Sample = 50.12 + (1.14 n)

=50.12 + (1.14×35)

S = 90.02 kg

$$\textbf{mileage} = \frac{\textbf{fuel} \times \textbf{actual} \times \textbf{weight}}{\textbf{s}}$$

$$= \frac{2.5 \times 60 \times 85}{90.02}$$

$$m = 141.635\ km$$

**2. Calculate the mileage for 85kg of user weight travelling in a bike**

**Sol:**

n = weight -50

= 85 – 50

n = 35 kg

Sample = 50.12 + (1.14 n)

= 50.12 + (1.14×35)

S = 90.02 kg

$$\textbf{mileage} = \frac{\textbf{fuel} \times \textbf{actual} \times \textbf{weight}}{\textbf{s}}$$

$$m = \frac{60 \times 85}{90.02}$$

Mileage = 56.65 **km/l**

**5. Unit calculation for mileage:**

$$mileage = \frac{(\frac{\text{km}}{\text{l}}) \times \text{kg}}{\text{kg}}$$

$$mileage = \frac{\text{km}}{\text{l}}$$

**5.1 Unit calculation for distance**

$$distance = \frac{\text{l} \times (\frac{\text{km}}{\text{l}}) \times \text{kg}}{\text{kg}}$$

Distance = km

**6. Future scope**:

In future this proposed technique can be improved by adding load cell in different places at two wheelers to measure the additional weight. The accurate mileage will be shown based on load cell.

Research is being done to implement this project in a very efficient manner by reducing its size, power consumption and at low price.

**7. Conclusion:**

The conclusion of the overall of the project was somewhat successful. Our aims that were stated in introduction had been met. The measurements are taken so the accuracy level is of 95% - 98%.The existing traditional and the microcontroller based float type measurement techniques are far from exact and are on the conservative. A more efficient and reliable sensing technology is the ultrasonic range sensing system with a microcontroller which has corrective action code inbuilt that is applied to the fuel sensor signal based on measurements to provide highly accurate measurement of the level of fuel in the tank. It was possible to install the any kind of two wheeler.

**REFERENCES:**

**[1]** R Aravind, E Arun Kumar, R K Harisudhan, G Karan Raj, G Udhayakumar in their work "Load Cell based Fuel Level Measurement using Arduino Uno Microcontroller"

**[2]**A.Avinashkumar, U.Singaravelan, T.V.Premkumar, K.Gnanaprakash in their work "**Digital fuel level indicator in two-wheeler along with distance to zero indicators**"

**[3]** S. Pal and R. Barik, "Design, development and testing of a semi cylindrical capacitive sensor for liquid level measurement," *Sensors Trans. J.*, vol. 116, no. 5, pp. 13–20, 2010.

**[4]**https://datasheet.octopart.com/A000066-Arduino-datasheet-38879526.pdf

**BIOGRAPHIES**

Mohammed musthafa.P, student, skp engineering college, tiruvannamalai, tamil nadu.

Madhu nirmal.D, student, skp engineering college, tiruvannamalai, tamil nadu.

Mageshwaran.K, student, skp engineering college, tiruvannamalai, tamil nadu.

Karthic.S, student, skp engineering college, tiruvannamalai, tamil nadu.