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Design and Fabrication of Portable Average (Mileage) Testing Machine for Two Wheeler Vehicles

Prof. Amit Ashokrao Gulalkari[1], Prof. Vijay G. Gore[2], Prof. Aniket P. Pathre[3], Prof. Manoj J. Watane[4]

[1] Assistant Professor, Department of Mechanical Engineering, G.H. Raisoni College of Engineering & Management, Amravati, Maharashtra , India.
[2] Assistant Professor, Department of Mechanical Engineering, P.R. Pote (Patil) College of Engineering & Management, Amravati, Maharashtra , India.
[3] Head of the Department, Department of Mechanical Engineering, G.H. Raisoni College of Engineering & Management, Amravati, Maharashtra , India.
[4] Assistant Professor, Department of Mechanical Engineering, Dr.Sau Kamaltai Gawai Institute of Engg. & Technology, Darapur, Amravati, Maharashtra, India.

Abstract - ***There have been major developments in the field of two wheelers with respect to every aspect of the vehicle. One of the major aspects of the vehicle that is responsible for making vehicle more famous and popular is the average of vehicle. This project was undertaken with an objective to test the average of vehicle in showrooms and service centers. The machine was fabricated and assembled according to design, with flexible features and under tested running the vehicle on the road using 50 ml fuel. We can find the average of the vehicle with high accuracy. The machine was tested and found to Work as expected.***

In the 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. Basically the concept is focused on under the prime motto of reducing manufacturing cost of unit so, any of service station owners can easily buy unit and use it. This type of unit is not available in market and does not exist yet in low prices. This unit is based on the interdisciplinary concept. The whole concept is related with the Mechanical as well as Electronics Engineering, i.e. Mechatronics.

The various mechanical and electronic components like fuel supply device, reed switch, permanent magnet, mechanical fixtures, Battery, LCD etc. are used for assembling the complete unit. The unit Design and fabrication of Portable average (mileage) testing machine for two wheeler vehicles is intended to be employing at two wheeler service stations, as well as manufacturers.

1. INTRODUCTION

Average is as important term used with respect to any vehicle. Average is the distance traveled by a vehicle consuming one liter of fuel. As far as economy is concerned, the average of vehicle should be maximum. The need of average testing machines arises from following points.

- The manufacturer must know the fuel efficiency of vehicle at standard conditions as well as at loading conditions.
- In the service station, after the service of vehicle it is necessary to know the average of the vehicle .Instead of, leaving it to customer to run it until one liter of fuel is burnt after a heavy long run. This machine consumes just 50 ml fuel and within a period of 5 minutes at certain specified conditions i.e. creating on road load conditions, the mileage is known to us. The creation of loads includes the load of Vehicle, driver, load due to air resistance, road friction etc.

1.1 Representation of Unit

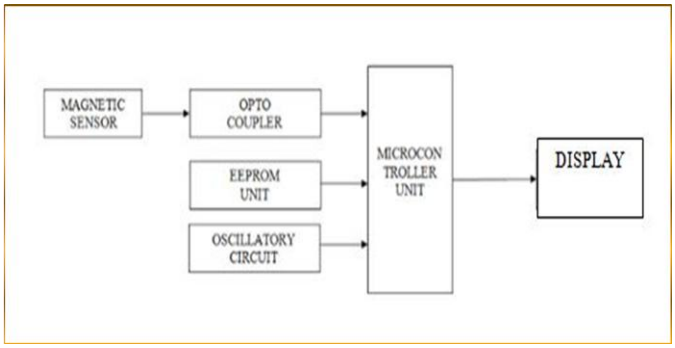

Fig -1: Line of operation of assembling unit

1.2 Key Feature

The features of the portable mileage testing machine are:

- Digital readout
- Distance travelled in KM
- Distance travelled is displayed in KM/lit on LCD
- Reading save in non-volatile memory(EEPROM)
- Reliability due to use of micro controller
- No Mechanical wear and tear
- Self reset to zero after completion of 99,999.9 KM
- Easy to build and fixed in to the bike calculation

2. MARKET SURVEY

The concept of market survey has a great importance in the field of conceived product, as its facilities or aids of to judge the market for our product and its future existence. It determines who and where the customer is what his needs and what he wants, what will lay for it. Market research also uncovers the future of existing product and the products yet to be introduced into the market. From the last 5 decades, market research has got immense popularity and has resulted in gaining higher market shares. The procedure of market survey must include the following steps:

1. Defining the objective of the product clearly.
2. Developing a clear set of research objectives.
3. Data collection from existing and future consumers as per their needs /requirements.
4. Using the findings of survey in developing the product.

So, in the view of aforesaid important points, it is quite evident that for launching /marketing a new concept in the market, survey research is very essential. we conducted a survey in Amravati (Maharashtra) and the adjoining areas. From this survey we concluded that our unit has got immense scope in market as it has got distinctive features for its promotions. The main advantage with our product lies within that, it can efficiently test the average or mileage of any two wheeler (Except Moped) when it is arranged with testing device and reed switch assembly too with just 50 ml of fuel and takes a few minutes to do the job.

3. METHODOLOGY

3.1 Aim

This project is design to calculate mileage by using portable mileage testing machine formed two wheeler bikes by using module interfacing with 8051 microcontroller sensor along with fuel arrangement device.

The present investigation is aimed as:

- Manufacturing of simple portable fuel supply arrangement connected between vehicle fuel tank and carburetor.
- Sense the rpm of the wheel by using magnetic reed switch.
- Speed sensor interfacing with microcontroller.
- This project is designed to find exact mileage of the two-wheeler in running condition.

3.2 Overview of the system

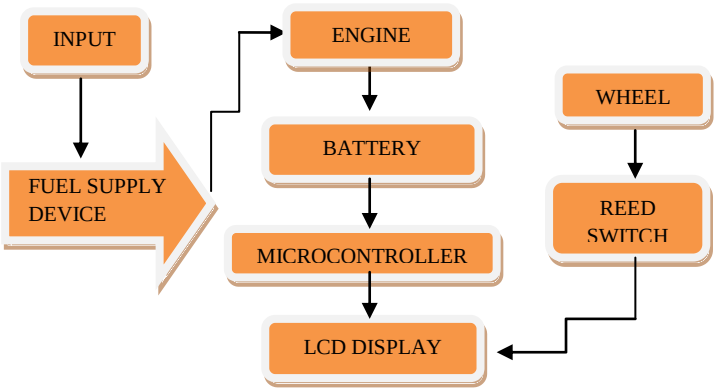

Fig -2: Block Diagram

3.3 Hardware & Software Description

The major components of the portable mileage testing machine are as follows:

- **Fuel supply device:**

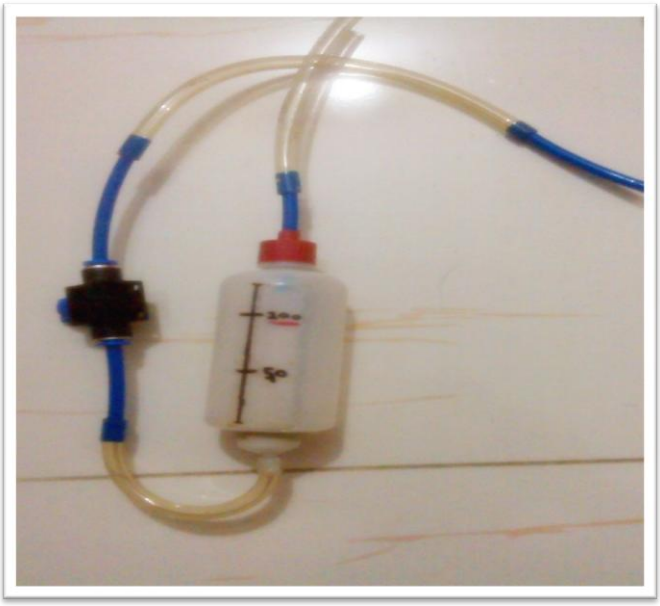

Fig -3: Fuel Supply Device

According to project requirement there is a need of 50 ml quantity of fuel supply (i.e. petrol) there wasn't

any such instrument available in the market therefore we made the idea to make our own fuel supply system as per our requirement this system consist of a bottle having calibration of 50 ml quantity with a fuel pipe to supply fuel from bottle to carburetor and there is one fuel controlling cock.

- **Reed switch:**

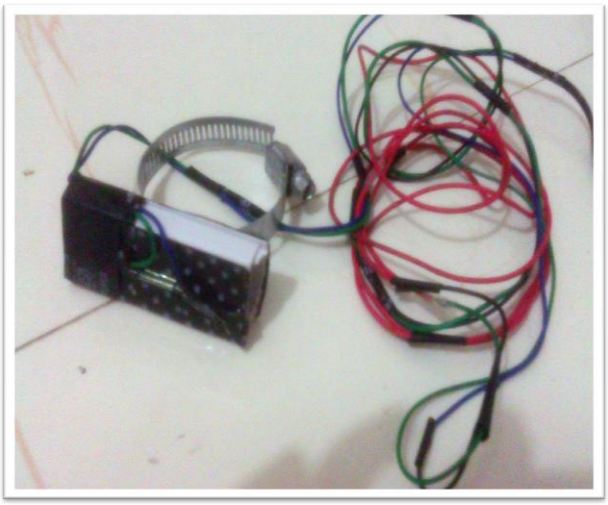

Fig -4: Reed Switch

As there was need of calculating rpm of the wheel we used reed switch for achieving our purpose we made assembly to fix reed switch on the front wheel of the vehicle. It works when magnet is brought near to it and pulse (rpm) is counted. Its interfacing is done with microcontroller.

- **Permanent magnet:**

Fig -5: Permanent Magnet

A permanent magnet is an object made from a material that is magnetized and creates its own persistent magnetic field. This magnetic field is invisible but is responsible for the most notable property of a magnet: a force that pulls on other ferromagnetic materials, such as iron, and attracts or repels other magnets.

In our project we have made arrangement of fixing permanent magnet on any one of the arm of front wheel.

- **Mechanical rings (Fixtures):**

Fig -6: Mechanical Rings (Fixtures)

In our project we used these rings for holding purpose .We used these rings for holding reed switch arrangement, magnet arrangement and most important our digital display unit.

- **Power supply (from 9v battery):**

Fig -7: Power Supply (From 9V Battery)

The most common form of nine-volt battery is commonly called the transistor battery, introduced for the early transistor radios. This is a rectangular prism shape with rounded edges and a polarized snap connector at the top. They are also used as backup power to keep the time in certain electronic clocks.

- **Digital Display Unit:**

This unit consists of LCD display and circuit. Main function of circuit is to receive input data given by reed switch and processing it according to coding and displaying required output on LCD.

Fig -8: Digital Display Unit

- **Software:**

EPROM versions are rare and have been replaced by EEPROM and flash, which are easier to use (can be erased electronically) and cheaper to manufacture. During a process a programming is also important for obtaining the required and fine output so here we used the software for programming is named MPLAB

4. PROCEDURE, ASSEMBLY AND SETUP:

For testing mileage of two-wheeler the following arrangements are done:

- Initially 50 ml fuel is taken from petrol tank into the fuel supply arrangement.
- Necessary connections are done of the fuel supply system.
- Make necessary arrangement of testing machine.
- Assembly of magnet and reed switch is done on front wheel of the bike.
- Reed switch arrangement is mounted on front suspension.
- Magnet is fixed on the front rim in such a way that there is minimum gap left between reed switch and magnet.
- Connections are made between testing machine and reed switch.
- Connect the battery to testing machine.
- Check whether the readings are zero if not reset it.
- Start the engine and drive the bike until 50 ml fuel is consumed.
- After complete consumption of fuel the bike gets automatically stop
- Note down the readings on LCD display.

5. CALCULATION:

You first need to know the radius of the bike's front wheel. The calculations here are based on Bajaj Discover model. The radius of the front wheel is 32 cm. (This can vary with the brand or model.)
Circumference of the wheel= 2πr
(Where 'r' is in cm)
= 2×3.14×32
= 200.96 cm or 2.0096 m,
The bike has covered 2.0096 meters in one revolution.
Therefore the distance in km:
= N×2.0096/1000
= N×0.0020096
Where 'N' is the number of revolutions per second

5. 1Logic:

Our main aim is to find mileage of bike or distance that bike will travel in 1 liter the understandable logic is as follow:

$$\frac{x}{50} = \frac{y}{1000}$$

y = x*20
Where,
x=distance that vehicle is travel,
Y=distance that vehicle will cover in 1 liter.

5. RESULT ANALYSIS:

5.1Result analysis based on unloading condition:

Table -1: Result Analysis (Unloading Condition)

SN	Name of Bike	Year of Purchase	Company Mileage	Mileage with MT m/c
1	Hero Honda Super Splendor(125 CC)	2007	65	59.3
2	Bajaj Discover(100 CC)	2010	102	83.1
3	Honda Shine(125 CC)	2008	65	60.4
4	Bajaj Pulsar(180 CC)	2007	45	41.8

Fig -9: Digital Display with Bajaj Discover unloading condition (Result Analysis)

5.2Result analysis based variable loading condition:

Table -2: Result Analysis (Variable Loading Condition)

SN	Name of Bike	Year of Purchase	Mileage (at load 104 Kg)	Mileage (at load 135 Kg)
1	Hero Honda Super Splendor(125 CC)	2007	61.9	57.4
2	Bajaj Discover(100 CC)	2010	76.3	74.8

Fig-10: Digital Display with Bajaj Discover loading condition (Result Analysis)

6. COSTING:

Table -3: Item list with prices for Assembly.

SN	Name of Item	Quantity	Cost(Rs)
1	LCD	1	180
2	Reed Switch	1	60
3	Opt coupler	1	115
4	Potentiometer	1	55
5	Resistance	04	16
6	Connecting Wire	1	70
7	Pneumatic Cock	1	160
8	Supply Pipe	1	15
9	Pneumatic Pipe	1	18
10	Switches	3	27
11	50 ml Bottle	1	10
12	Coding	1	500
13	PCB	1	50
14	Microcontroller	1	150
	Total Cost		` 1441

7. FUTURE SCOPE:

- The future implications of the project are very great considering the amount of time and resources it saves.
- Research is being done to implement this project in a very efficient manner by reducing its size, power consumption and at a low price. Instead of electrically chargeable batteries solar chargeable batteries can be used. We can also attach exhaust gas analyzer for analyzing the exhaust gases, in this way we can also control pollution. Hence, mileage as well as (PUC) can be made known simultaneously.

8. CONCLUSION:

The conclusion of the overall of the project was somewhat successful. All aims that were stated in introduction had been met. As per our project we have done a testing on

different vehicles i.e. on Bajaj discover 100 cc, Honda shine, hero super splendor and Bajaj pulsar are successful. Also it is very convenient for vehicle users as it gives the perfect mileage with digital display within a minimum time as it burns only 50 ml fuel.

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BIOGRAPHIES

Assistant Professor, Department of Mechanical Engineering, G.H. Raisoni College of Engineering & Management, Amravati, Maharashtra , India.

Assistant Professor, P.R Pote (Patil) College of Engineering and Management, Amravati, Maharashtra, India.

Head of Department, Department of Mechanical Engineering, G.H. Raisoni College of Engineering & Management, Amravati, Maharashtra , India.