Fuel consumption in a particular trip and fuel availability for motor bikes using Microcontroller and Android application.

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ABSTRACT:

It is very much important to measure and identify the consumable fuel in vehicle with an acceptable precision. The existing method includes analogue strip or capacitive sensor which is either too costly to install or inefficient to measure. In the proposed method, two Flow sensors are placed, one sensor to measure the amount of fuel entering the tank and another sensor to measure the amount of fuel leaving the tank to the carburetor. The difference between the above readings of the flow sensor gives the amount of fuel present in the tank and these reading are sent to android application via Bluetooth by Arduino microcontroller. The amount of fuel in the tank is continually examined, if the fuel is low, notification is sent to user for refilling the fuel.

For calculating fuel consumed in a particular trip a button is used to start and end the trip which is operated by user. Firstly before starting the ride, fuel quantity in tank and reading of the odometer is noted and after the ride ends, similar readings are noted through application. The difference in the fuel quantity is the amount of fuel consumed in above trip and the travelled distance can be measured by the difference of odometer reading.

KEY POINTS- Flow sensors, odometer, Arduino, Android Application, Bluetooth.

1. INTRODUCTION

Considering current scenarios of two-wheeler usages, a lot of data we get from them goes unrecorded and unused. Fuel efficiency is very important now-a-days not only for saving fuel but also better performance of vehicle. Existing system does not assure user about the accurate amount of fuel present in tank. These system includes analogue gauge which cannot give accurate idea about the fuel. In cases of going on long drive user cannot predict the amount of distance that the vehicle can travel and how much fuel should be filled before starting the ride. During such cases, in absence of correct knowledge about the fuel level it will be difficult for the driver to estimate the distance that can be travelled.

Users have no idea about the efficiency of the vehicle they drive regularly and do not keep a check on efficiency of the vehicle. If the efficiency is examined properly it will help the user to know the right time to provide maintenance and servicing to the vehicle. Users will be able to travel long distance considering the amount of fuel present in the tank as the mileage of the vehicle will be known to the users. Also they can ensure sufficient amount of fuel is filled in the tank even before leaving for the ride. Users will also get to know how much further can they travel based on the available fuel reading and mileage of the vehicle given to them by the application. Using the trip functionality, mileage of the vehicle and fuel consumption can be discovered between two points provided by user which will help users to know the mileage of the vehicle. This data will be stored in the android application and help user to analyze the efficiency of vehicle.

The sensor used should be cost effective and accuracy should be comprised with the use of sensor. Sensor should be liquid proof and reading should not be affected by the temperature. The android application will provide a user friendly interface, it will display all the necessary information about the vehicle which will help to better understand the acquired data and gain insights.

2. PROBLEM STATEMENT

To develop a system which can calculate the fuel consumption in a trip, indicate the fuel level accurately compared to existing system and provide data about vehicle which help users to analyze the data and gain insights with the help of android application using microcontroller and Bluetooth communication.

3. LITERATURE SURVEY

[1] J Vignesh proposed a method to find out the amount of petrol injected into the tank with a digital meter using float sensors but float sensors cannot produce accurate values when there is wobbling. And there is another proposed method that is used to find fuel level in aeroplanes using capacitance-level sensor which produces values with high accuracy. The main drawback of capacitance level sensor is its high cost which is not efficient when used in the two-wheeler users. Basic methodological errors of liquid level measurement are caused by changes in physical orientation and mechanical forces, when liquid level does not correspond to fuel volume. Additional methodological errors are mainly caused by temperature influence on measured fuel.

[2] Sarawale R.K discussed the measure of fuel in the tank in litres. This incentive in litters will be in numerical digits (ex: 1.2, 1.3 and 1.4). This project predominantly focuses about the sign of fuel level in bike tanks and predicting the user location by using latitude and longitude value which is send by GPS to the system. This project evades a great deal of issues like fuel bunks at fuel stations, fuel burglary and keeps us from getting into circumstances where we need to push our vehicles because of suppositions of the level of fuel. These days the fuel pointer framework for the bikes are computerized yet they don't show the correct measure of fuel which is available in the tank i.e. they demonstrate the measure of fuel as far as bars and not in numbers or digits like litres or Millilitre.

So this issue is contemplated for their work of building up the computerized (numeric) fuel pointer framework for bikes which indicates correct measure of fuel regarding Litres (L) or Millilitres (ml). The main advantage of this system is that it can gives accurate value of remaining fuel as well as the vehicle running capacity in km. But due to use of the ultrasonic sensor it needs specific shape of the tank to measure the fuel.

[3] T.V.Premkumar described about the indication of fuel level in two- wheeler tanks and various other features like the distance can be travelled to the corresponding fuel, is added with this arrangement which will explain the clear performance of the vehicle to the corresponding fuel. In this proposed system they using the A/D converter with LCD was fitted with the analogue fuel gauge of the two-wheeler and the result was successfully obtained. The A/D converter shows the amount of fuel in fuel tank in exact litres (EX: 1.3, 1.4, 1.5). The A/D converter shows the exact fuel in litres only when the fuel in the fuel tank is more than 1 litre. The accuracy level is upto95 – 98% because the error was around ± 0.2 litres, because the fuel in the fuel tank was measured on the basis of float level in the tank they didn't use any other sensors. But the drawback of this system is it displays the exact litres on plane roads and shows error value on slope surfaces.

[4] Nadim R Patel proposed system, theft of fuel is avoided and the theft of fuel from petrol pump will come to an end, which will decrease the corruption. Due to this, system will be more reliable. This system will obtain the accurate readings of fuel in digital format. Gears of a two wheeler vehicle are working properly or not will come to know to the owner of two wheeler vehicle. And also this system can be able to detect the accidents occurred.

4. PROPOSED SYSTEM

This data collected from vehicle has a wide scope of utility and application, we have proposed the following system. The system is divided into two parts: -

i) Fuel Calculation.

ii) Mileage calculation (for a particular trip).

iii) Android Application.

The fuel tank of the user would be connected with two flow sensors- one at inlet and one at outlet right before the carburettor. Both the sensors would be connected to an Arduino device. The Arduino device will calculate the flow of fuel (petrol) passing through it in timely fashion. These reading would be converted to volume of fuel passing through it. The formula for conversion would be applied by using suitable metrics and calibration factor keeping in mind the real life practical scenarios. The Arduino which is further connected to Bluetooth module will send the fuel quantity in volume that has been input through inlet and output through outlet periodically to an android application. To do so, the Arduino's Bluetooth module must be paired with the user's device containing the application. The unique Bluetooth module would also serve as an authentication factor to identify the host vehicle. Pairing would be a onetime process after which data transfer between host vehicle and user application can be done easily whenever the user's mobile phone would be in vicinity of the vehicle's Bluetooth module.

The android application would do the further processing required. This android application would be a fully-fledged user experience based application designed keeping the user requirements in mind. The application would work mostly offline requiring an internet connection only for activities like online backup and other less frequent activities. The user will be able to use the application without an internet connection without any problem.

The application is proposed to have following major functionalities:

a) Displaying available fuel in litres/millilitres.
b) Distance to fuel empty.
c) Display average of the vehicle of all time.
d) Display fuel consumption of all time.
e) Provide a Trip mode for the users where the fuel consumption and average for that particular trip will be shown.
f) Various other insights and reports.

To provide the above functionalities, the application will require data like fuel available, fuel being consumed, distance travelled etc. which it will derive from the host vehicle through Arduino. Fuel availability shown in precise litres and millilitres using modern day sensors will allow user to know nearly exact amount of fuel remaining in their vehicles tanks and the distance that can be travelled before reaching empty condition based on the mileage estimated on last trips. Also

users can now get the exact average their vehicles give also in various driving conditions without any extra calculation. This functionality is not available in many conventional vehicles. The trip functionality will provide user with ability to calculate above insights for a particular trip and a certain kind of driving conditions which they can further use for their benefits.

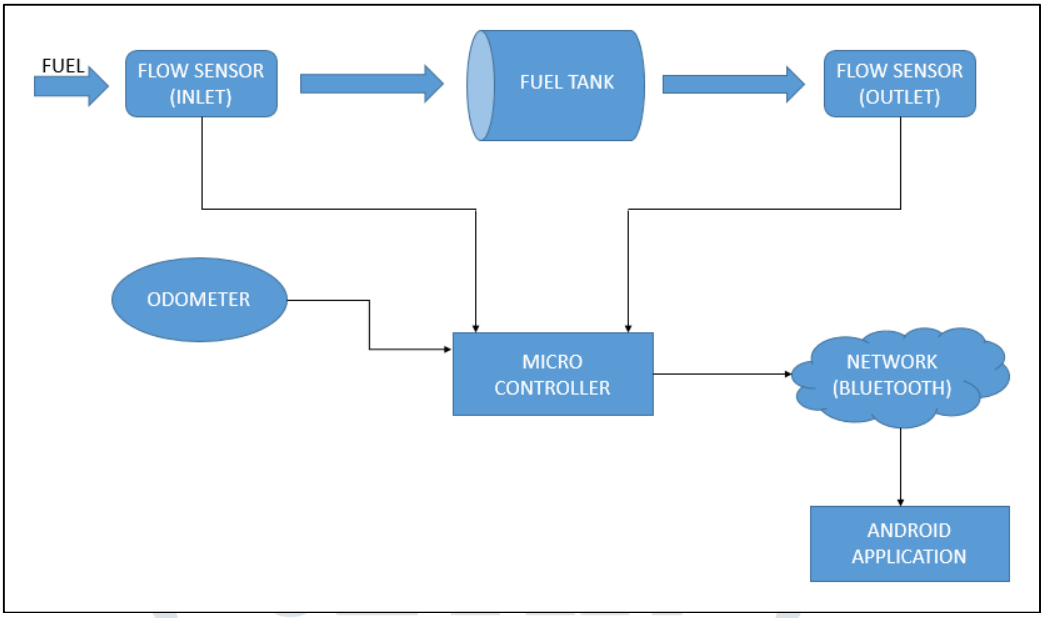

FIGURE 1: - ARCHITECTURE DIAGRAM

5. HARDWARE REQUIREMENTS

i) Flow sensor: This sensor sits in line with your fuel line liquid and contains a pinwheel sensor to measure how much has moved through it. There's an integrated magnetic hall effect sensor that outputs an electrical pulse with every revolution. The hall effect sensor is sealed from the fuel pipe and allows the sensor to stay safe and dry. The sensor comes with three wires: red (5-24VDC power), black (ground) and yellow (Hall effect pulse output). By counting the pulses from the output of the sensor, you can easily calculate fuel flow rate. Each pulse is approximately 2.25 millilitres.

ii) HC-05 Bluetooth Module: HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

iii) Arduino: The Arduino Uno R3 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 analogue inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. It is an open-source platform, means the boards and software are readily available and anyone can modify and optimize the boards for better functionality.

6. CONCLUSION

The project is focussed on providing two-wheeler users a better insight of their vehicle usage, most importantly precise fuel consumption and average of the vehicle used. The trip functionality will provide user with ability to calculate insights for a particular trip. The design of application focus on user experience and provide the information in user intrinsic, visually appealing manner and provide information about the vehicle. This will make the android application and the whole project more useful.

7. REFERENCES

[1] J Vignesh, V Nijanthan, J Venkateshwaran, K Suresh Kumar, Mrs B. Vidhya "Digital Fuel Level Indicator for Motor Bikes using Arduino Microcontroller",SSRG International Journal of Electronics and Communication Engineering (SSRG-IJECE) – Volume 4 Issue 3 – March 2017.

[2] Choudhary Saurabh, 2Barapatre Shubham, Bhong Kiran, Sarawale R.K. "SMART DIGITAL FUEL INDICATOR SYSTEM", International Engineering Research Journal (IERJ), Volume 2 Issue 9 Page 3552-3554, 2017 ISSN 2395-1621.

[3] A.Avinashkumar, U.Singaravelan, T.V.Premkumar, K.Gnanaprakash "Digital fuel level indicator in two-wheeler along with distance to zero indicator", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), Volume 11, Issue 2 Ver. III, PP 8084, 2014.

[4] Amruta B Kale, Sayali A Gaikwad, Nayan A Patil, Nadim R Patel "MODELING OF TWO WHEELER VEHICLE FOR FUEL INDICATION IN DIGITAL AND ACCIDENT DETECTION", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 10 | Oct -2017 e-ISSN: 2395-0056, p-ISSN: 2395-0072.