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Implementation on Smart Fuel Level Indicator and Mileage Calculating Device

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ABSTRACT: In the 21st century where everything has become digital, so that it's easy to interface it with real time systems. As we all are aware that motor vehicles display the amount of fuel in the fuel tank by means of some bars indicators through the E (empty), half, F (full) indicators. So by making the android App to display value of fuel indicator and interfacing it wirelessly will give the accurate value of the fuel in the tank. So by interfacing it with the Node MCU with different features of the project can be obtained. The amount of fuel is measured by using fuel level sensor in the tank by measuring the voltage across a variable resistor within the sensing system. This feature evades a great deal of issues like fuel theft at fuel stations, fuel burglary and also keeps us from getting into circumstances where we need to push our vehicles because of low level of fuel. By using a simple formula the mileage can also be calculated which gives us the estimation of our travelling distance before starting the journey. System will warn user when fuel is about to end or goes below 10%.

KEYWORDS: Node MCU, fuel level sensor, signal conditioning circuit

I. INTRODUCTION

Petrol is the most essential thing on Earth; no automobiles can run without petrol. Because of its most essentiality lot of people are trying to fraud by playing some cheap tricks. There are number of petrol bunkers that will try to fool us by short fuelling or short changing, when you go to fill your car or bike up, unless you stay alert. Most of the pumps still don't provide a printed bill. In order to eradicate the fraud you must check the meter reading or you should stay near to him. He never resets the meter to 0, he continues from the existing amount which results to less amount of fuel in our car or bike.

Fuel consumption for measuring engine performance is provided in kilometer per hour. Such performance, in engines in vehicles, is measured by a digital counting, measuring and calculating system. Fuel flow rate and distance traveled, or elapsed time units are converted respectively to streams of electric pulses which are counted and the ratio there of calculated and the results transmitted to a display. Current and average performance characteristics of an engine are displayed. For example, the current and average kilometers per hour of a motor vehicle are displayed to the operator. Fuel quantity is one of the undetermined factors in two-wheelers.

II. LITERATURE SURVEY

The paper "Smart Fuel Level Indicator and Mileage Calculating Device" gives the quantity of the fuel in the fuel tank in the form of numeric digits more accurately. Thus, due to this SyedaHiba et al [1] find out to what distance the vehicle can cover by the remaining fuel in the tank. The implementation of this system was very smooth, easy and very effective at a very low cost compared to all other techniques. The results are stored in Raspberry pi to keep track of the efficiency. The readings are unaffected by any Physical orientations and chemical changes of the liquid. All the equipment's have a long life, durable and quality materials.

Paper "Smart Fuel Level Indicator" [2] focused primarily on the fuel level sign in bike tanks and predicts the location of the user using the latitude and longitude value that GPS sends to the system. This paper evades a lot of issues such as fuel bunkers at fuel stations, fuel failure and stops us from getting into situations where we need to drive our vehicles because of the fuel level assumptions. The fuel pointer framework for the bikes is computerized these days yet they do not show the correct fuel measure available in the tank i.e. they show the fuel measure as far as bars and not in numbers or digits like liters or milliliter. The fuel pointer framework for the bikes is computerized these days yet they do not show the correct fuel measure available in the tank i.e. they show the fuel measure as far as bars and not in numbers or digits like liters or milliliter. This issue is therefore being considered for our work of constructing the computerized (numeric) fuel pointer framework for motorcycles which indicates correction. The fuel pointer system for the bikes is

computerized these days yet they do not display the appropriate fuel measure available in the tank i.e. they show the fuel calculation as far as bars and not in percentages or digits like liters or milliliter.

Today in this digitized world, if the fuel indicator in the automobiles is also made digital it will help to know the exact amount of fuel available in the fuel tank. The above-furnished fact is considered in my project and out a proper solution for indicating the exact availability of fuel in the tank digitally. In [3], Sahu Praveen Kumar calculated the amount of fuel in the tank in liters. This value in liters will be in numerical digits (ex: 1.2, 1.3, and 1.4). This paper mainly concentrates on the indication of fuel level in two-wheeler tanks. Various other features like the distance can be traveled to the corresponding fuel, is added to this arrangement which will explain the clear performance of the vehicle to the corresponding fuel.

There are number of petrol bunks that will try to fool us by short fuelling or short changing, when you go to fill your car or bike up, unless you stay alert. Most of the pumps still don't provide a printed bill. In order to eradicate this fraud paper [4] helps to know how much petrol has been falling into the petrol tank by showing you the exact point reading through LCD. Here we are implementing an IOT fuel monitoring and tracking system

In the recent times we are constantly hearing about petrol bunk frauds. Most of the petrol bunks today have manipulated the pumps such that it displays the amount as entered but the quantity of fuel filled in the customer's tank is much lesser than the displayed value. Let the pumps are tampered for the benefit of the petrol bunks owner. This results in huge profits for the petrol bunks but at the same time the customers are cheated. All the vehicles in India consist of analog meters hence it is not possible to precisely know the amount of fuel currently in the vehicle and also it is not possible to cross check the quantity of fuel filled in the petrol bunk. In [5], we focus on creating a digital display of the exact amount of fuel contained in the vehicles tank and also help in cross checking the quantity of fuel filled at the petrol bunk.

The objective of "Digital Indication of Fuel Level in Litres in Two Wheelers" 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, author Gokul.LS et al [6] 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.

Paper "SMART DIGITAL FUEL INDICATOR SYSTEM" [7] 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.

Nowadays, at many of the petrol pumps, we don't get the exact amount of petrol as shown by the filling machine. The amount of petrol we get is somewhat less than the amount we should actually get. In today's modern and digital world, if the fuel indicator in the vehicles is made digital, then it will help us to know the exact amount of fuel available/filled in the tank. The above fact is considered in our project. The exact amount of fuel available in the tank will be displayed digitally by making the use of Ultrasonic sensor. The ultrasonic sensor is a non-contact sensor, with low power requirement and good accuracy. It overcomes the problems faced by other gauges and is suitable for the non-contact measurement of the fuel inside the tank. Paper [8] mainly concentrates on the digital indication of fuel in vehicle's tank.

In [9], Elumagandla Surendar and Poreddy Prashanth proposed a digital measurement system which constantly displays the different parameters like fuel quantity and battery health. The fuel indicator which we use gives us 100% accurate result by displaying the quantity of petrol in numerical format i.e. in millilitres. The heart of the project is the microcontroller which takes necessary decision depends on the sensor feeds and displays the results in the digital format. An analog type fuel tank level sensor is interfaced to the Analog to digital controller (ADC) which converts analog voltage output from the sensor to the digital form and feed to microcontroller. Then the microcontroller calculates the level depends on the digital value multiplied with the volume of the tank at that level and displays the digital numeric value on the screen.

"Digital fuel level indicator in two-wheeler along with distance to zero indicator" [10] mainly concentrates about the indication of fuel level in two-wheeler tanks. 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.

III. PROBLEM STATEMENT

The existing fuel indicators installed in vehicles like Honda, Hero, Tvs, Yamaha are having the petrol indication in the form of points and analog meters, which leads to miscalculations to what distance vehicle can go with present fuel in tank. And one of the major problems with the kick less motor vehicles is that once battery gets discharged, the self-start motor will not respond making situation horrible to the user. The latest model cars present in the market also has a fuel indicator but it is not accurate in showing the petrol quantity in the tank. Some of the four wheelers like FORD, AUDI, BMW, BENZ are costly and are having huge demand in market had a distance estimator in them, which will show an average of the car's mileage for 1 kilometre. But if we go only in economy speed only the reading is appropriate. If we go with the maximum speed we may not get the exact reading that how much the can travel. To overcome such unavoidable conditions, the pre-measure and sensor data would help user to play safe on the road.

IV. METHODOLOGY

The Fuel level sensor is variation of capacitance between the sensor housing and the induction electrode caused by oil into the container, and these changes into the current change detection of oil in the container position (height) parts. The output of fuel level sensor is fed to microcontroller via signal conditioning circuit (SCC). The output of the sensor connected to a microcontroller should be a voltage level from 0 V to 3.3 V for the variation of the input variable. However output of fuel sensor is not in range of 0V-3.3V hence the sensor signals need some form of change of bias and/or shift of voltage level. This achieved by using SCC in between sensor and microcontroller which acts as a mediator/translator.

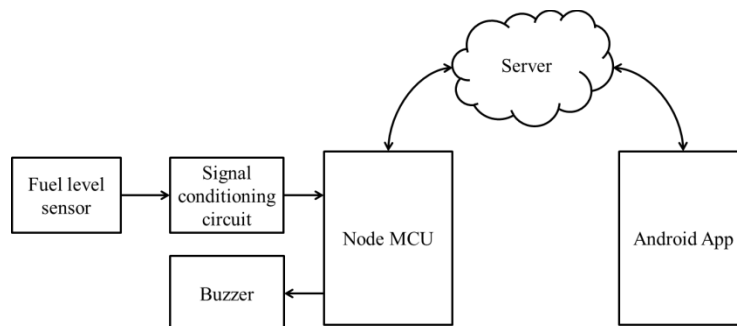


Fig.1 Block Diagram

Wi-Fi is inbuilt in Node MCU hence by creating account in firebase and filling its credentials while programming one can easily access firebase save data on cloud. Fuel level is continuously updated on firebase. Android App displays:

- Level of fuel in tank (in milliliters)
- Distance vehicle can cover up with remaining fuel
- Mileage of bike by taking into account how much distance vehicle travels in 1 liter of fuel

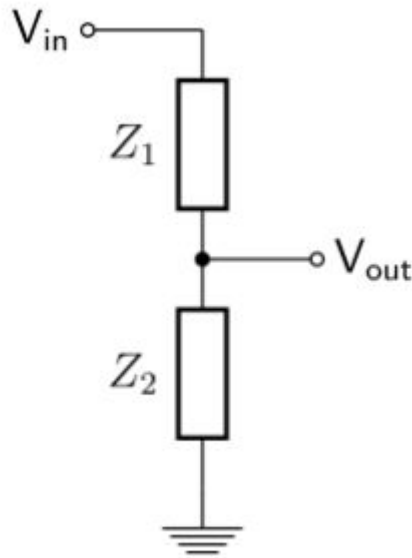
Mileage of bike -Mileage is calculated as follows:

$$\text{Mileage} = \text{miles driven} / \text{fuel consumed}$$

Miles driven- distance travelled by vehicle in miles fuel consumed-fuel consumed by vehicle. It is taken as 1 Litre. We calculate how much distance a vehicle covered in 1 litre of fuel If the fuel level decreased beyond certain threshold value then to indicate low fuel, buzzer starts buzzing.

Signal Conditioning Circuit

In electronics, a voltage divider (also known as a potential divider) is a passive linear circuit that produces an output voltage (V_o) that is a fraction of its input voltage (V_i). Voltage division is the result of distributing the input voltage among the components of the divider. A voltage divider referenced to ground is created by connecting two electrical impedances in series, as shown in Figure below.



The input voltage is applied across the series impedances Z_1 and Z_2 and the output is the voltage across Z_2 . Z_1 and Z_2 may be composed of any combination of elements such as resistors, inductors and capacitors. If the current in the output wire is zero then the relationship between the input voltage V_i , and the output voltage, V_o is:

$$V_o = \frac{Z_2}{(Z_1 + Z_2)} \cdot V_i$$

Here V_i is input from fuel indicator sensor, V_o is input to Node MCU. We used two resistors of appropriate values for obtaining desired output.

V. RESULTS

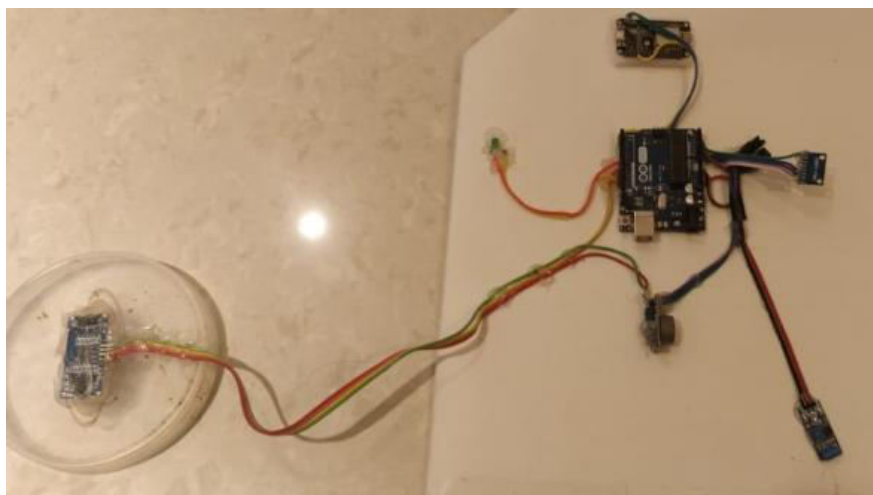


Fig.2. Hardware Module



Fig.3. View Fuel Level

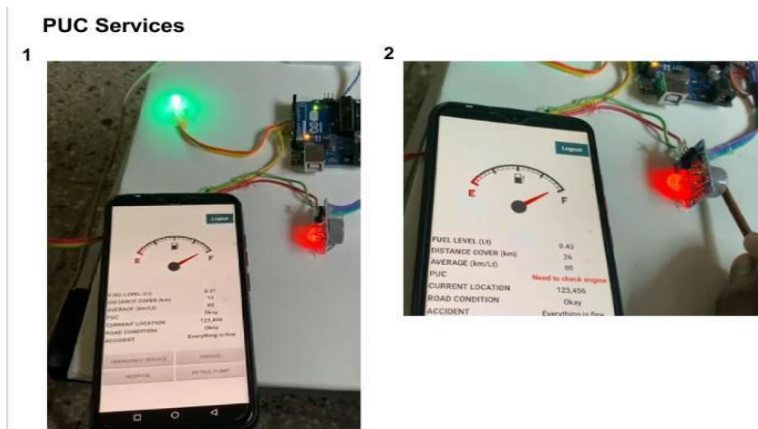


Fig.4. PUC Services

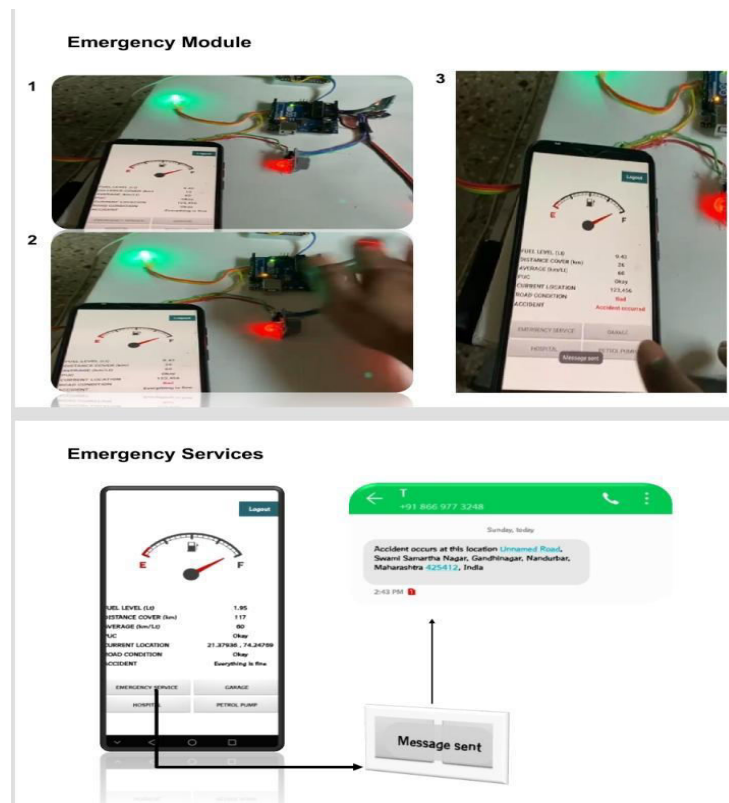


Fig.5. Emergency Services

VI. CONCLUSION

An advanced digital Fuel meter is the one which shows the level of Fuel in digital format. In this project, we propose a digital measurement system which constantly displays the different parameters like Fuel quantity and mileage in Android App. The heart of the project is the Wi-Fi integrated microcontroller (Node MCU) which takes necessary decision depending on the sensor feeds and displays the results on App. An analogue type Fuel tank level sensor is interfaced to the Signal conditioning circuit which converts value from sensor to appropriate value and feed to microcontroller. Then the microcontroller calculates the level.

The future scope of this project is to know the amount of impurities present in the total quantity of the fuel. This can be known with the help of sensors which senses the impurity in the fuel.

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