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Implementation of Automated Fuel and Oil Stock Digital Monitors for Vehicles

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Abstract: The existing fuel calculation methods installed in the vehicles are in the form of bars and points and some commonly used vehicles still having the analog meters to calculate the amount of fuel in the tank, so this method results in miscalculations and the rider is not aware of how much distance the vehicle can move with the available fuel in the tank. So we tend to design a system which actively displays the amount of fuel available in the tank and distance can be travelled with the available fuel to the rider, this system is made for the common people to their conventional vehicles.
Keywords: A/D Converter, Analog fuel gauge, Fuel mileage, Microcontroller, Two wheeler.

1. INTRODUCTION

A progressive 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 exhibits the different parameters like fuel quantity and mileage in the digital format. In this generation embedded system have becomes a vital part of human life. Each and every gadget we use has been digitized but one of the important field (i.e.) fuel calculation for the fuel consumed is still analog this project mainly aims in digitization of projecting digital fuel meter [1]. The existing fuel indication installed in vehicles like Honda, Hero, TVS, and Yamaha is having the petrol indication in the form of points and analog meter, which leads to miscalculation to what distance vehicle, can go with instant fuel in a tank. The latest model cars present in the market also has fuel indicator but it is not accurate in showing the petrol quantity in the tank [2]. A few of the four wheelers like FORD, AUDI, BMW, BENZ are costly and are having a huge demand in vend had a distance estimator in them, which will show an average of car's mileage for 1 kilometre. So we developed a design to help the common people for determination of the fuel in the tank effectively. In this project, we come up with a digital measurement system which constantly displays the different parameters like fuel quantity and mileage our digital indicator will indicate the level of fuel in litres and mileage in kilometres [3]. This type of fuel indicator has not been implemented in any of the trading two-wheelers till now.

2. RELATED WORKS:

Elumagnadla Surrender ,Poreddy Prasanth (Jan 2005) in this paper, the calculation of the fuel tank is done by using the float sensor and using the Analog to Digital Converter(ADC) to determine the amount of fuel in the tank some authors suggest that with the increases in vehicle usage over the world, fuel necessary has become a tremendous problem[4]. Formation and implementation of load cell based fuel measurement measures the accurate level of fuel adding while fuel filling process. There is a large variety of methods for measuring the fuel level, running from those using mechanical floats and a capacitive and optical sensor to ultrasound methods [6]. Nowadays all fuel bunks having types of the digital display unit in order to display the values of fuel adding to the vehicle. So by then, it is also implemented on to the tank of the vehicle also. But the con of using load cell is that it can't be used for measurement of highly reactive material such as petrol. So we decide to use an ultrasonic technique for petrol level measurement as it is a non-contact type measurement method. Some papers suggest that in all over the world all the vehicles are having analog fuel meter [5]. This meter indicates 3 statuses of fuel level which is empty half and full. So that we can't judge the absolute fuel present in the fuel tank.

V.R.Gandewar, Mahesh.S(Apr 2014) development and fabrication of "Alphanumeric Fuel Level Indicator For Two Wheelers" worn the Analog to Digital Converter and pressure sensor installed in the fuel tank to determine the amount of fuel in the tank which is contact type of sensors contacts with the fuel [7]. The estimated works based on our project are Park light is getting ON automatically while starting the vehicles, Alarm indication for non-removal of side stands is implemented when the driver of the car doesn't wear the safety belt and alarm starts for his alert. The project focal point on creating a piece of equipment which can help to actively exhibition the definite amount of fuel and fuel mileage of a motorbike in real time. It comprises of fuel tank, analog fuel gauge, battery, A/D converter with LCD display.

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3. BLOCK DIAGRAM:

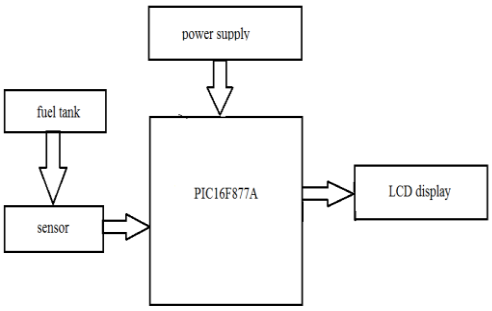

Figure 3.1Block diagram.

The block diagram as per shown in the above figure3.1 consists of the power supply unit, ultrasonic sensor, PIC microcontroller, and LCD display. In the block diagram of a digital fuel meter, one basic sensor is employed. It is the ultrasonic sensor which senses the fuel in the tank by sending and receiving the ultrasonic waves into the tank, so by calculating the time interval of the signal,it sends and receives the determination of amount of fuel in the tank and sends the analog data to the PIC microcontroller and the microcontroller sends to the LCD display which shows in the digital notations in litres and mileage in kilometres. The proposal is based on Programmable Integrated Circuit PIC16F877A where LCD screen and an ultrasonic sensor will be armed together. The fuel is being calculated and displayed by interfacing with LCD display.

3.1PROPOSED SYSTEM:

Nowadays the fuel indicator system for the two-wheelers are digital but they don't show the definite fuel amount which is present in the tank i.e. they show the measure of fuel in terms of bars and not in numbers or digits like litre or millilitre. An advanced digital fuel meter is the one which shows the level of fuel in digital format [8]. In this project, we propose a digital measurement system which constantly displays the different parameters like fuel quantity and mileage [9]. The heart of the project is the microcontroller which takes the necessary decision depending on the sensor fields and displays the results in the digital format. The project is based on Programmable Integrated Circuit PIC16F877A where LCD screen and ultra-sonic sensor will be armed together. The chosen PIC is used since the course for "Microprocessor and Microcontroller" only covers PIC16 areas [10]. Besides that, PIC16 is a widely used microcontroller and its instruction set, tutorials and examples are easily available especially on the internet [11].

3.2PROPOSED METHOD ADVANTAGES:

Results are shown in digital values. To know the amount of fuel in litres. Real-time updating of fuel will make rider to get to know the exact amount of fuel availability in the tank. Amount of fuel and distance can be travelled is not instantly. The main advantages of this system are that it can give an accurate value of remaining fuel as well as the vehicle running capacity in kilometre.

3.3DESCRIPTION OF CIRCUIT DIAGRAM:

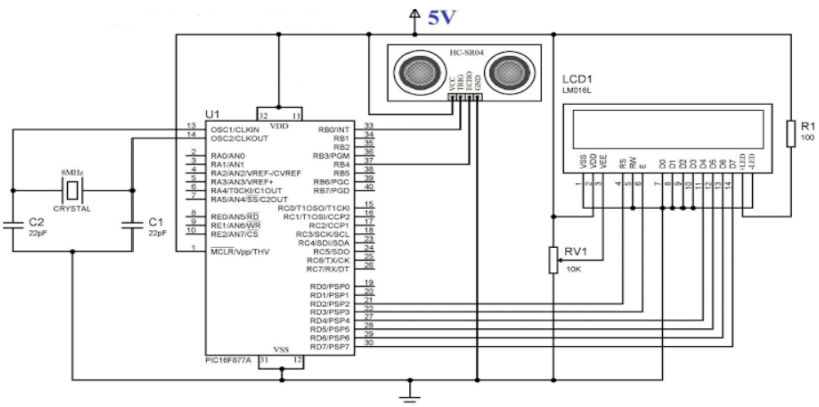

Figure 3.2 Circuit Diagram

Circuit connections for this digital fuel meter project, are shown in figure3.2 we have used a PIC16F877A for processing all the things used in the project. A load from the two transformers which are connected in series and parallel is connected to the op-amp non-inverting pins(3 & 5) and inverting pins(2 & 6) and the output 5v is fed into the analog pins 2(RA0) and 3(RA1) of a PIC. A liquid crystal display is used to display the status of power consumed and the tariff for the consumption. Data pins namely RS, EN, D4, D5, D6, D7 are connected to the PIC16F877A port B pins (i.e.) 39(RB4), 40(RB5), 35(RB0), 36(RB1), 37(RB2), 38(RB3).

3.4ULTRASONIC SENSOR:

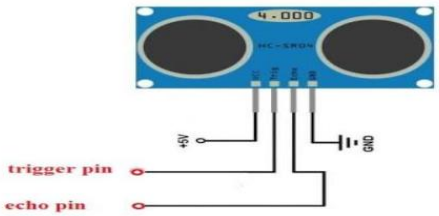

Figure 3.3 Ultrasonic Sensor

The HC-SR04 is a great, low power and easy to use dual channel sensor. Ultrasound is an acoustic wave with a very high frequency, ahead of human range. Since the audible frequency length is said to be between 20 Hz and 20 kHz, ultrasound typically means acoustic waves above 20 kHz. An ultrasonic sensor is a sensor which measures the distance of the respective gadget by sending the sound wave of a specific frequency. This sound wave is echoed after the collision with the respective object and this wave is received by the ultrasonic receiver. Space is measured by calculating sending and receiving time of this sound wave.

4. RESULTS AND DISCUSSION:

This project is developed using an embedded system and displays the amount of fuel in the tank digitally and mileage in kilometres for available fuel in the tank. The fuel amount is determined by the ultrasonic sensor and then the data is fed into the microcontroller and coding's for the calculation of petrol and distance are burned into the microcontroller and the required output is displayed in the LCD display. The fuel consumed and simultaneously distance calculated is projected in 2*16 LCD display.

5. CONCLUSION& FUTURE ENHANCEMENTS:

In this project, we have successfully constructed and implemented an "Automated Fuel and Oil Stock Digital Monitors for Vehicles". This project is implemented using PIC16F877A PIC-microcontroller where the cost of this controller is low and its handling is also easy. This prototype used an ultrasonic sensor the distance is determined based on time elapsed, as it input and the output will be displayed at LCD display in the quantities like petrol in litres and distance in kilometres.

The experiment conducted experimental on a gearless motor vehicle. The project gives us the indication of parameters like fuel level and mileage. The future scope of this project is that providing the vehicle with the oil monitoring system because the over draining of oil causes the engine to cease.

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