

Petrol Level Detection Using Ultrasonic Sensor

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ABSTRACT

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. This project mainly concentrates on the digital indication of fuel in vehicle's tank.

Keywords— Microcontroller, Ultrasonic sensor, Lcd, Buzzer.

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I. INTRODUCTION

There is a lot of news regarding the petrol pump frauds which leads to corruption. There is difference between the amount of fuel displayed on the meter and the fuel filled in the tank. Most of the times the fuel filled is less than the displayed value. This is because of the arrangements made in the filling machine which leads to the benefit to the owner. In case of analog display user cannot find out the accurate and precise value of the remaining fuel. By considering this fact, we have designed a digital fuel level indicator which will be of great importance to avoid fuel thefts on the petrol pumps. Although contactless methods are more complicated than contact methods, there are lots of sensors available for the fuel measurement. We have used an Ultrasonic sensor for the calculation of the remaining fuel. From security point of view, fuel level indication and alarm system will be used to indicate fuel level. It gives an audiovisual indication to the customer. Whenever fuel level will drop below the reserve level, alarm will be activated.

II. EXPERIMENTAL PROCEDURE

A. LITERATURE SURVEY

Authors in [1] have explained that with the increase of vehicle usage over the world, fuel necessary has become a tremendous problem. Design 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 fuel level, ranging from those using mechanical floats and capacitive and optical sensors to ultrasound methods. Nowadays all fuel bunks having types of digital displays unit in order to display the value of fuel adding to the vehicle. But the disadvantage of using load cell is that it can't be used for measurement of highly reactive material such as petrol. So we decided to use ultrasonic technique for petrol level measurement as it is a non-contact type measurement method.

Authors in [2] have stated that Contactless methods, such as those for optical and ultrasound sensing, measure liquid level without having to contact the liquid. Most of the companies are very interested to manufacture the sensors to indicate fuel from level and save your money. Digital fuel gauge in used to measure the accurate amount of fuel in the

fuel tank compared to the previous method .that is previous method consist of dash board in that needles are moved to indicate the amount of fuel but that is not accurate it just show the approximate value.

Authors in [3] have mentioned about improvement of conventional methods for fuel measuring. The security and accuracy of contactless measuring devices has helped a lot in accurate and error free measuring.

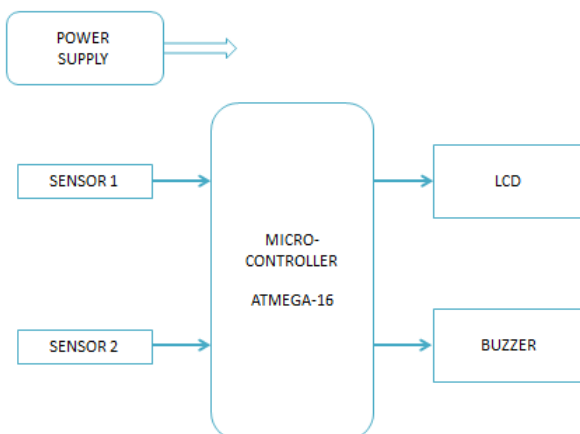
III.METHODOLOGY

The system contains two Ultrasound Sensor modules, Liquid Crystal Display (LCD) to show the updates, a micro SD card for data acquisition & data saving and Real Time Clock (RTC) to give accurate time and date. The whole system is controlled by using AVR controller.

Ultrasonic sensors are characterized by low-cost and the possibility of being used in environments and situations where it is not possible to use more complex sensors as camera systems and laser devices, optical sensors. In this work, HC SR-04 which is ultrasonic electric telemeter modules was employed as ultrasonic transmitter and receiver.

This module can measure a distance within 0.03-3 mt effectively and transform the data into impulse of different width. At first 5us, pulse is applied through the pin SIG of the module which triggers the transmitter to generate 40 kHz ultra sound signal string. At the moment the receiver catches the reflected wave it generates a high pulse width which corresponds to the time that the signal takes to reflected back. By using this pulse width we can measure the distance as well as the fuel level.

BLOCK DIAGRAM



The whole block diagram can be divided into 5 parts-

- Power Supply
- Microcontroller
- Sensors
- Display unit
- Buzzer

- Power Supply: As the input to the microcontroller is 5V, we have used LM 7805 as a voltage regulator which has a fixed voltage of 5V.
- Microcontroller: Atmega 16 is a 40-pin wide DIP (Dual In Line) package chip. This chip was selected because it is robust, and the DIP package interfaces with prototyping. This same microcontroller is available in a surface mount package.
- Sensor: It is a type of trans receiver. Ultrasonic sensor works on the principle of echo. The ultrasonic waves are sent to an object and the reflected waves are received. Time required for the reflected waves is recorded and accordingly the distance is calculated by knowing the speed of transmitted waves. This principle is used here.
- Display: Display units shows the amount of fuel digitally and also the distance the vehicle can cover.
- Buzzer: It is an audio signaling device. It is use as a alarm to avoid petrol theft.

IV.MERITS

- Digital fuel indicator helps you to measure the quantity of fuel in fuel tank and also pumped from the petrol bunk better than the analog meter.
- This helps you to calculate the mileage of your vehicle also.
- Buzzer provides security for bike from the petrol theft.

V. DEMERITS

- The major problem with this system is that, if proper connection is not done then due to short circuit there will blast in petrol tank.
- Observation and regular maintenance will be required for this system.

VI.APPLICATIONS

- This circuit can be used in bike to know the quantity of petrol available in the tank.
- This circuit can also be used for security purpose in bike to avoid the petrol theft.

VII. CONCLUSION

The proposed idea consists of ultrasonic technique for fuel measurement that acquires the measured fuel level and sends to the display unit which is present on the dash board. The data acquired from the sensor is given to the microcontroller . The processor processes the data by calculating the liter value that send to the display unit. If the petrol level suddenly decreases when the bike is in off condition, security alarm will ring, thus avoiding petrol theft.

VIII. PROJECT OUTCOME

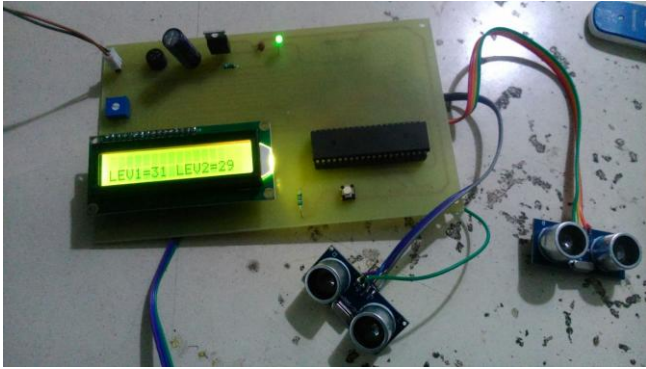


Figure 1. Output of both sensors(petrol level measured by both sensors)

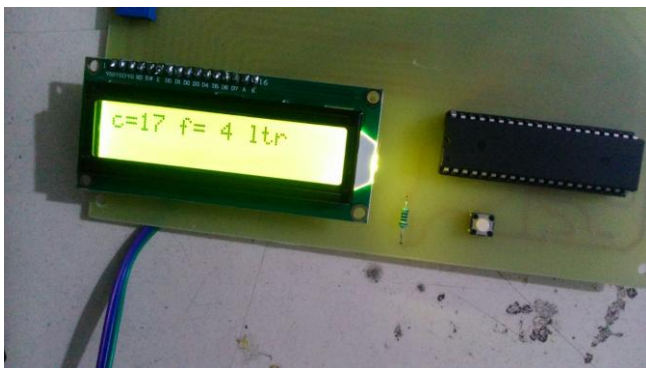


Figure 2. Mean value of both levels and amount of petrol present in the tank.



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