Detecting fraudulent of fuel level on LED digitized display using IoT sensors

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Abstract. Fuel prices are soaring day by day. Because of this, there is a great deal of increment in fuel fraud cases. In order to aid people in their vehicle’s fuel theft detection, this paper examines the ability of the system to perform a task which detects the fraud at the filling station. The real-time problem which is now happening in the filling station is the Fuel Level in the fuel tank. The appliance has a display screen which is used to show the amount of fuel already existing in the tank of the vehicle before filling and after filling the tank it shows the total level of fuel in the tank that is already existing plus the amount after filling accurately thereby knowing the exact amount of fuel which was filled in the vehicle. The difference in total fuel and amount already existing in the tank gives the amount of fuel filled. This helps to reduce the fraud at the filling station. The Arduino stage has gotten very famous with individuals simply beginning with gadgets, and all things considered. We used the Ultrasonic sensor which is placed above the tank temporarily as it is a cost-effective solution.

1. Introduction

Fuel Level Manager is characterized by the ability of the system to perform task which detects the fraud at the filling station. Our paper is based on real time problem which is now happening in the filling station. When we ask a person to fill the fuel in our vehicle, sometimes we don’t know the fuel indicated on the display board [1] will be actually filled in our tank or not.

The appliance has a display screen which is used to show the amount of fuel already existing in the tank of the vehicle before filling and after filling the tank it shows the total level of fuel in the tank that is already existing plus amount after filling accurately thereby knowing the exact amount of fuel which was filled in the vehicle[2]. The basic relative difference of total amount of the fuel which is already existing in the tank gives the amount of fuel filled is represented as follows. The work focussed on the primary objectives that we have accomplish to plan this machine is

- To build up an advanced fuel pointer which show the current measure of fuel present in the fuel tank.
- To recognize the distinction between existing fuel and current fuel with the goal that giving the measure of fuel filled in the tank.
- To give an easy to understand interface to the framework particularly for the two-wheeler clients.
1.1. Distance Calculation
The distance can be calculated with the following formula:

\[ \text{Distance} \, L = \frac{1}{2} \times T \times C \]

where \( L \) is the distance, \( T \) is the time between the emission and reception, and \( C \) is the sonic speed. (The value is multiplied by \( \frac{1}{2} \) because \( T \) is the time for go-and-return distance.) [3] This helps to reduce the fraud at the filling station.

2. Literature Survey

2.1. Prevailing Technique
The existing system consisting of many flaws that are happening in fuel locations. Present days there is no proper system to find current fuel in the container which gives us the exact measure (millilitres) of fuel filled inside the tank at filling location. At hand no displaying LCD screens to demonstrate fuel level and values of them. Such failures may be cost effective to user.

2.2. Recommending Technique
In proposed system this paper has revolutionized the area of fraud detection to an increased level of fuel for monitoring fuel tank [4] using Arduino compiler and a ultrasonic sensor is fixed to find out the level of fuel level sensing & also it gives the present fuel inside tank and fuel filled at that point and total fuel level after filling in side tank. By this we can control the fraud at filling station.

3. Accomplishment
Fuel Level Manager is characterized by the capability of the method to perform a task which identify the fraud at the fuel stations. This paper is based on a problem which is now happening in the fuel stations. The main components of this architecture are IoT and Arduino based vehicle fuel level detection are an ultrasonic sensor, microcontroller.

When the Arduino board is on, the Ultrasonic sensor measures the expanse of the current fuel levels and displays the values of before filled, after filling and variation of fuel levels on the LCD Screen board and when some quantity of fuel is added to the fuel tank, the current value changes to in 5 seconds As the name refers an ultrasonic sensor counts the expanse between ultrasonic waves. The ultrasonic sensor emits a wave and receives back the reflected wave from the object. Ultrasonic Sensors calculate the distance by measuring the time between the ejecting and receiving.

The highlights remembered for the sensors are:

- Transparent object perceivable
- Complex moulded items discernible.

The Sensor emits out a high-frequency sound pulse then we wait for the time engaged for the resonance of the sound to come back. The ultrasonic sensor has One opening which transmits ultrasonic emission and the other converse receives wave.

So, this paper consists of a level sensor that identifies the level of fuel in the vehicle. This reading is sent to the microcontroller. The microcontroller -Arduino has an inbuilt ADC during which the signal would be converted to DC. At the same time, the microcontroller, as programmed, would compare the reading from the sensor value of before, after filling the fuel tank.

Here ignition lock acts as the trigger to this module. When the keys are inserted in the ignition lock, the module would be de-activated and would be activated as soon as the keys are removed.
This System consists of hardware part and software part. Here, Hardware part is used for calculating number of litres of fuel in fuel tank of the vehicle. The software part represents the data. The architecture has three different modules namely Arduino, LCD, and Ultrasonic sensor, which consists ultrasonic sensor which measures fuel level of a microcontroller placed in each fuel tank to identify the number of litres of fuel.

4. Results
When the power button is turned on, ultrasonic sensor gets activated and it first scans the bottom of the fuel level which gives value displayed on the board in BF and after filling the fuel the value will be displayed in MLA\text{t}. The display screen shows us measuring level of the fuel differences filled in the tank. The figure above shows us the difference between before filling (BF) and after filling (MLAt). It also displays difference of before and after filling fuel tank (DF) and capacity of the tank (MLMx) is shown.

The amount produced of the digital fuel level system shows the initial value of the fuel there in the container, the value following of the tank, difference between the fuel before and after, capacity of the tank.
5. Conclusion and Future work
The current system makes sure that how much amount of fuel is exactly deposited to avoid loss of the amount of money. This system implementation helps to know the exact amount of fuel filled in tank, thereby detecting the fraud using the Ultrasonic sensor, Arduino board, and display sensor. This system assures the 85% accuracy level of fuel that is before filling the petrol and after filling the fuel. It also gives us the variation of initial and final levels.

This model highly influences the present scenarios and solves the problem of frauds that are been identified in the gas station. This model improved by changing the ultrasonic sensor to a weight sensor for fuel level monitoring to acquire 99% accuracy. We can implement this model for four-wheeler vehicles which are very helpful to the people. So, it is necessary to implement such designs in order to continue future needs and problems in earlier stages.

6. References
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