

Design and Fabrication of The Fuel Metering System Through The Fuel Dispenser

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Abstract

In the current scenario the frequency of scams and blunders are increasing these days, the innocent common people are hoaxed in their quotidian activities. The crude oil prices are increasing by every single minute passing, because of which consumers have reduced the use of gasoline running vehicles. But the scammers at fuel stations are earning tons of illegal profits by manipulating the displaying screen while filling up of fuel in the vehicle. The current study introduces a Hybrid fuel measuring system that uses ultrasonic waves to detect the level of the fuel in the tank and gives the real time value to the consumer or the owner of the vehicle. This idea if implemented in the all-running vehicles in the globe could shape a new automobile sector in which no frauds would take place and the customers could get the best value of the money they have spent for the gasoline to be filled in their vehicle's fuel tank. An effective fuel-metering device is fabricated to check and provide the amount of fuel filled in a tank through the refill process from source.

1. Introduction

There are multiples trust issues faced by customers in different streams of market. As we know the petrol prices are touching insurmountable heights, people are getting more and more cautious about every matter related to petrol. Due to huge reduction in the crude oil ores, and dramatic increase in consumption of different variants of oil like gasoline, petrol, diesel etc. , the inflation in the prices of crude oil is becoming very high making every single drop of oil highly valuable. The oil measuring system fitted in all types of vehicles is not efficient as it does not show or measure the level of gasoline filled in the fuel tank.

Breed, D. S [1], accurate measurement of fuel is having a great significance, because these days, fuel pumps owners make few changes in the fuel-dispensing machine to make huge illegal margins. Traditional oil measuring system can only show the estimate reading of

half or full tank or reference mark to half or full mark on the output meter. Therefore, we came up with the new pioneering idea in modern transportation world and named as hybrid fuel measuring system, which will help people in measuring the exact amount of fuel filled in their vehicle's fuel tank. This would probably increase the efficiency of a vehicle and would have a pragmatic effect on the pockets of the consumer.

Baughman, M. L [2], Hybrid fuel measuring system is one its own kind, as it gives very efficient, exact, optimized and useful readings of the fuel filled into the tank. The reason of the efficiency of our system is, we are using ultrasonic sensor, which is very accurate in its working. The efficiency of our fuel measuring system can be increased by increasing the data entries in the data set inserted into the code that is fed into Arduino.

. The Time of flight is that the time advance between the emissions consequent arrivals when reflection of a supersonic pulse train travel at the speed of sound. This causes giant response times for one activity. Supersonic sensors emit short, high-frequency sound pulses at regular intervals. If they strike an object, then they are mirrored back as echo signals to the sensing element that it computes the space to the target supported the time-span between emitting the signal and receiving the echo.

The point of this writing audit is to get an idea in exploring the field of research, which is worried about the estimation of fuel measurement framework in an urban setting to grow more information on the holes that should be loaded up with new research. Moreover, this writing study targets gathering achievement factors that examination has indicated work in urban communities in various settings and may be executed in other urban communities. Without going before the writing study, we do as of now presently foresee challenges finding legitimate when concentrates dependent on determined markers uncovering the effect on effectiveness of estimation of fuel in the fuel tank because of various measures presented.

2. Scope of study

Before starting of any project there is a need to study its objective and its future scope, it is better to understand it uses and limitations, in this chapter we will look into the scope and objectives of this project and understand its viability.

2.1 Scope

We know the petrol prices are touching insurmountable heights, people are getting more and more cautious about every matter related to petrol. Due to huge reduction in the crude oil

ores, and dramatic increase in consumption of different variants of oil like gasoline ,petrol ,diesel etc. , the inflation in the prices of crude oil is becoming very high making every single drop of oil highly valuable. These reasons are enough to motivate us to develop a hybrid fuel measuring system, which works on ultrasonic sensor, Arduino Uno and the code fed to the system. Our venture centres around making a gadget which can help to effectively show the accurate measure of fuel in the fuel tank continuously which involves a device to measure the level indicator and having a digital meter to shows reading for better understanding.

Different purposes for which our hybrid fuel measuring system can be used are as follows:

- Can be used in two wheelers
- Can be used in four wheelers
- Can be used in big storage fuel tanks at gas stations.
- To stop the blunders regarding less fuel filling compared to the value displayed on fuel pump screen.
- To increase the competence of fuel as per the money paid.
- To regulate the tax over the income generated by the sale of oil by the fuel pumps.
- To increase the customer satisfaction



Figure 1 Shows rising petrol prices are creating trouble for common people [5]

3. Research methodology

This chapter details everything we read to better understand the designing and construction of the project. These includes everything from the different aspects of a hybrid fuel measuring

system and its standards, equipment used and how they work together. Moreover, to the end we have detailed calculations that was used in the process.

3.1 Fuel Tanks

A fuel tank (or petroleum tank) is a protected holder for combustible liquids. In spite of the fact that any capacity tank for fuel might be supposed, the term is commonly applied to part of an engine framework in which the fuel is put away.

3.2 Automotive Fuel Tanks

By increasing the size of the fuel tank maximizes the distance with more space and also increases the weight. The parameters which are changed by above modification results in higher fuel consumption for the same performance. So, capacity of the fuel tank is a trade-off design consideration.



Figure 2 Car's Fuel Tank



Figure 3 Bike's Fuel Tank

3.3 Arduino Uno

The Arduino Uno is an open-source microcontroller board dependent on the Microchip ATmega328P microcontroller and created by Arduino.cc. The board is furnished with sets of computerized and simple I/O pins that might be interfaced to different extension sheets and different circuits.



Figure 4 Arduino Uno

3.4 Ultrasonic Sensor

A supersonic gadget might be a gadget that may live the hole to relate object by abuse sound waves. It allots separation by causation a wave at a chose recurrence and tuning in for that wave to recover. By recording the timeframe between the wave being produced and furthermore the wave skipping back, it's feasible to figure the hole between the navigational instrument gadgets and the objects.

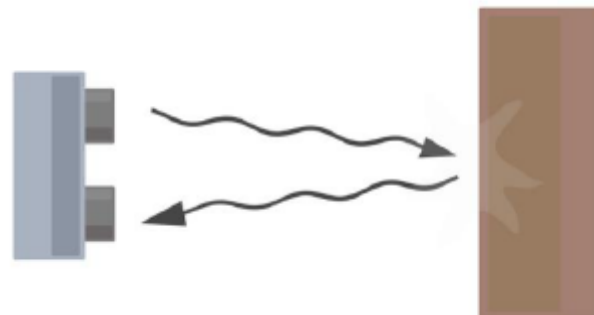


Figure 5 Working of Ultrasonic sensor

It is a crucial to get a handle on that a few items may not be distinguished by imperceptible sensors. This is frequently because of certain items are shaped or situated in such the easiest way the wave bobs off the objects, anyway avoided far away from the indistinct detecting component. Various items will assimilate the wave at the same time, which infers that there's no methods for the detecting component to watch them precisely. These are fundamental variables to think about once arranging and programming golem abuse a quiet detecting components.



Figure 6 ultrasonic sensor

4. Design approach

4.1 Structure Design

This can be considered as one of the most important phases of the project, in this stage we tried to come up with a suitable design, a feasible and reliable way to detect the level of petrol in the fuel tank. And looked ahead the different components that would be available for the fabricating such as the sensor. We have also studied the various papers to find out the required power that is needed so that a suitable sensor can be acquired.

4.2 Manufacturing strategies and materials

During the second phase of our project, we with the guidance of our mentor discussed various strategies and schemes for the selection of various materials and the equipment's needed which will fulfill the objective of the project. Then we came to a conclusion that materials and sensors which could fulfill the requirement are easily available within our budget. For this project we require a material which is stable and firm enough to hold the gasoline, and sensors which could give the near to exact or exact readings of the fuel level in the fuel tank.

4.3 Prototype and Design Approval

In this stage we made the design in Creo Parametric and tested its feasibility, for more accurate results we made an replica of hybrid fuel measuring system we procured and took that as the reference, as most Arduino and ultrasonic sensor are made with standard dimensions. Then the feasibility of the design is checked, keeping all the constraints, such as dimensions of Arduino and ultrasonic sensor and LCD screen.

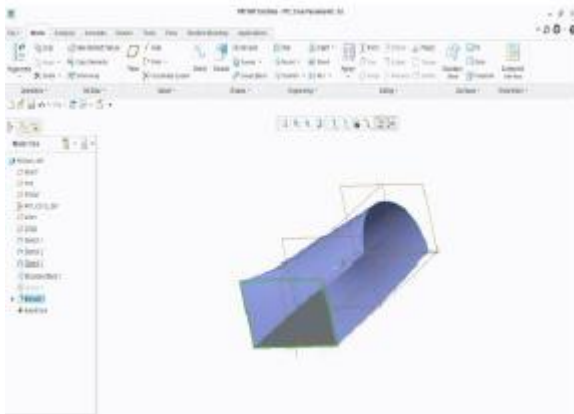


Figure 8 Half view of our container

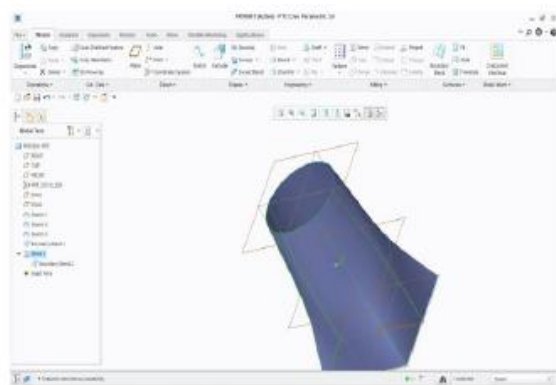


Figure 9 Half view of our container

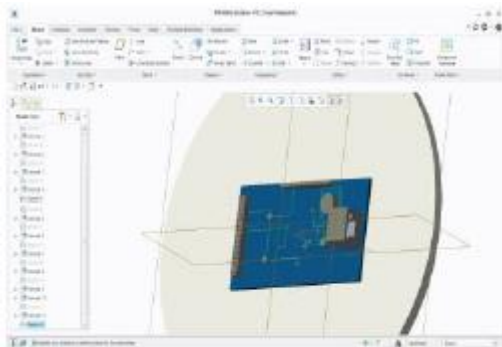


Figure 10 Arduino on cap

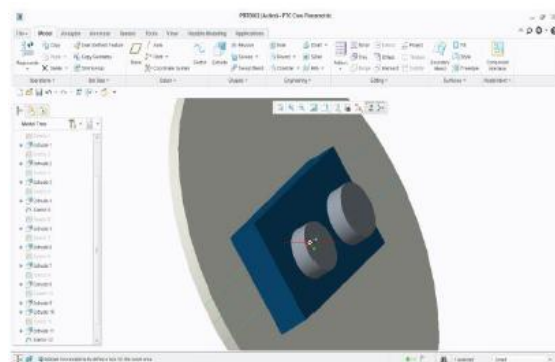
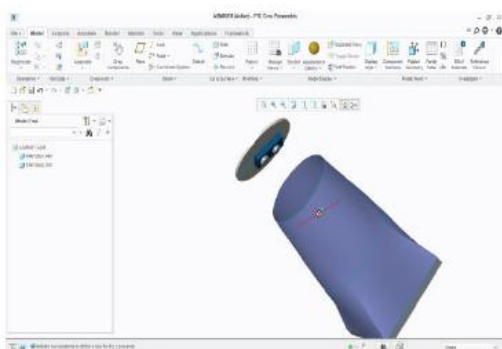
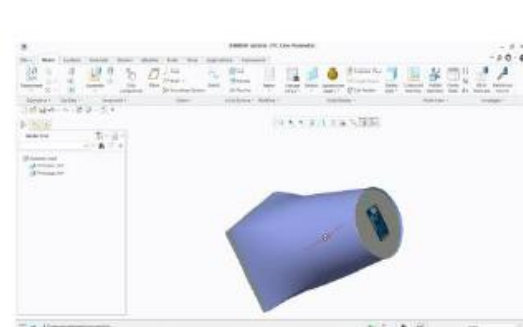


Figure 11 Ultrasonic Sensor



12 A



12 B

Figure 12 A & 12 B Parts and assembly of cap, sensor and fuel tank.

4.5 Purchase and Market Survey

As a student project there was need to constrain the amount of money we spend, so we performed extensive market survey so as to find as the best product as possible these include

Arduino-Uno, ultrasonic sensor, LCD screen, wires, Fuel Tank, inlet and outlet pipes and also all the tools required for the manufacturing process such as soldering guns, code, cutter etc.

4.6 Testing and Checking Dimensions

Before the producing method starts, it had been important to verify that the planning would be ready to perform the specified objectives. For this we tend to rechecked all the size within the style add cross checked with the fabric we tend to bought in order that there won't be any downside within the next stage.

4.7 Assembly

This the final stage where we assembled all the materials, sensors, LCD screen and tank ,this starts with making code for the working of Arduino , then feed the data set taken from the dimensions of tank. Then assembling all the parts by soldering. After this the working is checked. Then a test run is done to find any defects and adjustments are made to correct them.

5. Technical details of the setup

In this chapter, we discuss the working setup of the handle and also shed some light on the selection of the design, criteria of material and sensors and mechanism.

5.1 Basic Working

As we have discussed earlier ,there is a huge need of petrol level sensor ,as the petrol price are touching insurmountable heights and blunders in fuel pumps are increasing day by day. So ,we have designed a system called hybrid fuel measuring system ,which is very cheap in cost and can be installed in all types of fuel tanks, only thing we have to change is data set in respect to dimensions of the fuel tank.

The major issues we have faced is finding how to get the best or accurate value of level of any type of fluid in the fuel tank. After a deep technical research, we have concluded using ultrasonic sensor and a designed code as an input. The only thing that could vary is the data set used in developing the code.

6. Experiment conducted

The idea of this chapter is to provide the reader will the details of all the work done during the process of completion of the project.

6.1 Design

We have made the design in Creo Parametric and tested its feasibility, for more accurate results we made a replica of hybrid fuel measuring system we procured and took that as the

reference, as most Arduino and ultrasonic sensor are made with standard dimensions. Then checked the feasibility of our design, keeping all the constraints such as dimensions of Arduino and ultrasonic sensor and LCD screen. In this stage, we first did a market survey to find where the best quality product is available. Then we purchase the required materials and equipment to start the project.

7. Result and discussions

7.1 Outcomes

These are the main results we wanted to get by completing this project:

- We have designed an efficient fuel level measuring system
- We have the solution to stop the blunders regarding less fuel filling compared to the value displayed on fuel pump screen.
- We have a process to increase the competence of fuel as per the money paid.
- We have the solution to regulate the tax over the income generated by the sale of oil by the fuel pumps.
- We have a way to increase the customer satisfaction

7.2 Advantages

- Cost Efficient
- Stop Blunders in filling up the fuel
- Gives real time value of fuel filled
- Easy to install

7.3 Disadvantages

- Needs changes while installing into different tanks

8. Conclusion

The present system have a much-optimized design and is cost efficient. It can change the future of automobile industry as it has the potential to stop the blunders and frauds worth crores and could help common people to get the best value for the money they have spent. The present work finds application in almost every vehicle. Some of the applications where it finds a probable use, to attain a better quality of living, may include all the two wheelers, four wheelers, storage fuel tanks at gas stations.

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