

DESIGN AND FABRICATION OF DIGITAL FUEL METER WITH THE HELP OF ULTRASONIC SENSORS

Rishabh. S. Khobragade¹, Gokul. R. Bharbat², Saurabh. V. Shrikhande³, Rajat. R Barde⁴, Sanket. A. Warade⁵, Ishraj. R. Sheikh⁶

^{1,2,3,4,5}UG Student, Department of Mechanical Engineering, SBGITMR, Nagpur, India

Abstract:- In this paper, plan of a gadget is expounded that goes for assurance of the amount of the fuel provided to a fuel tank at a fuel outlet. Ordinarily, it has been seen that at fuel outlets because of a few proposed and unintended conceivable outcomes, genuine amount of fuel provided might be not exactly the asserted amount, especially in creating nations. While filling the fuel tank of the vehicles with the assistance of ultrasonic sensors which is utilized to gauge the separation in the present condition. As the estimating sensor was picked as SFR08 compose prepared by I2C and furthermore perception framework is PC based. The whole outline and investigation process is finished by the standard measurements. The objective of check estimations was to decide the genuine amount of fuel provided to the fuel tank particularly when estimating long separation.

Introduction:

The gadget is utilized to gauge the amount of fuel entered in the fuel tank through the spout. The tank is outlined in such a path, to the point that it comprise of two stages. Stage 1 is estimating the fuel went into the tank. At the highest point of the estimating tank there is a ultrasonic sensor which is utilized in mechanization errand to gauge remove, position change, and level estimation. For eg: They are use to quantify the amount of fuel in the fuel tank by estimating the time required by the ultrasonic waves to movement towards the recipient.

About the ultrasonic sensor:

Ultrasonic sensors are regularly utilized in mechanization errands to measure separate, position changes, level estimation, such as nearness locators or in unique applications, for instance, when estimating the virtue of straightforward material. They are in light of the guideline of estimating the engendering time of ultrasonic waves. This standard guarantees solid discovery is autonomous of the shading rendering of the protest or to the plan and the sort of its surface. It is conceivable to dependably identify even such materials as fluids, mass materials, straightforward items, glass and so forth. Another contention for their utilization is them utilizing in forceful conditions, not exceptionally incredible affectability to

earth and furthermore the likelihood of estimating a separate. Ultrasonic sensors are made in numerous mechanical outlines.

Principle: The ultrasonic sensor works on the principle of "time taken by the ultrasonic waves for its propagation".

Working of Ultrasonic Sensor:

Ultrasonic sensors work on the guideline of estimating the time between sending for the most part a couple of short heartbeats and accepting the impression of the transmitted flag. The essential building squares are the transmitter and recipient. Transmitter square might be made out of two sorts of transducer: Magnetostrictive transducers - are working at low frequencies and their standard depends on a mechanical change in the length of attractive material. Piezoelectric transducers - work at high frequencies and the guideline depends on the opposite piezoelectric impact. Ultrasonic beneficiary depends on the rule of the exchange of mechanical waves reflected back to the surface they strike.

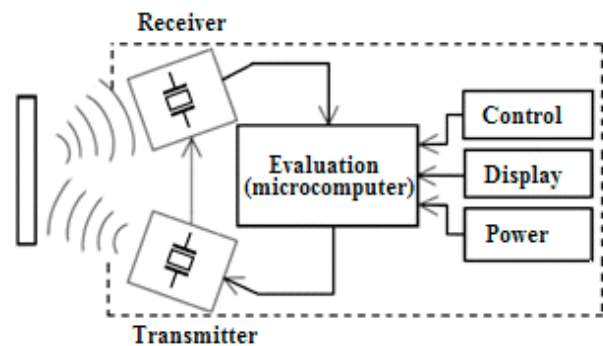


Fig1: The schematic diagram of ultrasonic sensor

Ultrasonic measurements:

Ultrasound has comparative proliferation qualities in the condition as capable of being heard sound. This is mechanical vibration molecule condition. Ultrasound engendering might be in vaporous, fluid and solids. For ultrasound is by and large viewed as a sound of a recurrence higher than 20 kHz. As indicated by the

utilization the ultrasound can be isolated into two gatherings: Dynamic ultrasound, when connected shows physical or compound impacts. The created yield achieves higher qualities. The ultrasound is utilized for cleaning, welding, boring and the like. Uninvolved ultrasound yield is differentiating produced at much lower (normally little) values. His principle zone of use is at that point estimating separation, distinguishing deserts in materials and thickness of the materials, estimating the stream of fluids and gases and furthermore diagnostics in human services. Speed of sound is subject to the kind of condition in which it moves, and the present temperature of the condition.

Ultrasonic sensor SRF08:

The sensor we are using here is SRF08 for our use .Ultrasonic sensor SRF08 is now and then additionally called as sonar. It is an ultrasonic impediment indicator. It can quantify the remove up to 11 m. The standard of estimation of the sensor is the ultrasonic flag on the eighth time frames and a recurrence of 40 kHz. Sonar estimates the time between sending the test flag and the getting of its appearance. Estimated esteems (singular reflections) are hidden away to 16 registers from which information would then be able to be perused ace framework. From this rule it tails one of the greatest preferences of this sensor - probability of estimating objects just at wanted separations. The sensor imparts through I2C transport. This truth permits you tending to of the sensor and furthermore makes sensor clusters. Notwithstanding changing the base address, which is set underway, the sensor empowers the choice of units also, yield factors estimating surrounding light. Sonar is moreover appropriate for use in neural systems. The distance can be measure by the formula.

$$V=D/T$$

..... (1)

Where V=velocity of speed ,D=Distance travelled by the ultrasonic waves and T is the time taken by the ultrasonic waves to reflect back from the surface.

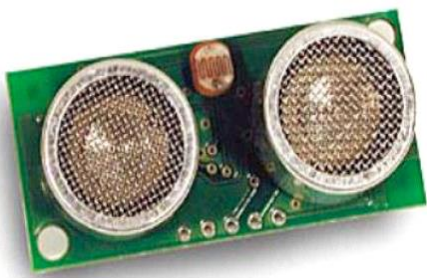


Fig2: SRF08 Sensor

Basic features of the sensor SRF08

Power supply voltage: 5 V DC

Current consumption: 12 mA – measuring, 3 mA – waiting

Frequency: 40 kHz

Measuring range: 43mm - 11000 mm

Communication bus: I2C

Base address: 0xE0 (adjustable 16 addresses) Metering Mode: multiple echo, recording up to 17 early reflections

Unit: inch, cm, microsecond

Dimensions: 43x20x17 mm

Design and fabrication of quantity measuring device:

The device consists of two phases:

- Phase 1 is a measuring tank.
- Phase 2 is a storage tank.
- Phase1 : It is an estimating stage where isolate tank is given in which we can gauge the amount of fuel provided .In this stage the tank at the highest point of its head comprises of a ultrasonic sensor. At still condition (implies where there is no fuel in the estimating tank) the ultrasonic sensor will radiate the ultrasonic waves which will strike the base of the tank and demonstrate the zero level which is adjusted at a scale regarding liters. Furthermore, when satisfactory measure of Fuel is provided or filled into the tank the waves will cover the separation in little span of time. Furthermore, from where we can ascertain the separation from eq (1).And then we can digitalize the information with the assistance of small scale controller. What's more, we can show this digitalized information on the showcase unit. Toward the finish of the estimating tank there is a valve which is utilized to permit the stream of fuel frame the channels into the capacity tank after the procedure of estimation is finished.
- Phase2: It is a capacity stage where the approaching fuel from the channels can be store in it. At the best it comprises of a Channel or valve which is utilized to permit the stream of fuel from the estimating tank with the assistance of funnels. It is like the tanks of the vehicles. This tank will supply the satisfactory measure of fuel for the procedure of ignition to the motor.

Importance:

- It will facilitate the estimation of correct amount of fuel into the tank.
- We can grow the limit of the capacity tank by executing this estimating tank and by opening the valves of both the tanks.
- We can utilize this idea in both two and four wheelers vehicles.
- We can utilize this gadget for flying machines to quantify the correct amount of fuel in the tank as it is very hard to gauge the measure of fuel.

Limitations:

- The vehicle must be in stationary position .If the vehicle isn't stationary then the sensor won't demonstrate the right detachment travel by the ultrasonic waves and along these lines it won't show the right measure of fuel in the tank.
- It will extend the cost of the vehicle.

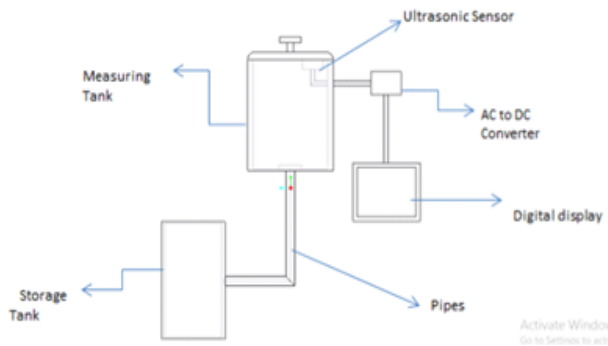


Fig1: Diagram of Fuel measuring device

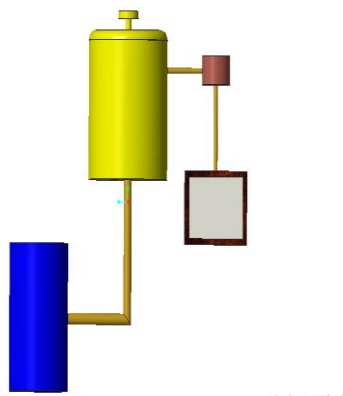


Fig 2: Solid model of the fuel measuring device

Result:

- The point of this analysis is to plan a gadget which is utilized to gauge the amount of fuel provided to the fuel tank of the Vehicle is sufficient or not. We have discovered that by actualizing this gadget we can quantify the correct amount of fuel provided to the Vehicle from the Fuel Station with the assistance of Ultrasonic sensor which is a type of uprooting sensor.
- The most normal issue looked in the Aircrafts are it is extremely hard to gauge the amount of fuel ,So by utilizing this gadget we can beat the issue.
- By actualizing this gadget in Motogp Vehicle it will build the limit of fuel in the Vehicle due to which it will be less demanding to cover more laps with no flop as the putting away limit is high because of the two tanks.
- Due to this gadget the expense of Vehicle is expanded by 2to3% of unique expense of the Vehicle.

Conclusion:

This paper center around the plan of a gadget which is utilized to quantify the correct amount of fuel in the vehicle provided by the fuel station. We additionally figure out how to choose the fitting sensor (Ultrasonic sensor) for the protected outline of the tank. A successful demonstrates was performed on Creo. By actualizing this gadget we can expand the productivity of putting away the fuel in the tank. The principle disadvantage of this gadget while utilizing in bike is the vehicle ought to be stationary and parallel to the surface and not in slanted position in the event that it isn't parallel then the ultrasonic sensor won't quantify the correct amount of fuel in the fuel tank.

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AUTHOR



Rishabh.S.Khobragade,
UG Student, Department of Mechanical
Engineering, SBJITMR, Nagpur, India