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Digital Fuel Volume Indicator in Motorbike

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Abstract: ***Nowadays, in the present technology everything has its own significance in solving anything. But the usage of petrol in our daily using automobiles is a mystery. To solve this problem to know the exact measurement of fuel that is filled into our fuel tank we are introducing a new method with ease. This experimented method reveals the exact amount of fuel that is filled at the petrol filling station by the aid of using a load cell placed at bottom of the petrol tank where the centre of mass of the fuel tank is concentrating. This load cell is interfaced to HX711 module then further to an arduino uno microcontroller to project readings on an LCD module. Though there are several methods to find the petrol level in the tank this method has its own significance in solving the problem exactly when the motorbike is in static position.***
Keywords*: load cell, arduino uno, HX711.*

I. INTRODUCTION

Digital fuel volume indicator is a simple type of fuel quantity measuring device which can exactly shows the volume of fuel quantity that was filled or previously present in our fuel tank by the aid of using load cell as the main component. Alongside we used arduino uno microcontroller for programming as well as HX711 module as analogue to digital convertor. The whole set up continued by adding an LCD module of 16*2 bit so that to visualize the quantity in litres. In previous days before the drastic development of technology there were float sensors which are just used to show the level of fuel that was present in our fuel tank. There are certain fuel level gauges including vibrating, rotating paddle, mechanical (diaphragm), microwave (radar), capacitance, optical, pulsed-ultrasonic and ultrasonic level sensors. Beyond all these methods the above discussed method is the easiest possible way to know the quantity of fuel that is present in our fuel tank.

II. LITERATURE REVIEW

G. Kiran Kumar,et.al, [1] suggests that to avoid the frauds that are happening in the petrol filling stations we need to cross check the amount of fuel that is present in our tank when it is filled. So they focused on creating a digital fuel meter which indicates the exact amount of fuel that was filled as well as it will send an sms to the user by indicating the exact amount, date and time etc,.

Rishabh Neogi [2] aimed the project to monitor the level of fuel in the petrol tank. The petrol tank with float sensor is connected to an analogue fuel gauge like every vehicle. The float sensor provides A/D convertor which converts analogue value to digital value which is further read by the microcontroller(which is flash programmable and erasable ROM) at last , the microcontroller gives the result of the amount of fuel in the tank which is displayed on the LCD screen. The system as a whole is connected to a battery.

Rahul Gogawale,et.al, [3] also worked on the same process and they had used an ultrasonic sensor for this process. 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.

S.Mohanasundaram,et.al, [4] introduced a system of Design and implementation of load cell based fuel level measurement by using a load cell placed at the below of the fuel tank, at any point of time it will continously measures the level of fuel adding to the vehicle with of processor and the value will be displayed in the display unit fixed on the dashboard.

Raveena A,et.al,[5] also worked on the same problem and used a bit different solution in finding the petrol level in bikes by placing the load cell at the bottom of the tank with the help of arduino uno and the display unit fixed with the dashboard.

III.PROPOSED METHOD

To avoid this kind of problems of petrol frauds an attempt was made by us to make a fuel metering system that will help to show the volume of fuel entering into the fuel tank accurately. By using this system the accurate measure of petrol in the tank can be visible digitally when the bike is in static position. For this method to workout we used a weighing scale which is used to measure weight in petrol tank. This will happen only if we have the possibility that total weight is concentrating at a point, so for this reason we found out the centre of mass of the bike fuel tank. Along with the load cell we made an circuit by using arduino uno, HX711 ADC module, LCD module and a 10k controller.

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IV. BLOCK DIAGRAM

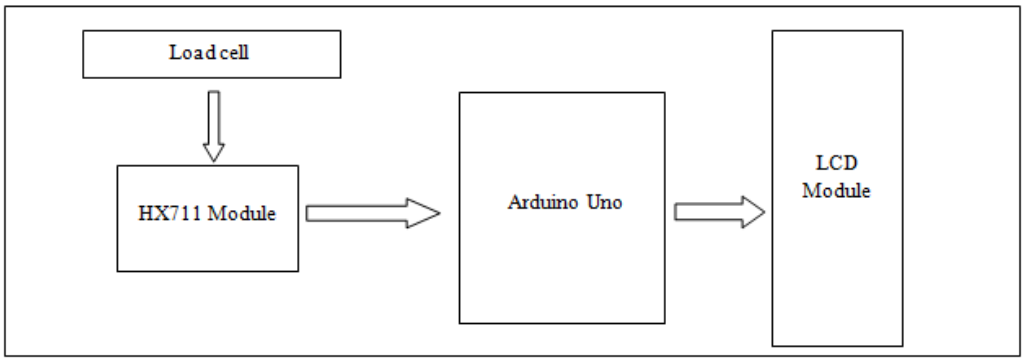

Fig.1 Block diagram of given system.

V. CIRCUIT DIAGRAM

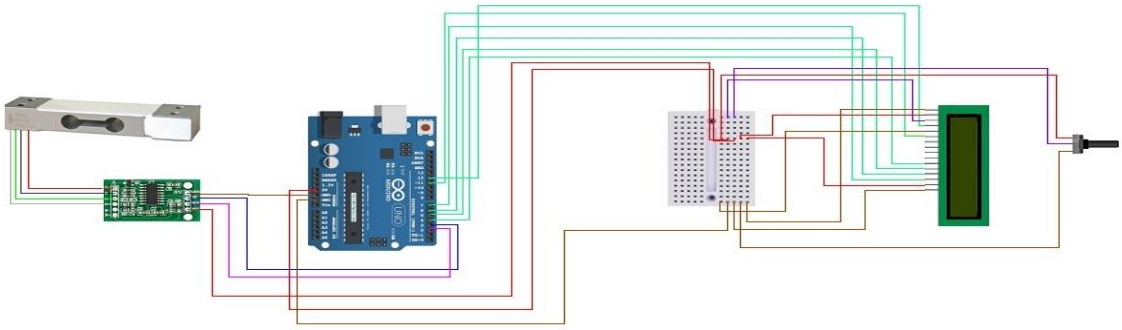

Fig.2 Circuit diagram.

VI. COMPONENTS

A. Load Cell

A load cell is a transducer which converts force into a measurable electrical output. Although there are many varieties of load cells, strain gage based load cells are the most commonly used type.

B. Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the MicrochipATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts.

C. HX711 Module

HX711 is a precision 24-bit analog to-digital converter (ADC) designed for weigh scales and industrial control applications to interface directly with a bridge sensor. The input multiplexer selects either Channel A or B differential input to the low-noise programmable gain amplifier (PGA).

D. Bread Board

A bread board is a construction base for prototyping of electronics.

E. Jumper Wires

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

F. LCD Module

Liquid Crystal Display is the technology used for display in notebook and other smaller computers. It is an electronic display module and used in wide range of applications. A 16x2 LCD display is the basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments.

VII. SYSTEM IMPLEMENTATION

In our project first of all we made a circuit by interfacing load cell, arduino uno, HX711 module, and made the initial code to run appropriately using arduino software and find out the calibration factor for the load cell based on the weight placed by considering density of the petrol used. Finally we have to make it visualize in LCD module so, we followed another circuit connection between arduino and lcd module along with bread board and used an 10k controller to adjust the contrast in LCD module. In order to make the LCD work another program between HX711 module and LCD module was dumped into the arduino uno. Thus this code is the final code for volume measurement.

Fig.3 Experimental Setup

A. Empty Tank Position

Initially we tested the equipment when the tank was in empty position without any fuel inside it as shown in Fig 3. At that moment it showed the reading as -0.02 lit based on the errors made during the process of calibration. Since it was a very negligible value we counted the reading as 0 lit at empty tank position.

B. Tank Placed With A Measuring Flask Of 100ml Capacity On Its Top

When we placed an empty measuring flask on the tank's top it recorded and showed the reading on the LCD module as 0.14lit based on the mass it contains and the space it occupies as shown in Fig 4

C. Tank Placed With A Measuring Flask Of 100ml Capacity On The Top Containing 50ml Of Petrol

Based on the above result we further filled the measuring flasks half of the amount with petrol then after the reading was displayed on the LCD module as 0.18 lit as shown in Fig 5. In this result the 0.14 is the space occupancy of measuring flask and further the fuel volume is 0.04lit which is approximately equal to 50ml of petrol.

D. Tank Placed With A Measuring Flask Of 100ml Capacity On The Top Containing 100ml Of Petrol

Further we make a step forward by filling the remaining space of the measuring flask and visualize the reading on the LCD module as 0.23lit as shown in Fig 6. In this reading 0.14 lit is the space or volume occupied by the measuring flask and the remaining 0.9 lit is the original petrol volume which is approximately 100ml, since 1lt is equal to 1000ml.

These are readings we identified by using very smaller volumes of petrol such as in millilitres. Rather than this when we use huge amounts there is a chance of getting 100 percent of accuracy.

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Fig.3 Reading of empty tank

Fig.4 Mounting of measuring flask on tank

Fig.5 50ml of petrol filled in flask

Fig.6 100ml of petrol filled in flask

VIII. CONCLUSION

By using above method we fabricated a new process to identify the exact fuel volume that is filled in our motorbike. As mentioned earlier this method has its own significance as well as very accurate in getting the fuel volume with zero error. We hope this method will be useful in the coming future to identify frauds in fuel filling stations too.

IX. FUTURE SCOPE

There was a scope for this process to be installed in bikes as well as in four wheelers based on considering some design specifications. It was at present designed without fixing it to bike chassis, in future there is a chance of making it fixed to the bike chassis.In future we can implement this method to four wheelers too.

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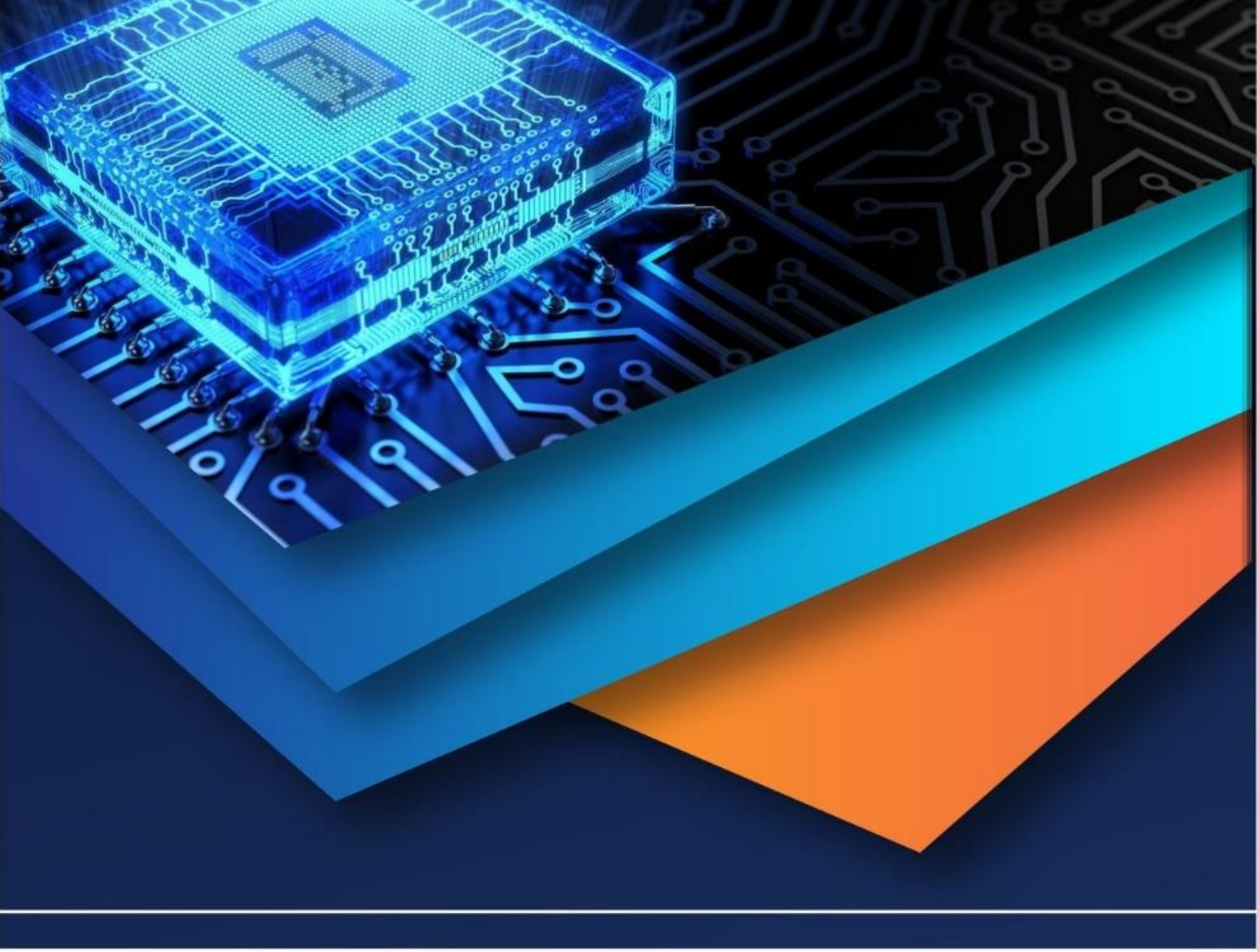

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