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Accurate Fuel Level Finder for Filling and Tank Left Over Fuel Using Sensors

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Abstract: Now a days we use different type of vehicle but most of vehicle running with The help of fuels so we should had a perfect meter for indication the level of fuel Today, in the existing vehicles we face a common problem of fuel meters not showing accurate results.

They are unable to show the exact amount of fuel left in the tank, though they are analog fuel meter or a digital one (bar type digital fuel meter).

Nowadays all fuel bunks having types of digital displays unit in order to display the value of fuel adding to the vehicle. But we don't know whether they adding accurate value or not.

Nowadays lot of information regarding the petrol bunk frauds which leads to corruption. There is difference between the amount of fuel which is displayed in the fuel tank and most of the times that is less than the quantity of filled fuel in the customer tanks.

Because the pump owner make the arrangements which leads to the benefit to the owner of the bunk. This case customer only cheated by them without knowing that. Most of the vehicles consist of analog meter so it cannot show the current amount of fuel. So now the time is going to change to digital and user want to understand everything.

Introduction

Today we use only analog meter but its not show the accurate amount of fuels and also we don't know the balance amount of fuel in that tank.

We are already aware that the modern display the amount of fuel in the fuel tank by the means of analog indicators, which oscillates between E (empty) and F (full) at its extreme ends or by digital bars running through E (empty) and F (full) indicators.

The aim of our project is to monitor the level of the fuel in the vehicle fuel tank and to automatically indicate the level information digitally, numerical value through LCD.

To the contrary every one of us might have experienced the problem with improper estimations of the current fuel indicating system.

Thus, digital (numeric) fuel indicator system will help us exterminate common problems like-

1. Misinterpretation of the amount of fuel left by the drivers.
2. Petrol pumps theft cases.

Also, it will help us to know the current mileage of the vehicle

Literature survey

Sl No.	Author/year	Title	Inference
1	Mohana sundaram,p.manikandan/2014	Design and implementation of load cell based fuel level measurement	Implementation of load cell
2	Jaimonchacko Varghese/2013	Low cost intelligent real time fuel mileage indicator for motor bikes	It's a mileage indicator specially made for motor bikes
3	Lee cooper/1920	Fuel indicator	Simple type of fuel indicator with low cost

4	h.canbolat/2009	A novel level measurement technique using three capacitive sensors for liquids	Different type of capacitive sensors
5	bezborauh	A new non intrusive optical technique to measure transparent liquid	Transparent liquid level measurement

Existing System

Liquid level measurement is necessary for different application such as industries and variety of filling process.

There are various type of filling process.

Most of these types are not measuring the liquid in accurate manner.

General capacitive liquid level method measures the electrical capacitance between electrodes immersed in a liquid level from the capacitance value.

Liquid level measurement is necessary for different application such as Industrial automation, Industries and variety of filling process. There are various type of methods for measuring liquid level from those using capacitive sensors, optical sensors methods[1], mechanical float to ultrasound methods. Most of these types are not measuring the liquid in accurate manner. General capacitive liquid-level sensors method measures the electrical capacitance between two electrodes immersed in a liquid and calculate the liquid level from the capacitance value[2]. Optical sensors, such as CCD cameras, can measure liquid level without having to contact the liquid by image processing.

Disadvantages

Cost is relatively high than analog meters.

High maintenance required.

Proposed System

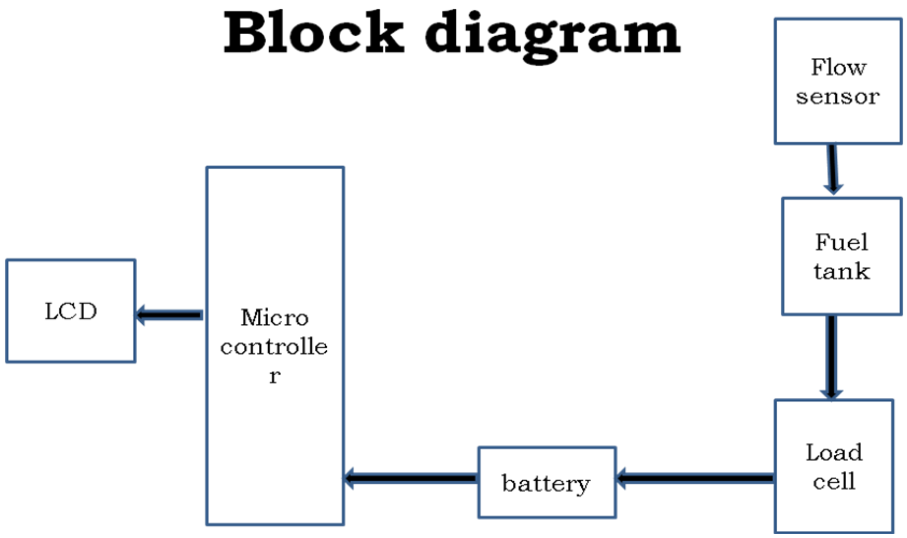
The basic concept of the proposed system is to develop a measurement techniques and it has to be implement in all type of vehicle with minimum requirements.

It is an efficient and accurate method of measuring the amount of fuel adding into the vehicle tank. Initially the load cell is fixed under the fuel tank with the help of vehicle base.

The display unit which is fixed in the Dash Board. While we enter into the fuel bunk, click the reset button which is present in the display unit.

Density is nothing but the thickness of fuel, initially crude oil having higher density from that different fuels are separated by the process and distributed in various applications. Hence the petrol and diesel having some set of density value and calculations are made by the formula which we are defined

Fuel	Energy density ($MJkg^{-1}$)	Energy density ($MJlitre^{-1}$)
Nuclear fusion of hydrogen	300,000,000	425,000,000
Nuclear fission of uranium 235	77,000,000	1,500,000,000
Liquid hydrogen	143	10
Natural gas (compressed to 200×10^5 Pa)	54	10
Petrol	46	34
Diesel fuel	45	38
Aviation fuel	43	33
Residential heating oil	43	33
Vegetable oil	42	31
Crude oil	42	37
Liquified natural gas	37	24
Coal (anthracite)	33	72
Charcoal	29	
Coal (bituminous)	24	20
Wood	6–18	2–3
Liquid hydrogen and liquid oxygen	13	6
Household waste	8-10	
TNT	4.2	7



Advantage

Digital fuel indicator helps to give measure of exact quantity of fuel left in the tank.

Exterminate petrol theft cases.

Easy to find out the balance amount of petrol in the tank

Hardware Requirements

Fuel tank

Load cell

Flow sensor

Pic 16F887 microcontroller

Power supply

Control circuit

Software

Embedded c

Flow Sensors

Flow - Mass flow rate

- Volume flow rate

- Velocity

- Types of flow

- Stream line … parabolic velocity profile

- Turbulent … vortices

Methods of measurement

- Direct: positive displacement (batch sensors, metering pumps)

- Indirect: measurement of velocity

- Or kinetic energy

Load cell

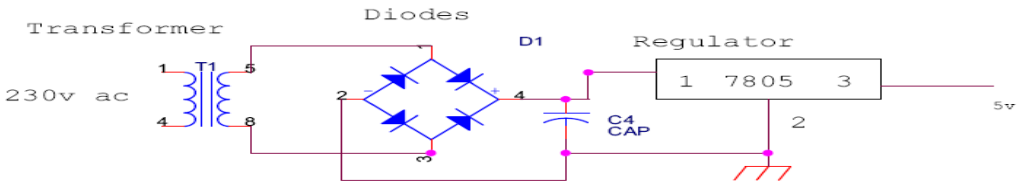
Load cell is a transducer that used to convert a force into electrical signal
The most common type is strain gauge

A strain gauge is a device used to measure the strain of an object

Power supply

Having a 5 volt DC power supply around in your workspace can be very useful. Many op amps, micro controllers, and other digital ICs {integrated circuits} run off 5 volts (although most now take a range of 3-15 volts)

POWER SUPPLY
POWER SUPPLY UNIT



POWER SUPPLY

Power supply unit consists of following units:

- Step down transformer
- Rectifier unit
- Input filter
- Regulator unit
- Output filter

Stepdown Transformer:

The Step down Transformer is used to step down the main supply voltage from 230V AC to lower value. This 230 AC voltage cannot be used directly, thus it is stepped down. The Transformer consists of primary and secondary coils. To reduce or step down the voltage, the transformer is designed to contain less number of turns in its secondary core. The output from the secondary coil is also AC waveform. Thus the conversion from AC to DC is essential. This conversion is achieved by using the Rectifier Circuit/Unit.

Step down transformers can step down incoming voltage, which enables you to have the correct voltage input for your electrical needs. For example, if our equipment has been specified for input voltage of 12 volts, and the main power supply is 230 volts, we will need a step down transformer, which decreases the incoming electrical voltage to be compatible with your 12 volt equipment.

Fuel tank

We used any different type of capacity tank

LCD display

LCDs are more energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystal and arrayed in front of a light (backlight) or reflector to produce images in color or monochrome.

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

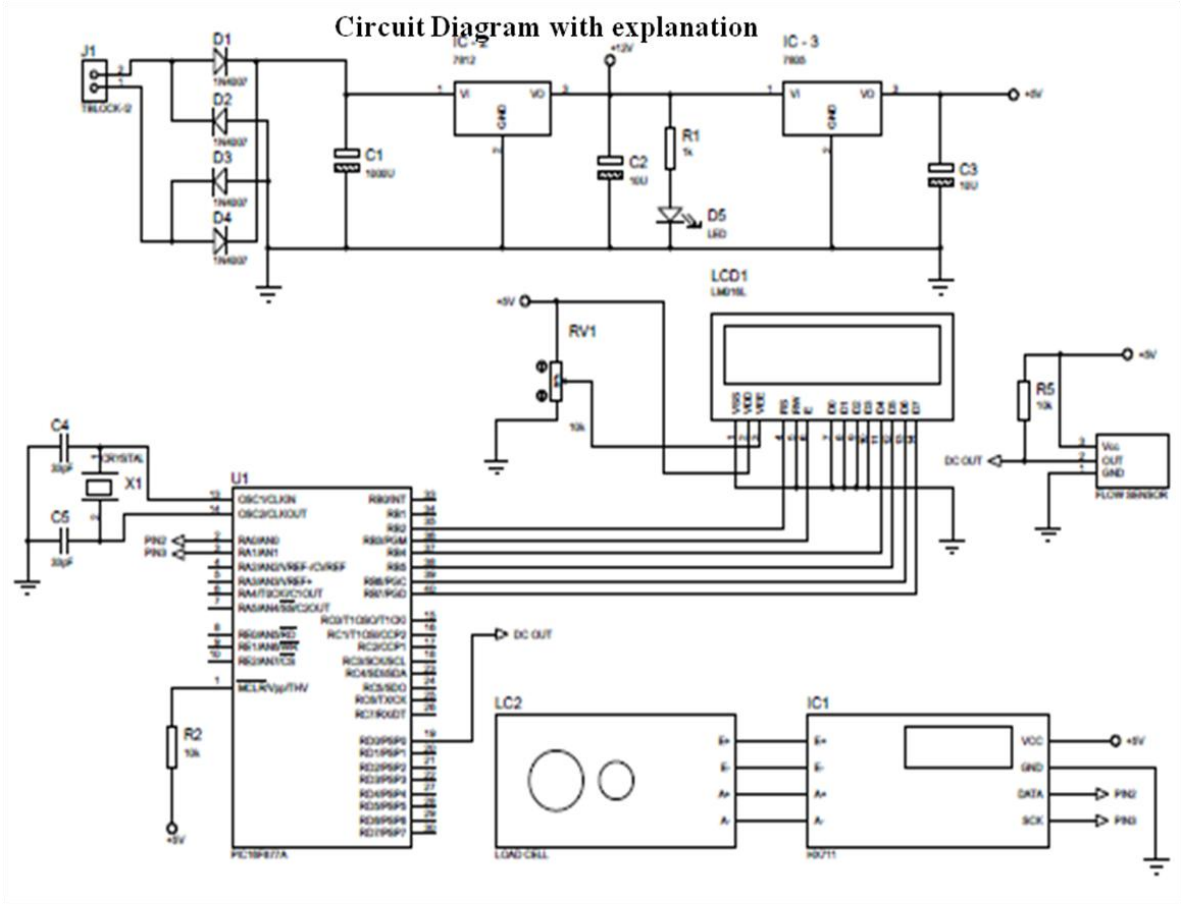
An LCD is made with either a passive matrix or an active matrix display display grid. The active matrix LCD is also known as a thin film transistor display. The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid. A current is sent across two conductors on the grid to control the light for any pixel. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active matrix display can be switched on and off more frequently, improving the screen refresh time (your mouse will appear to move more smoothly across the screen

Application

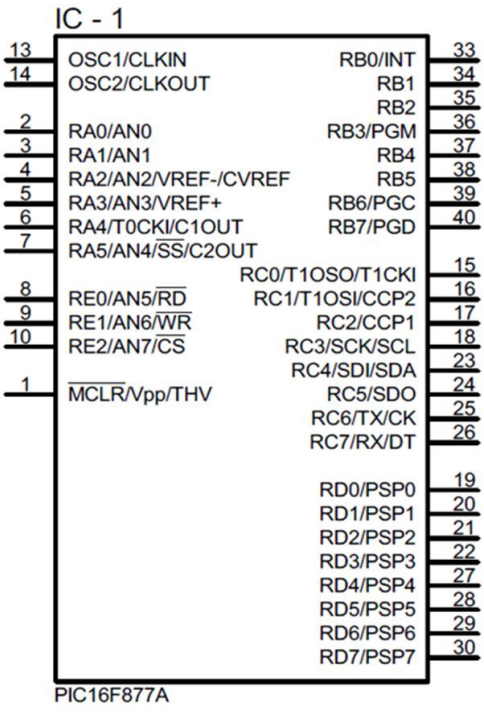
To produce a numeric readout of the amount of fuel left in the tank.

Precise level of fuel in reduced dash area.

This project is adaptable to all types of vehicles, to indicate the amount of fuel in fuel tank


Circuit Diagram with explanation
IC - 2
IC - 3
J1
D1
D2
D3
D4
C1
C2
C3
R1
D5
LCD1
RV1
R5
C4
C5
X1
U1
R2
LC2
IC1
DC OUT
+5V

Pin diagram


IC - 1
13 OSC1/CLKIN
14 OSC2/CLKOUT
2 RA0/AN0
3 RA1/AN1
4 RA2/AN2/VREF-/CVREF
5 RA3/AN3/VREF+
6 RA4/T0CKI/C1OUT
7 RA5/AN4/SS/C2OUT
8 RE0/AN5/RD
9 RE1/AN6/WR
10 RE2/AN7/CS
1 MCLR/Vpp/THV
33 RB0/INT
34 RB1
35 RB2
36 RB3/PGM
37 RB4
38 RB5
39 RB6/PGC
40 RB7/PGD
15 RC0/T1OSO/T1CKI
16 RC1/T1OSI/CCP2
17 RC2/CCP1
18 RC3/SCK/SCL
23 RC4/SDI/SDA
24 RC5/SDO
25 RC6/TX/CK
26 RC7/RX/DT
19 RD0/PSP0
20 RD1/PSP1
21 RD2/PSP2
22 RD3/PSP3
27 RD4/PSP4
28 RD5/PSP5
29 RD6/PSP6
30 RD7/PSP7
PIC16F877A

Conclusion

- In this paper we have implemented fuel level finder. we don't know how much of petrol filled and its value accurate or not. And we don't know balance amount of petrol in to our vehicle.
- Its very useful for our vehicle fuel saving and reduce petrol bunk theft

Future Enhancements

The proposed project work has aimed for developing a feasible low cost automation technique to measure the fluid level and its quantity. We can achieve least possible error and maximum accuracy in the measurement. We are designing a system which digitally displays the level of liquid inside the tank. Thus it is an efficient device made by keeping in mind the petroleum thefts at the various petrol pumps at the time of filling of tanks. In future we can also add some features like displaying mileage or distance to go before the tank gets empty.

Calculation of Fuel Level

Calculation of fuel level depends on the fuel density.

The density of the fuel is commonly expressed in kilograms per cubic meter.

Hence greater the fuel density, the greater the mass of fuel and the greater the mass of fuel than can be pumped for a given pump. Fuel density commonly increases with increasing molecular weight of the fuel and energy density values are tabulated Fuel density also generally increases with increasing molecular weight of the component atoms of the fuel molecules. Fuel density is used to calculate fuel volume ratio, which is in turn used to calculate the tank mass.

Therefore the by considering the fuel density, the calculation was made by the following formula.

Fuel volume ratio = Fuel Mass Ratio / Fuel Density

Tank mass = Tank pressure * 3.0 / effective tensile * X

Where,

X = Fuel Ratio + Oxidizer Ratio + Propellant Ratio

(Consider all Ratio in Volume)

FOR PETROL:

Where,

W indicates Weight measured by Load Cell,

T indicates Tank Weight,

L indicates Liters which are calculated.

Here Petrol having the density of **737.22 kg/m3.**

Hence the proportional values are,

1 Kilogram of vehicle petrol = 1.3564472 Liters

0.7372199 Kilogram = 1 Liter

FOR DIESEL:

Where,

W indicates Weight measured by Load Cell,

T indicates Tank Weight,

L indicates Liters which are calculated.

Here Diesel having the density of **885.0 kg/m3.**

Hence the proportional values are,

1 Kilogram of Diesel = 1.1299435 Liters

0.885 Kilogram = 1 Liter

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They don't just steal your fuel...
they steal your business too!
Fuel theft can lead to...
cancelled contracts and
loss of future business
Stop a thief in his tracks with a Locking Fuel Cap


Petrol


Save Fuel for the Future
Accelerate smoothly & save your fuel wastage.
Read the road carefully. Try not to rev your engine.
Use the gears properly. Drive within your speed limit.
Check your tyre time to time. Try not to Keep your engine on.
Walk if possible. Balance Using air condition.
Servicing regularly. keep it clean.


E
F


180 Ltrs.
Diesel
180 Ltrs.
180 Ltrs.
Diesel
Bill for
200 Ltrs.