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ADVANCED DIGITAL FUEL LEVEL INDICATION SYSTEM

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ABSTRACT
This research paper is about advanced fuel level indicator. Now a days the petrol bunks on petrol pumps is seen every day, i.e. there is difference between amount for which we are paying for and actual amount we are getting in our petrol tank of bike. After facing this problem we have designed a system with Arduino-UNO microcontroller board. What we have done for this research is that kept load cell below the petrol tank so that it will measure the quantity in liters. As well as the motion sensor is interfaced so that it will give mileage of bike. Another electronic component is also used and that is buzzer which will be activated whenever the fuel level in the tank will goes to reserved condition. All these electronic modules are programmed in arduino IDE software so that it will work according to function of our reasearch and output can be seen on the 16 x 2 LCD.

KEYWORDS: Arduino-UNO microcontroller board, load cell, motion sensor, buzzer, LCD 16 X 2.

I. INTRODUCTION

Now-a-days in our country the pricing of petrol is a big issue is going on and due to this high price of petrol per liter, the price of each and everything in our country is touching to thesky.

So to avoid problems regarding petrol filling, its purity, and difference between quantity paid for and actual given in the tank can be identified.

For this problem we engineer's made a system that can solve all these problems of petrol bunks which is named as "advanced fuel level indicator system."

This advanced system will give actual quantity of fuel in the tank in liters, mileage of vehicle; buzzer will be activated when vehicle goes to reserve all these things will give the solution to aboveproblems.

II. PROBLEMSTATEMENT

Analog fuel meter indicates three states of fuel level which are empty, half and full. So it is difficult to know the exact amount of fuel present in fuel tank. Analog fuel meter shows the amount of fuel by using needle. But due to this it is difficult to get proper idea about exact amount of fuel level present in fuel tank; and one cannot predict how much distance must be covered with the remaining fuel in the tank ofbike.

III. PROPOSEDWORK

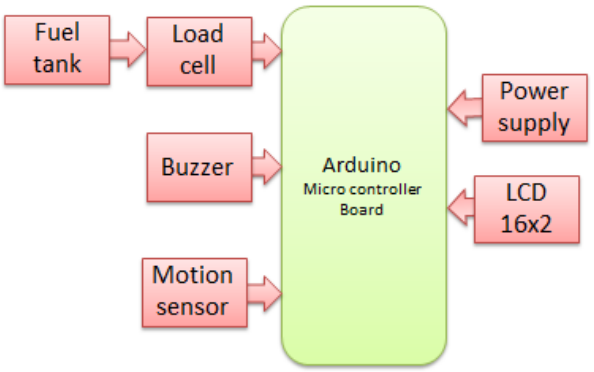

Figure 1 Block Diagram

This reasearch is able to show that simple available hardware and technology can be used to construct a robust fuel level monitoring system. The system designed and tested in this reasearch presented at the low construction cost of the system. This block diagram shows us how the construction of hardware parts is made in order to get desired results. Now lets consider the actual interfacing diagram ofcomponents.

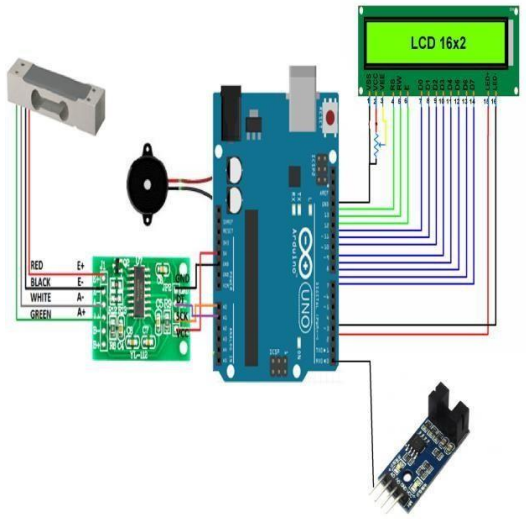

Figure 2. Interfacing of all modules

IV. COMPONENTSDESCRIPTIO N

A. LOAD CELL –

Several methods are available for fuel level detection but in this paper a precise measurement is proposed to detect the fuel level accurately. It is a transducer with strain gauge that measures the weight of fuel tank based on the force applied and it has a bridge circuit to convert the change in resistance to electrical signals.

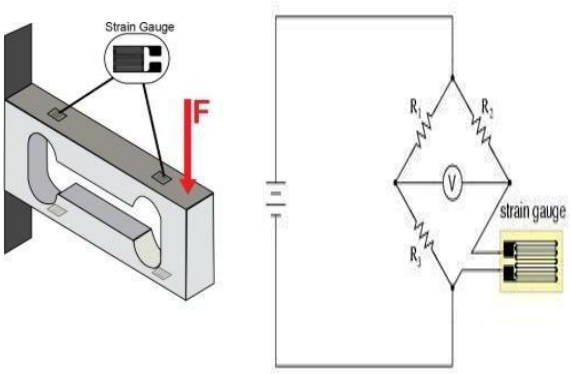

Figure 3. Load cell working

B. ARDUINOBOARD –

Arduino is an open source board with both hardware and software for an interactive environment with physical world. Arduino Uno is a microcontroller works on ATmega328 and it provides a set of analog and digital pins which is used for interfacing.

C. BUZZER–

$$L = \frac{W - T}{0.7372199} \ (Lit.)$$

When the vehicles fuel tank is goes to reserve level then it will give indication that vehicle's fuel is avilableupto reserve level.

SPEEDOMETER–

A speedometer or a speed meter measures angular velocity. It measures and displays the instantaneous speed of a vehicle. It also indicates the remaining kilometers that vehicle will run with the remaining fuel available in the tank.

D. LCD–

We are using a high quality 16 characters by 2 line display module, with back lighting.

1. 16 Characters x 2Lines
2. HD44780 Equivalent LCD ControllerBuilt-In
3. 4-bit or 8-bit MPUInterface
4. StandardType

V. METHODOLOGY

Using all the above components how the actual amount of fuel added is calculated for that; Let us consider the measurement techniques in this system.

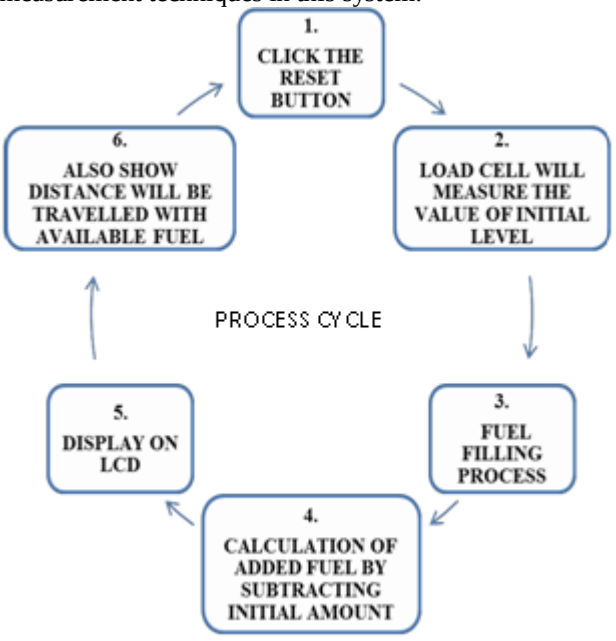

Figure 4. Process Cycle

Calculation of amount of fuel added in litres.

Calculation of the fuel added in litres can be done easily by knowing the density of fuel i.e. petrol

we know,

$$\text{DENSITY} = \frac{MASS}{VOLUME}$$

but,

$$VOLUME = \frac{MASS}{DENSITY}$$

Therefore,

Also, Where, w = weight measured by load cell, t = tank weight,

Density of petrol is 737.22 kg/m3.

Means, 1 Liter = 0.7372199 Kilogram

In this way conversion of kilogram to litre is calculated using above formulae's.

VI. LOAD CELLINTERFACING WITH HX711

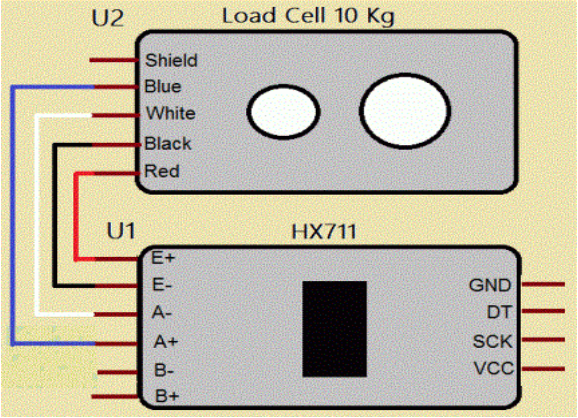

Figure5. Load cell interfacing with hx711

SCOPEFORFUTUREWORK

Our reasearch can be further enhanced in the future.

1. Thereasearchcanbeimprovedbycalibratingthefuelflow sensor so that it continuously updates the data for every 10 ml offuel.

2. The pressure sensor can be molded to fit the valve of the tube for easy measurement. This reasearch can be enhanced byinterfacingGPSwitharduinototrackvehicle'slocationin case of any emergencysituations.

3. In case of theft of vehicle, it can be stopped i.e.the engine can be shut down remotely using additional software enhancements.

4. Location of the vehicle can be determined atany point oftime.

5.Fuel leakage can be detected by implementinga fuel leakagesensor

Before making the whole circuit to work it is necessary to "calibrate load cell HX711 with Arduino". For "calibrating Load Cell HX711 with Arduino" we need to put 100g weight at starting when the LCD displays put 100g weight. Once 100gm weight is kept over the load cell, calibration is done.

Load cell which is an amplifier senses the weight and supplies a electrical analog voltage to hx711 load amplifier module. Then this amplified value is fed to the arduino where the output of hx711 is converted into the weight values in grams. And then it is converted into litres just by dividing weight by density. The output result is displayed on 16*2 lcd.

VII. APPLICATIONS

1. This circuit can be used in bike to know the quantityof petrol available in thetank.

2. Field servicemanagement.

3. This circuit give indication when bike goes to reservefuel condition.

4. Not only it will give the reserve fuel condition butalso show mileage on LCDscreen.

ANNEXURE

Program for load cell

```
#include <LiquidCrystal.h>
LiquidCrystallcd(7, 6, 5, 4, 3, 2);

#define DT A0
#define SCK A1
#define sw 9

long
sample=0;
float val=0;
long
count=0;

unsigned long readCount(void)
{
unsigned long Count;
unsigned char i;
pinMode(DT,
OUTPUT);
digitalWrite(DT,HIGH)
;
digitalWrite(SCK,LOW
);
Count=0;
pinMode(DT, INPUT);
while(digitalRead(DT));
for (i=0;i<24;i++)
{
digitalWrite(SCK,HIGH);
Count=Count<<1;
digitalWrite(SCK,LOW);
if(digitalRead(DT)) Count++;
}

digitalWrite(SCK,HIGH)
;
Count=Count^0x80000
0;
digitalWrite(SCK,LOW
); return(Count);
}
void setup()
{
pinMode(SCK, OUTPUT);
```

```
pinMode(sw, INPUT_PULLUP);
lcd.begin(16, 2);
lcd.print("        Weight ");
lcd.setCursor(0,1);
lcd.print(" Measurement ");
delay(1000);
lcd.clear(); calibrate();
}
void loop()
{
 count= readCount();
 int w=(((count-sample)/val)-2*((count
 sample)/val));
 lcd.setCursor(0,0);
 lcd.print("MeasuredWeight");
 lcd.setCursor(0,1);
 lcd.print(w);
 lcd.print("g            ");

 if(digitalRead(sw)==0)
 {
  val=0
  ;
  sampl
  e=0;
  w=0;
  count
  =0;
  calibr
  ate();
 }
}
  void calibrate()
{
 lcd.clear();
 lcd.print("Calibrating.
 ..;
 lcd.setCursor(0,1);
 lcd.print("Please Wait...");
 for(int i=0;i<100;i++)
 {
  count=readCount();
  sample+=count;
 }
 sample/=100;
lcd.clear();
lcd.print("Put 100g & wait"); count=0;
while(count<1000)
{
count=readCount(); count=sample-count;
}
lcd.clear();
lcd.print("Please Wait...."); delay(2000);
for(int i=0;i<100;i++)
{
count=readCount(); val+=sample-count;
}
val=val/100.0;
val=val/100.0;  // put here your calibrating weight
lcd.clear();
}
 {
 val=val/0.7372199; lcd.print("fuel in liters");
 }
```

VIII. CONCLUSION

In the present days even a cheapest liquid is according to the standard of measurement but the costly fuel which is most required for day to day life is not according to the standard measurements.

Our reasearch is very useful for a common man as it avoids him by getting cheated. This measuring unit should be fixed to all the vehicle so that we get an exact quantity of fuel to measure the inflow.

It may be enhanced with any microcontrollers and can be implemented in all types of vehicles. By using this method petrol bunk frauds can be avoided.

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