International Journal of Innovative Research in Science and Engineering
Vol. No.2, Issue 03, March 2016
www.ijirse.com
ISSN: 2454-9665

STUDY OF DIGITAL FUEL METER AND FUEL THEFT DETECTION

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ABSTRACT

In recent day's world has become digitized, if we make fuel meter in the vehicle also digital it will help to know exact amount of fuel present in fuel tank. In our Project we have made digital fuel meter. Here, we are indicating amount of fuel present in tank digitally. That value is in numerical digits (ex: 1lit, 1.5 lit, 2lit etc).Fuel thefting is also measure problem all over the world. In our project whenever there is fuel thefting, due to the noise of burglar alarm people are aware of the fuel thefting and also during fuel thefting a text message delivered on mobile to the owner of the bike. This is real time occurring process. The previous vehicle system don't have such a functionality that there is no display gear level whatever may be the condition though the bike is running or not. Disallows any new person on bike to adjust the gear level. But in our system we can overcome above problem by using digital meter which show the gear level in steady state or running state of vehicle.

Keywords –A/D Converter, Float sensor, Fuel tank, Mileage, PIC microcontroller,

I. INTRODUCTION

Nowadays everything is digital in all over field. Digital fuel meter is also implemented intwo wheeler, but they do not shows the exact fuel level which is present in the tank i.e. they shows the amount of fuel in terms of bars and not in numbers or digits like liter or milliliter.That's why we do not get proper idea about fuel present in our tank. We get only approximate level of fuel. So this problem is taken into consideration for our project work of developing theDigital (numeric) fuel indicator system for two wheelers which shows exact amount of fuel interms of liter or milliliter.

This value in liters will be in numerical digits (ex: 1.2 lit, 1.3 lit, 1.4 lit). This project mainly concentrates about the indication of fuel level in two- wheeler tanks. Various other features like the distance can be travelled to the corresponding fuel, is added with thisarrangement which will explain the clear performance of the vehicle to the corresponding fuel.[1]

In the recent times we are constantly hearing about petrol thefting. Most of the petrolbunks today have fraud the pumps such that it displays the amount as entered but the quantityof fuel filled in the customer's tank is much lesser than the displayed value. Yet the pumps are tampered for the benefit of the petrol bunks owner. This results in huge profits for the petrolbunks but at the same time the customers are cheated. All the vehicles in India consist of analogmeters hence it is not possible to precisely know the amount of fuel currently in the vehicle and

ISSN: 2454-9665

Also it is not possible to cross check the quantity of fuel filled in the petrol bunk. In this project we focuses on creating a digital display of the exact amount of fuel contained in the vehiclestank and also help in cross checking the quantity of fuel filled at the petrol theft.[2]

II. LITERATURE SURVEY

2.1 Analog Fuel Meter

In all over the world all the vehicle are having a analog fuel meter.This meter indicatesthree states of fuel level which are empty, Half and Full. So we cannot judge the actual fuelpresent in the fuel tank. In Fig1 we can see analog meter, which shows the fuel level by using needle. Butdue to this we do not get proper idea about fuel level present in fuel tank. Due to improperknowledge of fuel present in the tank we can undergo in trouble due to low fuel.

Figure 1: Analog fuel meter

As considering previous analog system we are going to implement advanced system. Inour system we are doing digital fuel meter and theft detection. In digital fuel meter we areindicating the amount of fuel in the tank in liters. This value in liters will be in numerical digits(Ex: 1 lit, 1.5 lit, 2 lit).

2.2 Fuel Thefting

There is major problem of fuel thefting all over the world. Thefting is malpractice whichincludes removal of the fuel pipe in the absence of owner and misusing the fuel from the bike.The owner of the bike unaware of fuel theft and he will come to know about it only when hewants to ride his bike on the next time. Previously due to absence of any burglar alarm or buzzer the system. The people were not aware about fuel thefting.

To overcome this problem we have put this idea of digital fuel meter and fuel thefting. Using PIC microcontroller .In our project whenever there is fuel thefting, due to thenoise of burglar alarm people are aware of the fuel thefting .and also during fuel thefting atext message delivered on mobile to the owner of the bike. This is real time occurring process.Recently the lock system for the pipe ensured least amount of fuel thefting but it lasted only forsmall duration of time. The disadvantages of this lock system are thief can break the system byusing duplicate key and removal of fuel from bike.

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of analog meters hence it is not possible to precisely knowthe amount of fuel currently in the vehicle. Also it is not possible to cross check the quantity offuel filled in the petrol bunk.

2.3 Gear level indication

The previous vehicle system don't have such a functionality that there is no display gearlevel whatever may be the condition though the bike is running or not. This disallows any new personon bike to adjust the gear level.But in our system we can overcome above problem by using digital meter which show thegear level in steady state or running state of bike.

III. MODELING AND DEVELOPMENT OF SYSTEM

3.1 Block Diagram

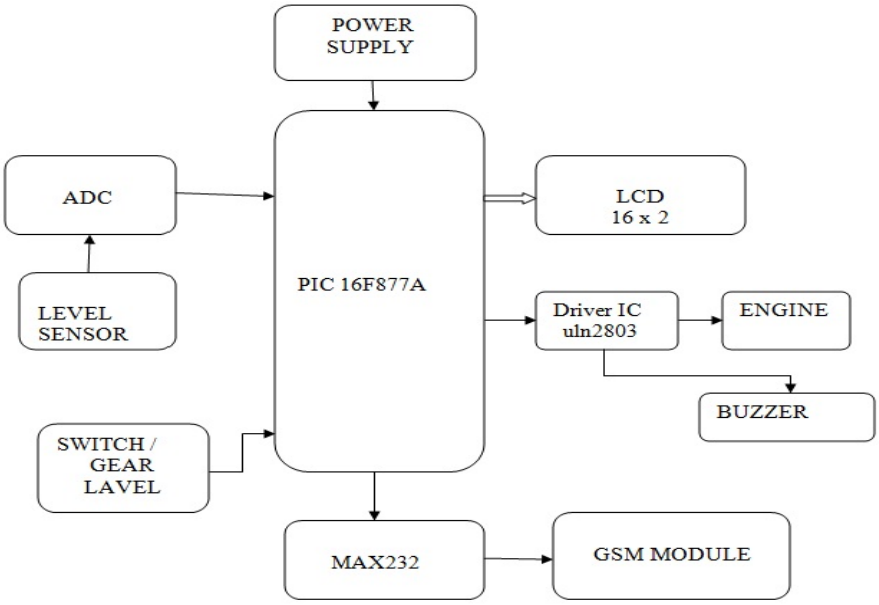

Figure 2: Block Diagram

The basic block diagram of the Digital Fuel meter using PIC micro-controller is shown in Fig 2. Mainly this block diagram consists of the following essential blocks:Power Supply,PIC16F877A microcontrollerLCD Display,Fuel Float Sensor, GSM Module,MAX 232. Buzzer, Driver IC ULN2803.

3.1.1 Power Supply

Linear regulated power supply, all the electronic circuit needs a dc voltage is derived fromthe single ac phase main supply. For this purpose we have to use a regulated dc power supply.The basic building blocksof regulated dc power supply areStep down transformer, Rectifier,Filter, Voltage regulator IC's, Load.

3.1.2 PIC 16F877A Microcontroller

PIC (Peripheral Interface Controller) is an 8 bit Microcontroller used in this system and it is theheart of the overall system. PIC16F877A series controller used here seems to be efficient and cost effective for this Digital meter system. The proposed design uses PIC micro-controller. Itis a low power controller that provides support for high speed communications, with the ability to be programmed using different commands.[4]

3.1.3 LCD Display

ISSN: 2454-9665

Interfacing between micro-controller and the LCD is required for displaying the status ofFuel level present in the fuel tank. The LCD is set to 16x2 display. Depending on the statusof fuel level, the LCD displays the level of fuel in digit like 1.1 lit, 1.2lit etc.The data from themicrocontroller is communicated using upper 4 bits of one-of the ports and the data pins of theLCD is connected to data pins D4, D5, D6, D7 of the LCD. The LCD is enabled using Enable(E) pin. Reading and writing of data to the LCD is handled using R/W pin.

3.1.4 Fuel Float Sensor

A fuel gauge is an instrument used to indicate the level of fuel contain in a tank. Commonly used in most motor vehicles, these may also be used for any tank including underground storage tanks.

As use in vehicles, the gauge consists of two parts:

- The sensing unit.
- The indicator

Figure 3: Fuel Float sensor

The sensing unit usually uses a float connected to a potentiometer, typically printed ink design in a modern automobile. As the tank empties, the float drops and slides a moving contact along the resister, increasing its resistance. In addition, when the resistance is at a certain point, it will also turn on a “low fuel” light on some vehicle.

The Indicator unit is measuring and displaying the amount of electric current flowing through the sending unit. When the tank level is high and maximum current is flowing, the needle points to “F” indicating a full tank. When the tank is empty and the least current is flowing, the needle points to “E” indicting an empty tank.

3.1.4.1 Specification of fuel sensor

- Minimum resistance 10 ohm and maximum resistance 100ohm.
- Supply voltage 5 V.
- Electrical Angle is 45degree
- It having 10 taps.
- Operating temp range is -60 to 80degree Celsius.

3.1.5 GSM Module

We are using model no 1122 GSM Modem in this project.This GSM Modem can acceptany GSM network operator SIM card and act just like a mobile phone with its own uniquephone number. Advantage of using this

modem will be that you can use its RS232 port tocommunicate and develop embedded applications. Applications like SMS Control, data transfer,remote control and logging can be developed easily.

3.1.6 MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator tosupply TIA/EIA-232-F voltage levels from a single 5-V supply. Each receiver converts TIA/EIA-232-F inputs to 5-V TTL/CMOS levels. These receivers have a typical threshold of 1.3 V, atypical hysteresis of 0.5 V, and can accept 30-V inputs. Each driver converts TTL/CMOS inputlevels into TIA/EIA-232-F levels. In this project MAX 232 is use for the serial communication between GSM Modem andMicrocontroller.

3.1.7 Buzzer

Buzzer is a electronic device commonly use to produce sound light weight simple construction and low price make it usable in various application like computers call bells etc. It is thephenomenon of generating electricity when mechanical pressure is apply to certain material andthe vice versa is also true.

3.1.8 Driver IC ULN2803A

The ULN2803A device is a high-voltage, high-current Darlington transistor array. Thedevice consists of eight NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be connected in parallel for higher currentcapability.

3.2 Circuit Diagram

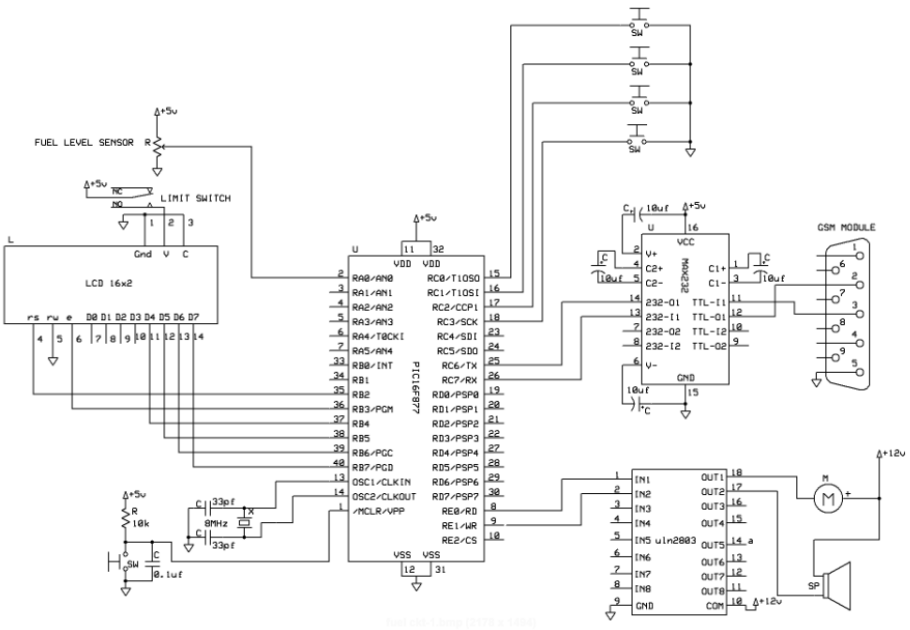

Figure 4: Circuit Diagram

3.3 Working

Circuit diagram is shown in Fig 4. We have used PIC 16F877A Micro controller.LCD16x2 is connected to Micro controller to display the level of fuel and gear. For sending a messageof Fuel Thefting we have used GSM Modem. Buzzer is used for alert.Initially limit switch is used to turn ON ignition. After ignition LCD will display currentvalue of fuel level and Gear level. By pressing start switch vehicle will start and it consume

ISSN: 2454-9665

someamount of fuel present in the fuel tank. In running condition of vehicle we must have to changethe gear level of vehicle, this changeable gear level is also display on LCD. After some time wewill stop vehicle, at that time the current level of fuel is stored in micro controller memory.

While fuel Thefting occurs then Fuel level goes down and message send to owner by usingGSM Modem.At that time Buzzer will ON. From that we will come to know fuel thefting wasoccurred

3.4 Algorithm

The digital meter follows a sequence as discussed above. The functions are as follows:

1. Start
2. Initializing the switch of vehicle
3. Start the engine of the vehicle
4. Display the level of the fuel and gear on LCD
5. Keep the engine ON, and display current value of fuel level and gear level.
6. Stop the engine of the vehicle
7. Store the petrol level value
8. If the petrol level goes down from stored value during thefting.
9. Then send message to owner and buzzer of vehicle will ON
10. If not then go to step no 7
11. Stop

3.5 Flowchart

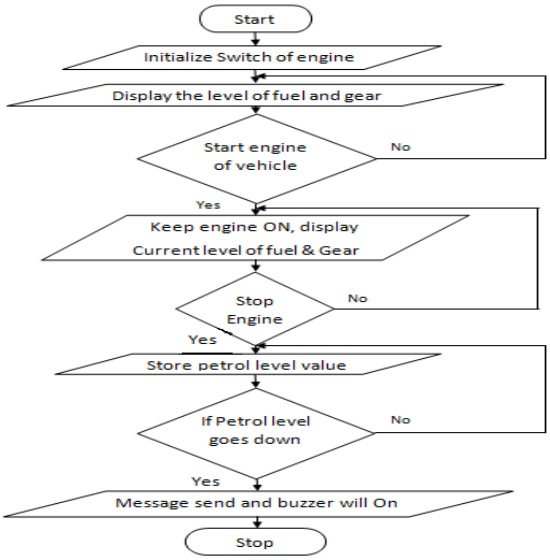

Fig 5: Flowchart

IV. RESULT

In this way we get the fuel level and gear level in the digital format. As shown in Fig 6 we can see that digital fuel level as 5L and gear level as a zero. When there is fuel thefting occurs buzzer will on and massage will sent on owner mobile.

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Figure 6: digital meter

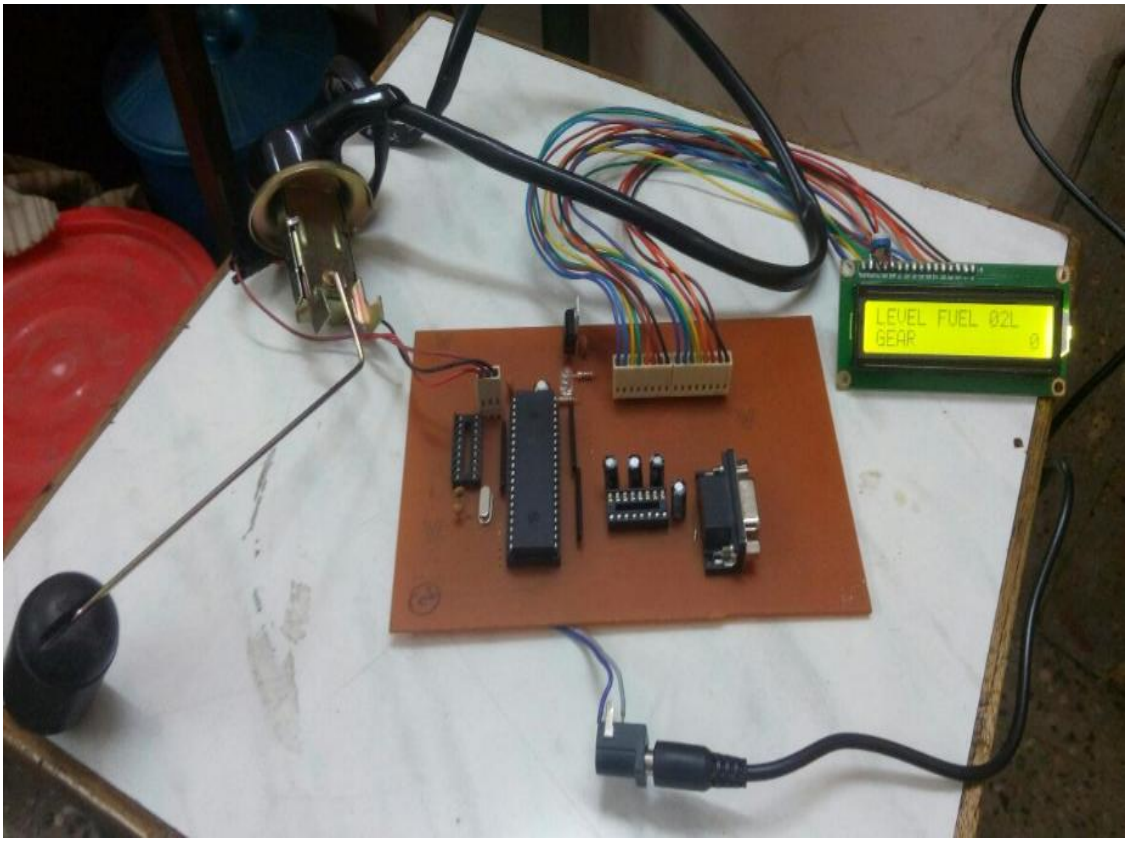

Figure 7: digital fuel meter kit

V. CONCLUSIONS

In our Project we have made Digital Fuel Meter, Which shows the level of fuel digitallyand also theft detection can be done. It gives the high accuracy than the Analog Meter.

In the present days even a cheapest liquid is according to the standard of measurementbut the costly fuel which is most required for day to day life is not according to the standardmeasurements. Our project is very useful for a common man as it avoids him by getting cheated. This measuring unit should be fixed to the entire vehicle so that we get an exact quantity of fuel tomeasure the inflow. Presently all the vehicles are using a fuel gauge which gives an approximatequantity of fuel, but an exact measuring tool should be made available.

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