

Design and Implementation of GSM Based Digital Fuel Meter and Fuel Theft Detection Using PIC Microcontroller

Mrs.P.Geethabai ME.,¹ L.Deepika², M.Dharani³, P.Haripriya⁴, G.Lavanya⁵

1.Assistant Professor (bonslae@gmail.com)

Department of ECE, Kings college of Engineering, Punalkulam.

2,3,4,5-Kings college of Engineering (lavangandhi7@gmail.com)

Abstract: In recent day's world has become digitized, if we make fuel meter in the vehicle as digital it will help 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 the tank digitally. Fuel theft is also problem in all over the world. In our project whenever there is fuel theft occurs, due to the noise of burglar alarm people are aware of fuel theft and also during fuel theft a text message is 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. 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, Fuel tank, Mileage, PIC microcontroller.

I. Introduction:

Digital fuel meter is also implemented in two 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 litre or millilitre. 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 the Digital (numeric) fuel indicator system for two Wheelers which shows exact amount of fuel in terms of litre or millilitre. 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 this arrangement which will explain the clear performance of the vehicle to the corresponding fuel. In the recent times we are constantly hearing about petrol theft. Most of the petrol bunks today have fraud the people such that it displays the amount as entered but the quantity of 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 petrol bunks but at the same time the customers are cheated. All the vehicles in India consist of analogy meters hence it is not possible to precisely know the amount of fuel currently in the vehicle and 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 vehicles tank and also help in cross checking the quantity of fuel filled at the petrol bunk.

II. Existing System:

2.1. Analog Fuel Meter:

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



Figure 1: Analog fuel meter

As considering previous analogy system we are going to implement advanced system. In our system we are doing digital fuel meter and theft detection. In digital fuel meter we are indicating the amount of fuel in the tank in litres. This value in litres will be in numerical digits.

2.2. Fuel Theft:

There is major problem of fuel theft all over the world. Theft is malpractice which includes 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 he wants to ride his bike on the next time. This is due to absence of any burglar alarm or buzzer system. The people were not aware about fuel theft. To overcome this problem we have put this idea of digital fuel meter and fuel theft. Using PIC microcontroller, in our project whenever there is fuel theft, due to the noise of burglar alarm people are aware of the fuel theft and also during fuel theft a text message is 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 theft but it lasted only for small duration of time. The disadvantages of this lock system are thief can break the system by using duplicate key and remove fuel from bike.

Most of the petrol bunks today have frauds the people such that it displays the amount as entered but the quantity of fuel filled in the customer's tank is much lesser than the displayed value. All the vehicles in India consist of analogy meters hence it is not possible to precisely know the amount of fuel currently in the vehicle. Also it is not possible to cross check the quantity of fuel filled in the petrol bunk.

2.3. Gear level indication:

Traditional vehicle system not include gear level indication but in Digital Fuel Meter system gear level indication also provided, from that we get information about gears of system are working properly or not.

III. Modeling And Development Of System:

3.1. Block Diagram:

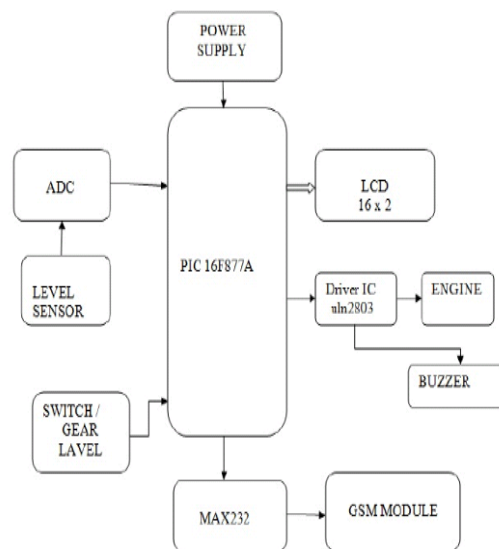


Figure 2: Block diagram of system.

We have used PIC 16F877A Micro controller. LCD16x2 is connected to Microcontroller to display the level of fuel and gear. For sending a message of Fuel Theft we have used GSM Modem. Buzzer is used for alert. Initially limit switch is used to turn ON ignition. After ignition LCD will display current value of fuel level and Gear level. By pressing start switch vehicle will start and it consume some amount of fuel present in the fuel tank. In running condition of vehicle we must have to change the gear level of vehicle, this changeable gear level is also display on LCD. After some time we will stop vehicle, at that time the current level of fuel is stored in micro controller memory. While fuel Theft occurs then Fuel level goes down and message send to owner by using GSM Modem. At that time Buzzer will ON. The basic block diagram of the Digital Fuel meter using PIC micro-controller is shown in Fig2. Mainly this block diagram consists of the following essential blocks: Power supply, PIC16F877A microcontroller LCD Display, Fuel Float Sensor, GSM Module, MAX 232, Buzzer and Driver IC ULN2803.

3.2. Power Supply:

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

3.3. PIC 16F877A Microcontroller:

PIC (Peripheral Interface Controller) is an 8 bit Microcontroller used in this system and it is the heart 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. It is a low power controller that provides support for high speed communications, with the ability to be programmed using different commands.

3.4. LCD Display:

Interfacing between micro-controller and the LCD is required for displaying the status of Fuel level present in the fuel tank. The LCD is set to 16x2 displays. Depending on the status of fuel level, the LCD displays the level of fuel in digit. The data from the microcontroller is communicated using upper 4 bits of one of the ports and the data pins of the LCD 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.

3.5. GSM Module:

We are using model no 1122 GSM Modem in this project. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer remote control and logging can be developed easily.

3.6. MAX 232:

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply 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 input levels into TIA/EIA-232-F levels. In this project MAX 232 is use for the serial communication between GSM Modem and Microcontroller.

3.7. Buzzer:

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

3.8. Driver IC ULN2803A:

The ULN2803A device is a high-voltage, high-current Darlington transistor array. The device 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 current capability.

IV. 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 theft.
9. Then send message to owner and buzzer of vehicle will ON
10. If not then go to step no 7
11. Stop.

V. Display in digital:

As shown in figure 3, we can see that digital fuel level as 5l and gear level as a zero. In this way, we get the fuel level and gear level in the digital format. When there is fuel theft occurs buzzer will on and message will sent to owner mobile.



Figure 3: digital meter

VI. FLOW CHART:

This is the required flow chart for testing the fuel in the automobile and used to the automobile from theft.

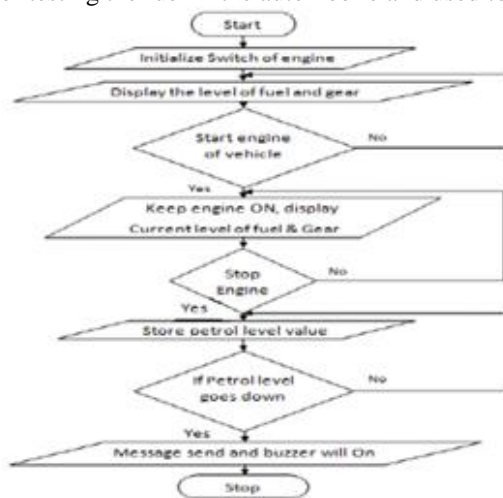


Fig 4: flow chart

VII. Conclusion:

Digital Fuel Meter used for prevention from fuel theft & also it display the available fuel in tank in digitally. This meter is more advantages over analogy meter by PIC microcontroller and GSM owner of bike is aware from fuel theft using buzzer or SMS to the owner of bike. We increase the standard of measurement system using Digital Fuel Meter because of Digital Fuel Meter cheating with customer by fuel filling station can be avoided and performance of system also improved with the help of Digital Fuel Meter.

References:

- [1]. A.Avinashkumar, U.Singaravelan, T.V.Premkumar and K.Gnanaprakash, Digital fuel level indicator along with distance to zero indicator. IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), 11:80{84 Mar- Apr. 2014.
- [2]. Mrs.Udayavalli.V. ,Mrs.M.Omameswari, Embedded system based intelligent digital fuelGauge. IPASJ International Journal of Electronics and Communication (IJEC), 2, March-April 2014.
- [3]. Kunal D. Dhande, Sarang R. gogilwar, SagarYele and Ass. Prof.VivekGandhewar, Fuel level measurement techniques: A systematic survey. International Journal of Research in AdventTechnology.
- [4]. Muhammad Ali Mazidi, PIC microcontroller and Embedded System. (2013).
- [5]. Awadhesh Kumar Sandip Kumar SinghLecturer, Assistant Professor Department of Mechanical Engineering U.N.S.Institute ofEngineering and Technology&V.B.S.Purvanchal University Jaunpur- Digital Fuel Indicator in Two Wheelers IJSRD – International Journal for Scientific Research & Development| Vol. 2, Issue 12, 2015 | ISSN (online): 2321-0613 All rights reserved by www.ijrsd.com 290
- [6]. Kunal D. Dhande, Sarang R. Gogilwar, SagarYele and Associate Prof. VivekGandhewar, “Fuel Level Measurement Techniques” A Systematic Survey.
- [7]. JaimonChacko Varghese, BineshEllurayilBalachandran, “Low Cost Intelligent Real Time Fuel Mileage Indicator for Motorbikes”.
- [8]. Mr.ShakibJaved S. Sheikh, Mr.Sumit D. Chambhare, Prof. V. R. Gandhewar, Prof. Mahesh S. Gorde, “Development and Fabrication o f Alphanumeric Fuel Level Indicator for Two Wheelers”.
- [9]. Madhav Murthy, ICDMM2014, ICDMM39, International Conference on Design, Manufacturing and Mechatronic Design and Fabrication of Digital fuel level indicator for two wheeler