

# Smart Security Framework using GSM -GPS Technologies Indication of Digital Fuel

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**Abstract:-** In the recent times we are constantly hearing about petrol bunk frauds. Most of the petrol bunks today have manipulated the pumps 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. Let 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 analog 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 focus on creating a digital display of the exact amount of fuel contained in the vehicles tank and also helps in cross checking the quantity of fuel filled at the petrol bunk. Finally once the fuel is filled at a bunk the device also sends an SMS to the vehicle owner indicating the amount, quantity, and date, time etc. And also we can find the exact location of the vehicle.

**Keywords:** Fuel, Gsm, Gps, Sensor, LCD

## I. INTRODUCTION

In this modern and fast running world everything is going to be digitized to be easily understandable and also to give exact calculation. Considering this idea we started a project named Digital fuel gauge, which shows the exact amount of fuel remaining in the fuel gauge as compared to the previously used gauge meter in which a needle moves to give a rough estimate of the fuel left.

A fuel indicator is an instrument used to indicate the level of the fuel contained in the tank. Commonly used in cars and bikes, these may also be used in any tank including underground storage tanks.

As used in cars, the fuel gauge has two parts:-

- The sender unit
- The indicator

The sending unit usually uses a float connected to a variable resistor. When the tank is full, the resistor is set to its low resistance value. As the tank empties, the float drops and

the slides a moving contact along the resistor, increasing its resistance, finally reaching its highest value when the tank is empty. In addition, when the resistance is at a certain point, it will also turn on a "low fuel" light on some vehicles.

Meanwhile, the indicator unit (usually mounted on the instrument panel) is measuring and displaying the amount of electrical 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" indicating an empty tank.

## II. PROPOSED SOLUTION

This project focuses on creating a digital display of the exact amount of fuel contained in the vehicles tank and also helps in cross checking the quantity of fuel filled at the petrol bunk. Finally once the fuel is filled at a bunk the device also sends an sms to the vehicle owner indicating the amount, quantity, and date, time etc. And also gives the exact location the vehicle.

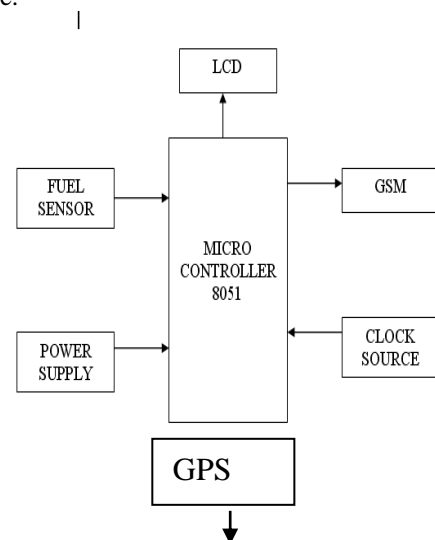


Fig 1. Block diagram

### III. COMPONENTS

#### Microcontroller

A Microcontroller has all of the essential blocks to read from a keypad, write information to the display, control the heating element and store data such as cooking time. In addition to simple ON/OFF inputs and outputs, many microcontrollers have abilities such as counting input pulses, measuring analog signals, performing pulse-width modulated output, and many more.

#### GSM Modem

GSM (Global System for Mobile Communications) is worlds most famous Mobile platform. Mobile phones with SIM cards use GSM technology to help you communicate with your family, friends and business associates. GSM systems have following advantages over basic land line telephony systems:

- Mobility
- Easy availability
- High uptime

GSM technology is being mostly used for talking to family, friends and business colleagues. we use communication feature of Telephone landlines for internet, e-mail, data connectivity, remote monitoring, computer to computer communication, security systems. In the same way we can use GSM technology and benefit from its advantages.

Now access control devices can communicate with servers and security staff through SMS messaging. Complete log of transaction is available at the head-office Server instantly without any wiring involved and device can instantly alert security personnel on their mobile phone in case of any problem. Bio-Enable is introducing this technology in all Fingerprint Access control and time attendance products. You can achieve high security and reliability.

#### Level sensor

Level sensors detect the level of substances that flow, including liquids, slurries, granular materials, and powders. All such substances flow to become essentially level in their containers (or other physical boundaries) because of gravity. The substance to be measured can be inside a container or can be in its natural form (e.g. a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.

#### LCD

We are using a high quality 16 character by 2 line intelligent display module, with back lighting, Works with almost any microcontroller.

#### Features

- 16 Characters x 2 Lines
- 5x7 Dot Matrix Character + Cursor
- HD44780 Equivalent LCD Controller/driver Built-In
- 4-bit or 8-bit MPU Interface
- Standard Type
- Works with almost any Microcontroller
- Great Value Pricing

### IV. SYSTEM DESIGN

The micro controller & the GSM unit is interfaced with the fuel level sensor of the vehicle. Every vehicle has a separate number, which is given by the corresponding authority. The GSM unit is fixed in the vehicle.

The amount of fuel is stored in memory of the microcontroller. Using keil software and embedded c we can send the SMS through Modem to that particular mobile number and wait for the response if any.

After the readings the controller will send data to the modem. Modem, in turn sends data to the other end. On other end the vehicle owner will receive the data in the form of a fuel existing before refuelling, fuel added while refuelling and the total amount of fuel in the tank.

Using GSM we can get the response very fast due to which time is saved. After sending the readings to the vehicle owner, the owner can request for the location of the vehicle by sending an SMS to the sim card used in the GSM.

The vehicle owner at any point of time can request for the amount of fuel and the location of the vehicle. After all this process the microcontroller will reset the memory to get the fresh readings during the next re-fuelling.

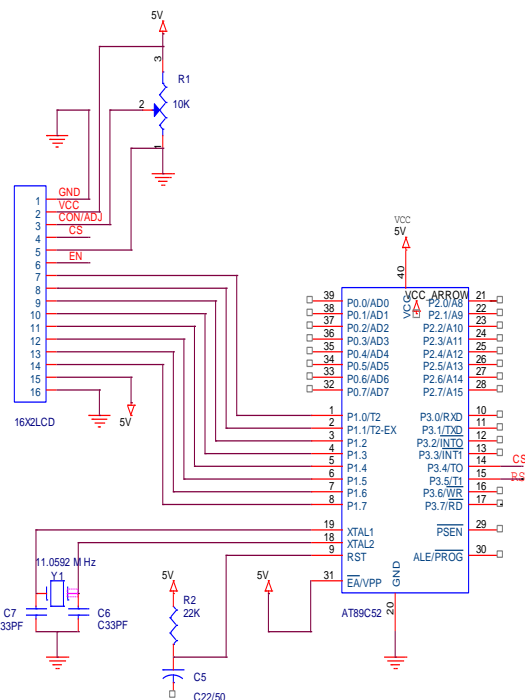


Fig 2. LCD and MICROCONTROLLER Interfacing:

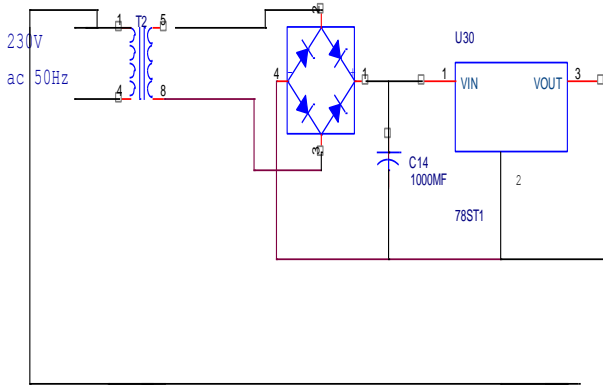


Fig 3. POWER SUPPLY SECTION\_1

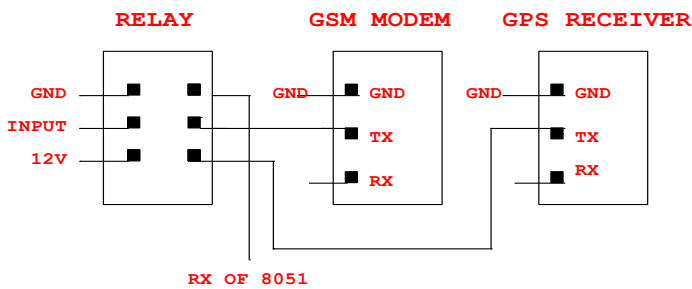


Fig 4. POWER SUPPLY SECTION\_2

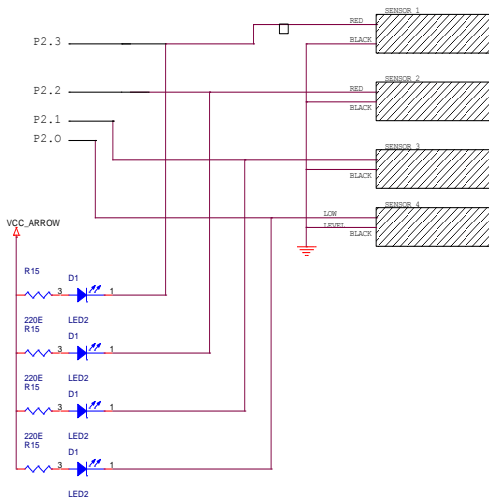


Fig 5. SENSORS INTERFACING TO MICROCONTROLLER

- Microcontroller (AT89C52):**  
 An 8051 architecture microcontroller (AT89C52) is used as the microcontroller unit. The 8051 is an 8 bit Reduced Instruction Set Computer (RISC) microcontroller. It has four 8 bit ports, total 32 I/O lines. Different peripherals of the meter are connected with its ports as shown in Fig6.1. It has 64KB of program memory and 256 byte of RAM. The firmware inside the microcontroller's program memory is built using two layers – the *Driver Layer* and the *Application Layer*. The *Driver Layer* contains protocols for accessing different hardware peripherals such as LCD, EEPROM, RTC, LR, GSM modem, etc. On the top of the *Driver Layer*, the *Application Layer* contains routines for load

calculation, bill calculation, data SMS frame creation, etc. *Application Layer* calls different routines of the *Driver Layer* to access hardware peripherals.

- Display Unit:**  
 A 16 x 2 character LCD (HD44780) is interfaced with the micro-controller port using 4 data wire mode. Different meter readings like current month kWh, total kWh, voltage, current, date, time, etc. are sequentially displayed here.
- Permanent Data Storage Unit:**  
 If power fail occurs, the content of the RAM must be stored in EEPROM so that when power is back, the meter can start from its last state. An I2C EEPROM (AT24C64) of 8KB size is used for this purpose. Also, different billing slabs containing rates for peak and off peak hour, meter ID etc. are stored here.
- GSM Modem:**  
 A GSM modem is interfaced with the micro-controller's serial (RS232) port for sending and receiving SMS. Using the FBUS protocol, the microcontroller sends different commands to the modem and receives data SMS frames from the GSM modem. The serial communication with the modem is full duplex 8 bits, no parity, 1 stop bit and at 115200 bauds. We have used Subscriber Identification Module (SIM) in the modem.
- Cellular Communication**

  - A cellular mobile communications system uses a large number of low-power wireless transmitters to create cells. The basic geographic service area of a wireless communications system.
  - Channels (frequencies) used in one cell can be reused in another cell some distance away. Cells can be added to accommodate growth, creating new cells in un-served areas or overlaying cells in existing areas.
- RS232:**  
 RS-232 is simple, universal, well understood and supported but it has some serious shortcomings as a data interface. The standards to 256kbps or less and line lengths of 15M (50 ft) or less but today we see high speed ports on our home PC running very high speeds and with high quality cable maxim distance has increased greatly. The rule of thumb for the length a data cable depends on speed of the data, quality of the cable.
- Regulator (7805):**  
 This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and

thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

- **Rectifier:**

A rectifier is an electrical device that converts alternating current (AC) to direct current (DC), a process known as rectification. Rectifiers have many uses including as components of power supplies and as detectors of radio signals.

#### V. TECHNOLOGIES USED

We have used Embedded C and GSM for mobile communication as technologies. 8051 Microcontroller IC, GSM Modem, GPS modem Level Sensors and LCD for hardware part and Keil Compiler, Embedded C for software part.

#### VI. FUTURE DIRECTIONS

Our technology can be further enhanced in the future.

- In case of theft of vehicle, it can be stopped i.e. the engine can be shut down remotely using additional software enhancements.
- Speed of the vehicle can be limited.
- Location of the vehicle can be determined at any point of time.

#### CONCLUSIONS

The Digital fuel indicator design like that described above will most likely be more accurate, more reliable, and cheaper than other analog meters, and will allow for added features that benefit both the customer. In the near future, the different vehicle company manufacturers will implement this kind of fuel system which also provides security for the vehicle owners. Not only will the measurement be more accurate, but, the consumers also will not be cheated for their hard earned money.

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