



## Tracking of Fuel Road Tankers for Anti pilferage and Anti Adulteration

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### Abstract:

Fuel leakage detection is a very challenging task so the collection and control system of Fuel information is developed. A network that includes Fuel stations, Fuel storages, Fuel pressure regulating stations, the strategic positions where Fuel can leak can be tracked by GPRS. The functions of this system includes remote monitoring of the pressure on the pipe network, flow, environmental parameters and real-time collection of information, alerting and reporting.

The aim of this project is to monitor and track the fuel theft and adulteration while transporting. The system detects the leakage of the FUEL using Fuel sensor and alerts the driver/company about the Fuel leakage by sending information through Wi-Fi. The proposed system uses the WI-FI to alert the driver about the Fuel leakage. When the system detects the FUEL concentration in the air exceeding the certain level then, it immediately alerts the driver/company by sending information through wi-fi to specified mobile phone and alert the driver by activating the alarm which includes the LED, Buzzer simultaneously and display the message on LCD display to take the necessary action and switch on the exhaust fan to decrease the Fuel concentration in the air.

**Keywords:** Adulteration, Fuel detection and prevention, Fuel sensor, microcontroller, Wi-Fi.

### I. INTRODUCTION

The life on earth exists because of air and water. What happens if both are polluted? This is the situation in most of the urban areas. Air and water are being polluted at a rapid rate due to the excess use of chemicals, fertilizers, emissions of Fuels from vehicle, leakage of Fuel from household etc. Fuel emissions create respiratory illness and also environmental problems like acid rain, ozone layer depletion etc.

Fuels are volatile compounds which are colorless, odorless and tasteless. So when these compounds spread in air it will be difficult to identify with human naked eye. At present several methods are available which detect the Fuel leakage. But the drawback of these systems is it uses a static network of sensors. By using this static network the correct source of leakage cannot be identified. The Fuel as soon as it leaked it will spread very fast in air. Thus a proper device should be required to detect the leakage. In this project, an embedded electronic platform is used which can monitor a moving vehicle with chemical sensing system for Fuel leakage detection and environment monitoring.



This system consists of PIC microcontroller . GPS is used for detecting the location of Fuel leakage. Five MQ series sensors are attached to the system which is used for detecting LPG, methane, ammonia, carbon monoxide and humidity. The vehicle moves through a predefined path. This device works in two modes firstly it works in predefined path. Secondly it move by manually i.e. as instructions given by the controller.

The FUEL or propane which is flammable mixture of hydrocarbon Fuels used as fuel in many applications like homes, hostels, industries, automobiles, vehicles because of its desirable properties which include high calorific value, which produce the less smoke, produces less soot, and does not cause much harm to the environment.

Natural Fuel is another widely used fuel in homes. Both Fuels burns to produce clean energy, however there is a serious problem about their leakage in the air. The Fuels being heavier than air do not disperse easily and may lead to suffocation when inhaled also when Fuel leakage into the air may lead to explosion. Due to the explosion of LPG Fuel the number of deaths has been increased in recent years. To avoid this problem there is a need for a system to detect and also prevent leakage of LPG. Fuel leak detection is the process of identifying potentially hazardous Fuel leaks which can be detected by means of various sensors. These sensors usually employ an audible alarm to alert people.

### 1.1 Objectives:

- To measure the pressure of the fueling tanker.
- To measure the thefting and leakage of the fuel using flow sensor.
- To prevent the theft of the fuel, make automatic tap locking system.
- Find level of the fuel in tank in order to display the distance can be travel.
- Gather the sensor information and upload through wi-fi to monitoring unit.

### 1.2 Existing System:

In recent years, Fuel use safety cannot be optimistic. Currently, the main Fuel network detection is the use of portable / handheld Fuel leak detectors, vehicle-mounted Fuel network monitoring system, and the disadvantage is that the both detection systems cannot achieve real-time Fuel information collected. So we go for the sensor based proposed system to achieve and overcome the disadvantage in the earlier system.

### 1.3 Proposed System:

The remote monitoring and control to Fuel pipelines and Fuel storage facilities at places such as Fuel leakage can be realized by using this proposed system. This proposed system contains the data acquisition section and the collection section. Data acquisition section contains the pressure sensor, flow sensor, Fuel sensor for monitoring the pressure, speed, and leakage of the Fuel. The sensor values will be in analog format so we go for the analog to digital converter to convert the value into digital. The values will be uploaded in internet via GPS modem using the PC. When any abnormality occurs in the sensor value then the buzzer will be invoked and alert the person.



## II Literature survey

### 2.1 “Fuel Checker and Theft Indication”

Description:

This project has a WI-FI modem which send message to owner of vehicle when there is fuel theft going on. Vehicle Petrol theft is one of the main concerns of many bike owners and car owners. Many times, we have heard or some of us have already faced that petrol from their bike or cars has been stolen. Main intention of this project is to avoid such situation. In SMS based petrol theft detection system, we have used a Level sensor to detect the petrol level in petrol tank. If the level goes below certain threshold level then this sensor gives a particular signal to ARM. Then ARM turns on the buzzer and sends SMS to the car/bike owner. ARM is a main heart or Central Processing Unit of the system.

### 2.2 “Detection of fuel theft in heavy vehicle”

Description:

The poised system uses Wireless based communication for monitoring the vehicle's position. Initially, the process involves measuring fuel level followed by eliciting the information and sends it to the server for further detection. Finally, the message is sent along with vehicle position and fuel level in the tank. This enables in identifying the level of fuel at different times whenever the tank is opened. This improvement in sensors will be a great boon to eradicate fuel theft and vehicle positioning issue.

### 2.3 “Design and Implementation of a New Nonradioactive-Based Machine for Detecting Oil water Interfaces in OilTanks”

Description:

describes that a new ultrasound-based technique was developed to determine oil, emulsion and water level in the oil tank. It consists of a compact, programmable ultrasound-based multilayer level measuring device for a feed forward neural network is implemented. The advantages of this method over current methods include contactless distance measurement, higher precision, lower costs, easier configuration and nonionizing radiation is used.

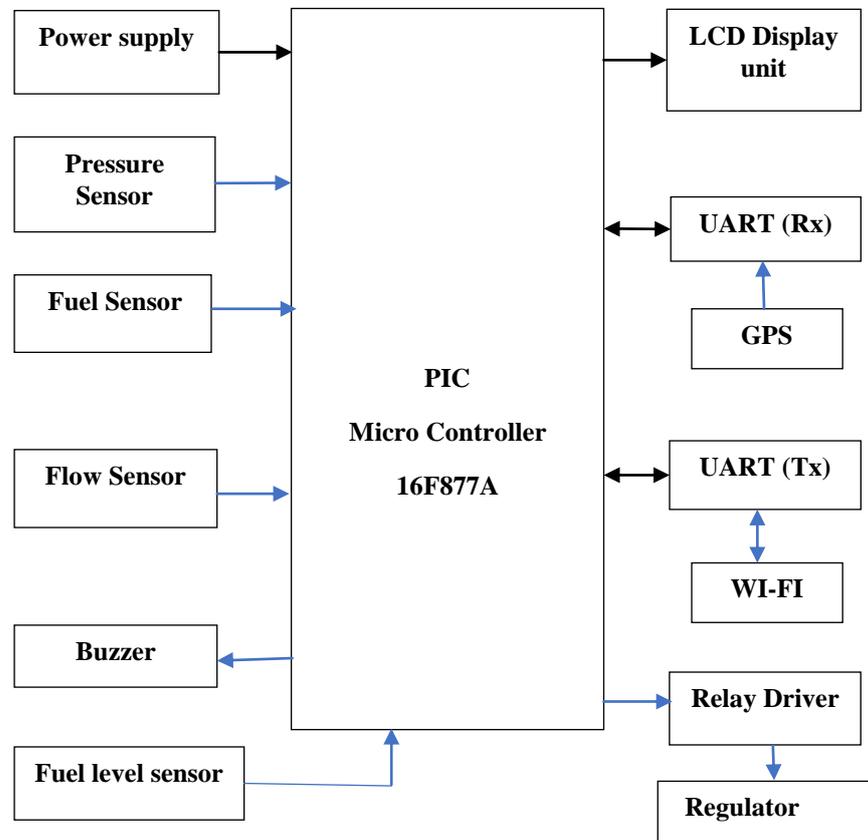
### 2.4 “Digital fuel meter and fuel theft detection”

Description:

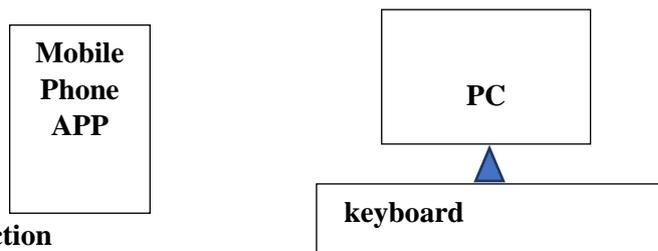
In this Project we have made digital fuel meter. Here, we are indicating amount of fuel present in tank digitally. That value is in numerical digits (ex: 1lit, 1.5 lit, 2lit etc.). Fuel thefting is also measurable problem all over the world. In our project whenever there is fuel thefting, due to the 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 vehicle.



**III BLOCK DIAGRAM:**



**(a) Data section**



**(b) Collector section**

**Fig.1. Block diagram of proposed system (a) Data section (b) Collector section**

**3.1 System Overview:**

The system overview comprises of block diagram which includes microcontroller, pressure sensor, flow sensor, Wi-Fi, Alarm unit and Knob control level sensor. This proposed system contains the data acquisition section as shown in fig.1.(a) and the collection section as shown in fig.1.(b). Data acquisition section contains the pressure sensor, flow sensor, Fuel sensor for monitoring the pressure, speed, and leakage of the Fuel. The sensor values will be in analog format so we go for the analog to digital converter to convert the value into digital. The values will be loaded in internet. When any abnormality occurs in the sensor value then the buzzer will be invoked and alert the driver.



### 3.1.1 Microcontroller:

An efficient and smooth working controller is needed to continuously sense both leakage and level of the gas. And also, fast response is required when leakage is found. Along with this the monitoring system must provide additional leakage information. The detection system includes PIC microcontroller board which is compatible with microcontroller chip 16f877A. It has 32 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 12 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

### 3.1.2 Fuel Sensor:

MQ-6 fuel sensor has high sensitivity to Propane, Butane and FUEL, also response to Natural gas. The sensor could be used to detect different combustible gas, especially Methane, it is with low cost and suitable for different application. It senses the leakage of FUEL sends the alert signal to the microcontroller alternatively turn on Buzzer when it reaches the danger level.

### 3.1.3 Display:

It is necessary requirement to put a display about system monitoring and controlling performance, which displays the various messages such as leakage of gas detection. Additionally the system also, displays the actions carried out in the microcontroller. For the work of displaying the alert messages Liquid crystal display (LCD) of 16\*2 characters operating on +5-volt supply and operated 4-bit mode is implemented.

### 3.1.4 Pressure sensor:

The Pressure sensor is used to monitor the level of fuel present in the cylinder. For calibration purpose the Pressure sensor is used along with load cell.

### 3.1.5 Regulator:

The basic principle of Regulator is the creation of rotating magnet inside the mobile part of the Regulator, rotor. Regulator indicates fixed magnet and rotor indicates rotating magnet. When fuel leak occurs this monitoring, system senses the leak by means of sensor and the value is given to the microcontroller. When gas leak occurs this monitoring, system senses the leak by means of sensor and the value is given to the microcontroller.

### 3.1.6 WI-FI:

The WI-FI modem is highly flexible plug and play modem based on tri-band ESP8266. ESP8266 can fit almost all the space requirements in much real-time application. This global system for communication technology making it very easy to send and receive the messages support the AT commands. These commands can be implemented by interfacing to the receiver and transmitter pins of microcontroller.

## IV ADVANTAGES

- Highly reliable
- Fast response
- Low cost



## V APPLICATIONS

- Fuel industries
- Hotels and restaurants
- Petroleum companies
- Fuel and petroleum transportations
- Chemical manufacturing units

## VICONCLUSION

This project presents and discusses the problems related to fuel management systems and overcoming these problems through an automated electronic system. The project presents considerations about both the hardware and software part of the system which involves measurement of fuel level, pressure and leakage through their respective sensors and sending these measurements through Wi-Fi network and also sends exact location by using GPS to the Organizer's mobile as well as to the computer wirelessly.

## VIIACKNOWLEDGMENT

I would like to thank my Guide **Mr. Sreekanth B, Assistant professor, Department of ECE, RRIT** for giving me this opportunity to complete my project in our college, who also helped me in various stages of project and making this project a success.

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