IJSTE - International Journal of Science Technology & Engineering | Volume 4 | Issue 10 | April 2018
ISSN (online): 2349-784X

Petrol Adulterant Monitoring System

Genevy Sequeira
Student
Department of Electronics & Telecommunication Engineering
Don Bosco College of Engineering, Fatorda-Goa

Muriel De Souza
Student
Department of Electronics & Telecommunication Engineering
Don Bosco College of Engineering, Fatorda-Goa

Melanta Correia
Student
Department of Electronics & Telecommunication Engineering
Don Bosco College of Engineering, Fatorda-Goa

Prof. Kimberly Morais
Assistant Professor
Department of Electronics & Telecommunication Engineering
Don Bosco College of Engineering, Fatorda-Goa

Abstract

Fuels that are contaminated or whose quality has been weakened by adding inferior quality ones are referred to as adulterated fuels. There has been hardly any data in developing nation but the rising consciousness in tailpipe emission levels has prompted some action towards curbing adulteration. Increased emission of hydrocarbons, carbon monoxide, oxides of nitrogen and particulate matter intoxicate the air from such fuels. Experts say health problem could result from harmful tailpipe emission and cancer using pollutants, through not all form of adulterants are harmful. Here the monitoring of liquid adulteration particularly that of petrol is done by setting a limited range of the specific gravity of petrol and maintaining temperature corrections at various temperature points to obtain an accurate specific gravity reading. In this manner, one parameter of the adulteration of petrol will be distinguished from pure petrol.

Keywords: Pressure Sensor, Specific Gravity, Programmable Logic Controller (PLC)

I. INTRODUCTION

Gasoline or Petrol is a transparent, petroleum-derived liquid that is used primarily as a fuel in spark-ignited internal combustion engines. It consists mostly of organic compounds obtained by the fractional distillation of petroleum, enhanced with a variety of additives

The characteristic of a particular gasoline blend to resist igniting too early (which causes knocking and reduces efficiency in reciprocating engines) is measured by its octane rating. Gasoline is produced in several grades of octane rating. Tetraethyl lead and other lead compounds are no longer used in most areas to regulate and increase octane-rating, but many other additives are put into gasoline to improve its chemical stability, control corrosiveness, provide fuel system cleaning, and determine performance characteristics under intended use. Sometimes, gasoline also contains ethanol as an alternative fuel, for economic, political or environmental reasons.

Fuels that are contaminated or whose quality has been weakened by adding inferior quality ones are referred to as adulterated fuels.

Adulteration of fuels mainly involve adding kerosene or diesel to petrol. World statisticsbon adulteration indicate that 70 percent of driver and mechanics have experienced this problem in petrol engines and rarely on diesel and Compressed natural gas(CNG) engines.

There has been hardly any data in developing nation but the rising consciousness in tailpipe emission levels has prompted some action towards curbing adulteration. Increased emission of hydrocarbons, carbon monoxide, oxides of nitrogen and particulate matter intoxicate the air from such fuels. Experts say health problem could result from harmful tailpipe emission and cancer using pollutants, through not all form of adulterants are harmful.

The country's dairy industry faces several hurdles in ensuring product quality and safety. The aim of this project is to develop new instrumentation methods and sensor systems for petrol quality analysis to enable inspection and traceability of produce.

The developed system is very much useful for the easy analysis of the petrol sample and determines whether the given sample is adulterated or not. The project is interfaced with the PLC which processes and classifies the petrol sample which is finally displayed on screen. This is an interestingly new project in the field of electronics. It helps to analyze the petrol samples based on petrol density, conductivity and temperature.

II. METHODS FOR ESTIMATION OF FUEL ADULTERATION

A. Laboratory Tests:

The laboratory tests conducted were density and kinematic viscosity. Calibrated hydrometers and thermometers were used for density estimation American society for testing materials chart was used to convert the observed density to density at 15degree C. The kinematic viscosity of diesel was estimated by using 'U' type calibrated viscometer and the time to be recorder for viscosity testing was noted with help of calibrated stopwatch.

B. Gas Chromatography (GC):

GC is powerful laboratory tool which can be used to detect hydrocarbon based adulterants .However it requires an experienced technician to operate the equipment and interpret the results. It is an effective method for detection of adulterants in gasoline and diesel but would require easily portable, robust and user friendly equipment which may be operated by an inexperienced operator also.

C. Effect on Colour:

Dyes are usually added for identification in solid or liquid form. Orange dyes are added for regular petrol, red dyes are added for premium petrol and green dyes are added for aviation gasoline to distinguish and specify the quality of petrol or type of fuel. As per IS 2796/2000, normally oil orange dye is used for colouring petrol. As the quantity of petrol samples reduce, the colour of samples was found to be dark orange as compared to the initial fresh petrol sample. It was found that as % evaporation of samples increases the orange dye present in the petrol also get intensifies to dark orange. This increase in intensity of the colour is attributed to the concentration of the orange dye in the evaporated petrol sample.

D. Evaporation Test:

The evaporation techniques are capable of detecting very low concentrations (1-2%) of diesel in gasoline and fairly low concentrations (5%) of kerosene in gasoline. However this is basically a laboratory technique and is not suitable for field use.

E. Distillation Test:

This technique exploits the difference in the boiling points of different liquids comprising the fuel sample. Accurate distillation data for uncontaminated fuel is essential for comparison and precise results. The technique, however, is not suitable for field use as the measurement set up is generally bulky and measurement process is time consuming.

III. LIMITATIONS

1) Wastage of Petrol Samples by adding various chemicals.
2) The above test are time Consuming.
3) It is a costly method.
4) The results are not accurate.
5) The Evaporation method causes air pollution that lead to diseases like lung cancer.

IV. PROPOSED METHOD

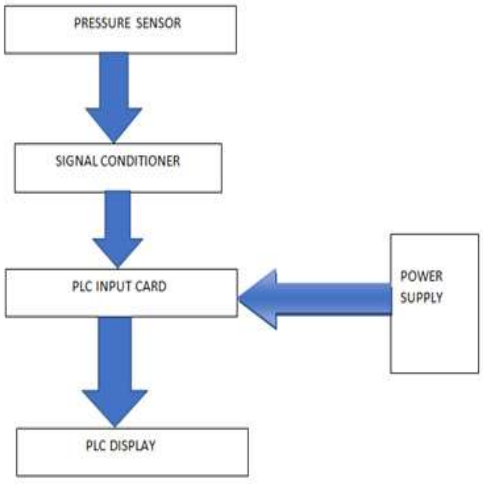

Fig. 1: block diagram

The system consists of analog sensor namely pressure sensor. The pressure sensor has 1% total error band. It is suitable for measurements of liquids or gas pressure even for difficult media such as contaminated water, steam and mildly corrosive fluids. The durability is excellent. It exceeds the latest heavy industrial requirements including surge protection and is over voltage protected to 16Vdc in both positive and reverse polarity.

PLC is used for the control and continuous monitoring of manufacturing processes. It's a smart relay for simple control applications. It has high reliability and ease of programming and process fault diagnosis. In this system we used PLC having AC models (110-240Vac) and DC(12-24Vdc), upto 48 I/O(32 digital inputs,16 outputs), backlit LCD screens,RS485 communication-module, wide range of programmable functions. It provides 250 lines ladder programming.

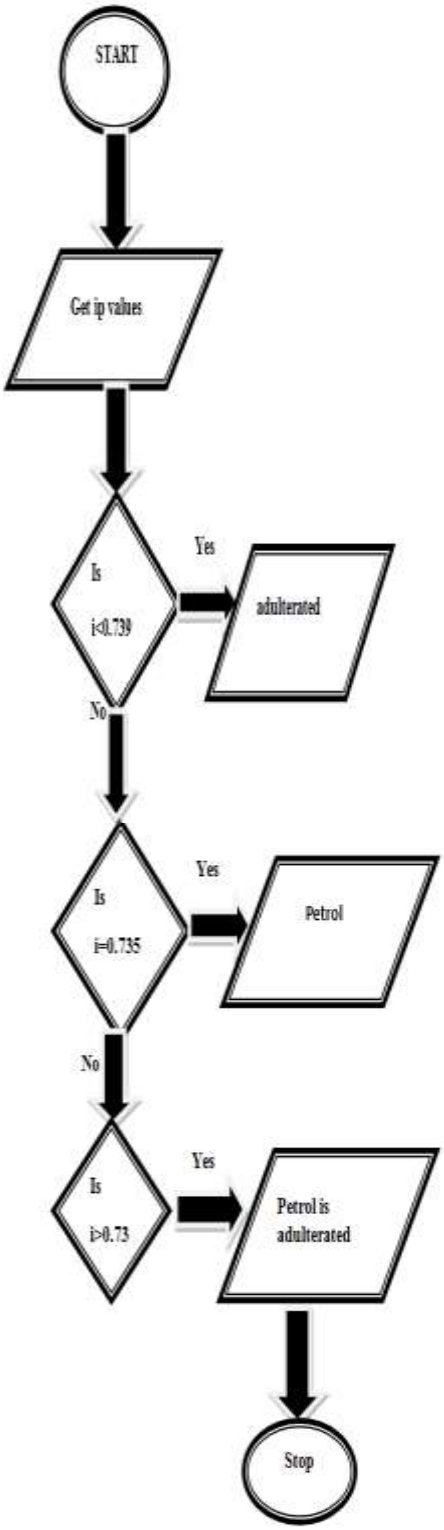

Fig. 2: Flow chart diagram

From the given figure input value i is the input taken from pressure sensor. The i value is matched with specific gravity of petrol. If the condition satisfies then result is displayed. If the condition fails, it goes to next step. For the petrol specific gravity range 0.739.If the resultant value does not lie within the mentioned range then display will show as petrol is adulterated.

V. EXPERIMENTAL RESULTS

Equation to Calculate Specific Gravity of Petrol: By knowing the input value, we can calculate specific gravity of petrol .As illustrated in equation (1), based upon the input value of the sample of petrol the end result of the equation is the specific gravity of the sample. This is then given to the PLC for further comparison to the set value

$$\Delta p = \rho fluida \Delta h \text{ ----------equation (1)}$$

Δp= change in pressure
Δh= change in depth
$\rho fluid$= density
a= constant acceleration

VI. CONCLUSION

This is an important and beneficial method which can help in avoiding any form of petrol adulteration where the samples of petrol are compared to a fixed value. Thus ensuring that there is no mixture of diesel in samples of petrol and avoiding degradation for the same.

ACKNOWLEDGEMENT

We are truly thankful for the guidance of our professors who guided us towards the completion of this project.

VII. FUTURE WORK & SCOPE

Apart from providing the quality assurance of petrol to consumers this method can also be used in detecting the specific gravity of any liquid such as milk and other oils by making use of the fiber-optic sensor.

Addition to this method we can use a GSM Module from one base station to the main base station where the main authority can have an access from a distance and monitor if anything is going wrong and if the samples of petrol is adulterated. The data is stored for about a month.

REFERENCES

[1] A new method for estimation of automobile fuel adulteration Anil Kumar Gupta and R.K. Sharma Department of Electronics and Communication Engineering National Institute of Technology Kurukshetra-136 119 India
[2] Analysis of Petrol: A Clarification for Purity of Petrol G. M. Ramteke , L.B. Revatkar, R.V. Phadke, N.L.Chutke* Regional Forensic Science Laboratory, M.S. Nagpur-440012, India *Corresponding author: Nitin Chutke, email: nitichutke@gmail.com
[3] Estimation of petrol and diesel adulteration with kerosene and assessment of usefulness of selected automobile fuel quality test parameters
[4] 1Sh. R. Yadav, 2*K. Murthy V, 1D. Mishra and 1B. Baral 1School of Engineering, Department of Mechanical Engineering, Kathmandu University, Dhulikhel, Kavre, Kathmandu, Nepal 2School of Science, Department of Biological Sciences and Environmental Science, Kathmandu University, Dhulikhel, Kavre, Kathmandu, Nepal