IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684, p-ISSN: 2320-334X
PP 20-23
www.iosrjournals.org

Modified Type Intelligent Digital Fuel Indicator System

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ABSTRACT: *There are many sensor based techniques available in the market to measure the liquid level and gives you a close idea of quantity of the liquid, however can provide you an exact approximation of quantity as in cars by fuel meters by which we can get an idea of whether tank is full, half full or empty etc. The liquid level detector and optimizer play an important role in tanks to indicate the level of liquid of a particular density. In this paperwe have proposed a technique to measure the amount of liquid available in tank also give the knowledge about their chemical composition as well as purity level of fuel & it is the first device which can give the accurate knowledge about of how much the vehicle can run. This device digitally displays the level of liquid inside the tank, fuel composition & running capability of vehicle by using load sensors. The measurements are taken so the accuracy level is of 95% - 98%. Thus it is an efficient device made by keeping in mind the petroleum thefts at the various petrol pumps at the time of filling of tanks.*

Keywords*: A fuel level detector, C.P.U. (Central Processing Unit), E.C.U. (Electronic Control Unit), indicator, modulator, sensing.*

I. INTRODUCTION

A fuel level detector (fuel gauge) is a device inside of a car or other vehicle that measures the amount of fuel still in the vehicle. This type of system can be used to measure the amount of gasoline or some other type of liquid. It will typically consist of a sensing or sending unit that measures the amount of fuel actually left and a gauge or indicator that relays this information outside the fuel container. A fuel gauge can be designed in a number of different ways and many gauges have several flaws that can make the readings less than accurate. The two parts of a fuel gauge are the sensing or sending unit and the indicator or gauge.

A sensing unit is the part of a fuel gauge found within or connected to the actual fuel storage container on a vehicle. In a car these days, for example, the sensing unit will consist of a float inside the fuel tank, which is connected to a metal rod that runs to a small electrical circuit. The float raises or lowers depending on the amount of gasoline in the fuel tank.

But in our case there are three basic parts of fuel gauge
Sensing
Computing (E.C.U. + C.P.U. + modulator)
Indicator

A sensing unit is the part of a fuel gauge found within or connected to the actual fuel storage container on a vehicle. In a car these days, for example, the sensing unit will consist of a float inside the fuel tank, which is connected to a metal rod that runs a small electrical circuit. The float raises or lowers depending on the amount of gasoline in the fuel tank, wheel speed, braking torque, load (vehicle itself + occupants + luggage) & acceleration ratio etc. We are introducing one more element in the branch of fuel gauges is the COMPUTER which is a programmed based micro processing unit. It is consist of E.C.U., C.P.U. & modulator.

E.C.U. receives information from each individual sensor, the signal is sent to the C.P.U. which collects data & computes it then send to the modulator which module the signals and display it to the indicator. It works as a computer for fuel gauge.

Fig. 1 modified type intelligent digital fuel indicator from reference no. [3]

Background

Some Major Factors That Have The Greatest Impact On Fuel Consumption Are-

Quick acceleration, Heavy braking, Speeds, Weather, Cargo or cargo racks, Towing a trailer or carrying excessive weight, Electrical accessories, Hilly or mountainous terrain, Four wheel drive, Temperature.

There are so many other factors also which are responsible in reduction of fuel economy but due to the very small range it does not much more affect the fuel economy but still reduces it. They are called immeasurable factors. It reduces fuel economy as 3% of all other factors. Those factors are-

Displacement, Gearing, Aerodynamics, Induction, Intake and Exhaust restrictions, Rolling resistance, Mechanical Resistance, Altitude.

In These Gauge System There Are So Many Sensors Are Used To Measure That Factors Introducing One By One-

Acceleration sensors

Acceleration sensors measure relative acceleration as a state variable for linear and rotary drives and analyze the dynamic behavior of a drive system.

For rotative applications.

High sensitivity.

Wide range.

Brake caliper LVDT sensor

High brake disc wear is required to monitor by race engineers by using a miniature linear position sensor in the brake caliper. High performance contactless LT series LVDT sensor is specified in this application. Caliper piston movement is measured by LVTD sensor. At hard braking circuits disc wear is calculated by using this information.

High temperature operation.

Very compact designs.

Multiple mounting options.

Long operational life.

Raychem signal cabling.

Optional in-line electronics.

Speed sensors

For control and measurement systems this sensor provides speed and direction information. Between sensor face and a target, a target induced magnetic field is detected by rotational speed sensors. The operating temperature of the sensors is about 200^{o}C.

The temperature performance of the inductive (ISS) sensor is about 200^{o}C. The output voltage of the sensor is proportional to the target speed and air gap. Crank and cam speed are the applications.

Displacement sensors

Digital dial gauges

To save space and enable flexible configuration, slim body design.

Eliminates to readjust whenever power is turned off.

In order to solve the problem of over tightening the stem portion a nut installed type is available.

Sensors for air conditioning

Evaporator sensors

In air conditioning systems the most important functions of temperature sensors is controlling the temperature of the evaporator. Thus it gives knowledge about fuel consumption. Some part of fuel is also consumes by A.C. and affect the mileage.

Digital temperature sensors

High measurement accuracy accompanied by low power consumption and user friendly system integration capability is provided by digital temperature sensors.

High accuracy.

16/24 bit resolution

Low power

Density sensors

A unique fluid density sensor has developed by ISSYS. A small, hollow silicon micro tube is uses by this sensing approach. At a given frequency this small tube vibrates. The vibration frequency will change as the density or concentration of the liquid in the tube changes.

By using the vibrational frequency of the micro tube the density of the fluid can be measured. The density or API output can be used by petrochemicals and biofuels to indicate the type of fuel, its purity and to blend fuels together.

II. METHODOLOGY

In sense of the mileage of any vehicle is affected by some factors which we have consider in and also take most economical, useful, intelligent and quick responding sensors to calculate the effect of the all the factors directly as well as indirectly too.

All the sensors are situated on their particular separate place to perform their operation. Sensors are very efficient quick responding units. The sensors collect all the data in running vehicle and then the collected information moves up to the E.C.U.

E.C.U. is controlling unit which make command on all the individual sensors give them power to run and forward the collected data to the C.P.U. The E.C.U. is electronic control unit. Then the data moves up to the central processing unit i.e. C.P.U. at this unit the data finally computed into the numeric form by the mean of programming. All the data from the sensors is converted into the one form of mileage means HOW MUCH VEHICLE CAN RUN? All the information is in coded form which moves towards the modulator.

Modulator is the unit to modulate the information and finally the data in display on the digital fuel indicator in a numeric form.

To maintain the accuracy level the C.P.U. has designed. By providing the clearance in data computation there is 3% to 4% of clearance for sensors errors and immeasurable factors so the information as given by system as near as actual. Thus the modified type intelligent fuel indicator system operates.

FIGURES AND TABLES

Figure

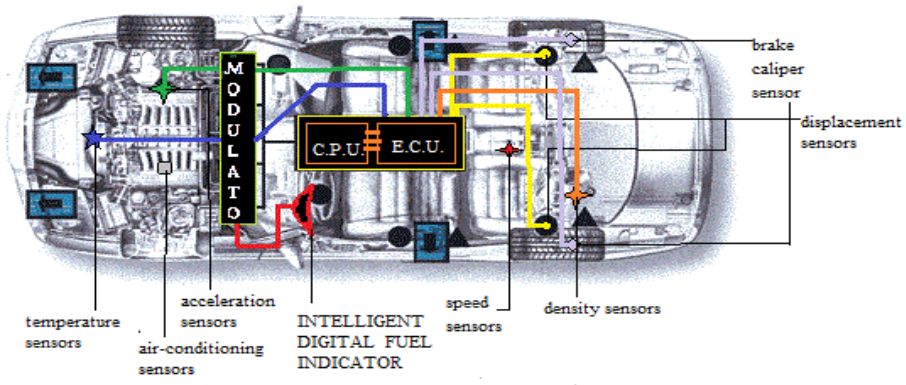

Fig.2 fuel gauge methodology from reference no. [13]

Table

Fuel Gauge Methodology

SENSOR NAME	WORKING ON	SITUATION	SPECIFICATION
Density sensors	Fuel quality measurement	Fuel tank	ISSYS
Acceleration sensors	Acceleration fluctuation measurement	Flywheel	FISCHER
Brake caliper sensor	Braking torque	Brake caliper	LVDT
Speed sensors	Wheel speed	Propeller shaft	ISS
Displacement sensors	Cargo or cargo racks & terrain	Suspensions	DDG
Air-conditioning sensors	Air-conditioning inputs	Compressor	ES
Temperature sensors	Weather & engine temperature	Engine case & vehicle body	DTS

CONCLUSION

The modified type intelligent fuel indicator is very advance type indicating system. The main advantages of the system are that it can give the accurate value of remaining fuel as well as the vehicle running capacity in K.M. The accuracy level is up to 95% to 98% because of advance type C.P.U. is preferred. It also gives the knowledge about the fuel quality due to the density sensors which is highly advance sensor for fuel composition detection. The operation time taken is very less in micro seconds. All the equipments have long life, durable & quality material.

Due to the best quality assurance it is costly and only favorable for luxury vehicle. It is not suitable for low & medium class vehicle. Thus it increases the cost of the luxury vehicle and in case of sensor failure of any one of them can stop working system fully, these are the main drawback of system.

It is applicable for all the vehicle which can afford, all the fuel conserving machines, all type of fluid indication. In present time there are so many fuel gauges are available which is digital but they can only give the remaining fuel identification in percentage, engine speed and wheel speed but in our system we can get direct value of remaining fuel with the running capacity of the vehicle, fuel quality and also ultra sharp L.E.D. display.

Thus the modified type intelligent fuel indicator system is best in the field and will be most advance gauge indicator in future.

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