“EMBEDDED SYSTEM BASED FUEL GAUGE AND DIGITALIZATION OF VEHICLES”

PROJECT REFERENCE NO. : 37S0971

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Keywords: Microcontroller pic16f877, Fuel flow, Tier pressure gauge, Adaptive lighting, E-sign boards, Fog detection, Fuel gauge, Tachometer, Liquid crystal display

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 tank 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 slider on 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.

**Objectives of the project:**

This project focuses on creating a digital display of the exact amount of fuel contained in the vehicle's tank and also helps in cross checking the quantity of fuel filled at the petrol bunk so that the customers cannot be cheated as they cross check the quantity of the fuel. And subsequent additional features are added to the system to assist the drivers which enhance the compatibility of the system. A fuel quantity measuring unit is designed so that exact amount of fuel is known to the driver. To further enhance the assistance to the driver a module is added which control the lighting system adaptable to the surrounding environment. To assist the user in maintenance of the vehicle fog detection avoidance unit and tier pressure sensors are added. To detect the sign board a unit is added in vehicle and in the sign board through which the sign is displayed on the dash board of the vehicle.

**Methodology:**
Software Requirements

- HITEC C Complier
- IC Flash Utility

Hardware Requirements

- PIC16F877 microcontroller is used to compute the data coming from the all the sensors and modules which eventually process the data and display them in the display unit.
- A flow sensor is required to measure the inflow of the fuel and it should be calibrated to the quantity of the fuel.
- A load cell is required to check the amount of fuel present in the tank.
- A zigbee module is used to receive and transmit the sign board data in the vehicle.
- IR pulse generation module is used to measure the speed of the vehicle which generates the pulses as the wheel of the vehicle rotates.
- LDR is used in detecting the fog and it is also used to in adaptive lighting system.
- RELAYs are used to trigger the higher voltage devices like bulb and fans. These relays are triggered by the microcontrollers.
- Resistance based pressure sensor is used to measure the tier pressure of the vehicle which can also be replaced by the sensor which can fit to the valve of the tier.
- LEDs are used for the indication of activation of units.
➢ 128x64 pixels graphical LCD is used as a display unit. This is compatible in displaying the traffic signs.

➢ Power supply is given by the step down transformer and the step down AC voltage is rectified using bridge rectifier.

➢ A piezo electric buzzer is implemented to give an indication if there is any change in the parameter.

Circuit Diagram:
U3.35
FUEL SENSOR

U3_40
R1
RELAY SPDT
+5V

12V
Q1
bc548
R2
1k
0.1uF
1uf

Keyboard

Power Supply

U1
VCC

ZigBee Tx

VCC
**Conclusion:**

In the present days even a cheapest liquid is according to the standard of measurement but the costly fuel which is most required for day to day life is not according to the standard measurements. Our project is very useful for a common man as it avoids him by getting cheated. This measuring unit should be fixed to all the vehicle so that we get an exact quantity of fuel to measure the inflow. Presently all the vehicles are using a fuel gauge which gives an approximate quantity of fuel, but an exact measuring tool should be made available. We have used a load cell to eradicate the fuel measuring problem. The tier pressure sensor helps in maintenance of the vehicle. The modules like automated lighting system, fog detection and avoidance, tachometer and E-sign boards help the driver while driving the vehicle.

**Scope for Future Work:**

The applications in project have proved to be very important and it much required for the society. The project has the potential in it so that it gives way for future development of the project. The project can be improved by calibrating the fuel flow sensor so that it continuously updates the data for every 10 ml of fuel. The pressure sensor can be molded to fit the valve of the tube for easy measurement. All the traffic sign boards have to be digitized. The overall performance of the project can also improved by using higher end processors. The project can also be improved by applying some more application which concentrate on safe driving through loss of life due to accidents can be avoided.