Smart Fuel Level Indicator and Mileage Calculating Device

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Abstract—In the 21st century where everything has become digital, so that its easy to interface it with real time systems. As we all are aware that motor vehicles display the amount of fuel in the fuel tank by means of some bars indicators through the E (empty) ,half, F(full) indicators.So by making the dash board digital and smart, it gives the accurate value of the fuel in the tank. So by interfacing it with the raspberry pi with different features of the project can be obtained. The amount of fuel is measured by using UV sensor in the tank by subtracting the total volume and air volume of the tank .This feature evades a great deal of issues like fuel theft at fuel stations, fuel burglary and also keeps us from getting into circumstances where we need to push our vehicles because of low level of fuel. By using a simple formula the milage can also be calculated which gives us the estimation of our travelling distance before starting the journey. The problem of the low fuel can be overcome by using GPS which locates the nearest petrol pump. Tire is the most essential part of automobile and it plays crucial role in ensuring safe driving. Even then, almost every vehicle on the road run with either one or more under inflated tires. By using pressure sensor the tire pressure is monitored which also help in maintaining ware and tare of the tire.

Keywords—Raspberry Pi, GPS, pressure sensor, UV sensor.

I. INTRODUCTION

Today in this digitized world, if the fuel indicator in the automobiles is also made digital it will help to know the exact amount of fuel available in the fuel tank. The above furnished fact is considered in this project and found out a proper solution for indicating the exact availability of fuel in the tank digitally. Here, it indicates the amount of fuel in the tank in litres. This value in litres will be in numerical digits (ex: 1.2, 1.3 and 1.4). By which the distance covered can be calculated. The project mainly concentrates about the indication of fuel level in two- wheeler tanks and mileage detection. Various other features like the distance that can be travelled to the corresponding fuel, is added with this arrangement which will explain the clear performance of the vehicle to the corresponding fuel. It shows the amount of fuel in terms of bars and not in numbers or digits like Litre or Millilitre. A survey has been done on the existing fuel indicator systems and fuel tanks of different bikes and scooters. The fuel level indicator can be used for any type of fluid and the level is automatically detected by weighing Mass of the liquid by pressure sensor and displaying the output on LCD. By using GPS the nearest location of the petrol station will be indicated in the LCD . Using the pressure sensor the air pressure of the wheel of the 2-wheeler will be found out which will avoid many accidents which are caused while travelling.

II. LITERATURE SURVEY

[1]"Intelligent Real Time Mileage indicator for motorbikes" by JaimonChacko Varghese, BineshEllupurayilBalachandran published in the year 2014. It calculates the mileage of the vehicle is displayed on the dash board and the amount of fuel & the distant covered can also to known while travelling.

[2] "Ardunio based digital fuel gauage& vehicle monitoring system" byNitesh.K.A, Lohith.B.N published in the year 2015. The system implements a digital display meter for avoiding fuel theft & develop a system which also monitors the temperature of the engine ,seat belt warning & Alcohol content by using sensors in 4-wheelers.

[3]"GSM Based digital fuel meter & fuel theft detection using PIC Microcontroller" by Trupti K. Wable ,Rajashree R. Shinde published in the year 2016.The implementation of the digital meter mounted on the vehicle and allowing a buzzer to indicate fuel theft.

[4] "Automatic tyre pressure monitoring system using wireless communication" by Mr.Prashant. G. Salunkhe ,Mr.Harshal R. Kulthe,Mr. Saiprasad N. Kolhe , Mr.Ayaan A. Khan Published by 2017.This system implements a tyre pressure system that monitors the air pressure of the tyre and alerts with a warning light.

[5] "Intelligent digital fuel gauge along with engine locking system using Ardunio" by M.Prakash, V.Raguna, K.Sowmitha, P.Thamilzamudham and Mrs. P. Nandhini. Published in the year 2018 .By using fuel gauge the

amount of fuel present in the tank is indicated if anyone skips the signal instead of running behind the vehicle by using GPS the police can lock the vehicle engine .to unlock the authorized person need to send password to restart it.

III.   PROBLEM IDENTIFICATION

The use of analog usage of a system that is fitted to most of the vehicles today do not give an accurate information about the features such as to know the exact amount of fuel left , pressure in the tyre and calculating the mileage according to the fuel left which may be inconvenient for the users

IV.   METHODOLOGY AND IMPLEMENTATION

The below figure 1 shows the design of system hardware where it consists of Raspberry pi 3, pressure sensor, 16x2 LCD display, GPS Module, pressure Sensor, hall effect Sensor [6]
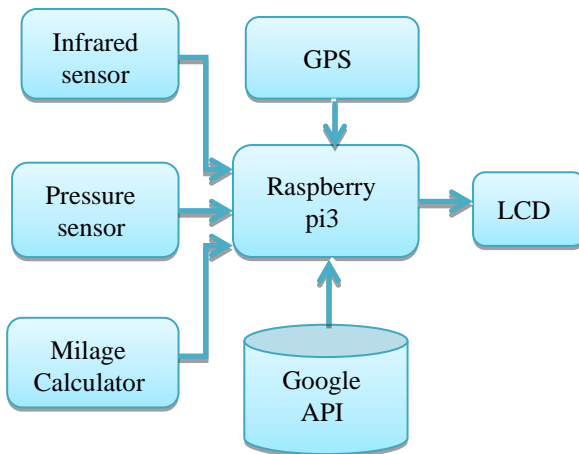
The proposed system aim in the measurement of the fuel in the vehicle tank using infrared sensor.A sensor to measure the quantity of petrol and send it to the raspberry pi. It detects when there is a low level and requires a refill. The code will be looping continuously and taking input from the sensor, when the level of petrol reaches a threshold value mentioned it raises an interrupt. The interrupt is basically another code that runs a google API to find the current location of the user using a GPS module. This basically returns the location in [latitude and longitude] once the current location is returned ,the API will list out all the petrol bunks that are present in a radius of 2km along with the location. Then using the distance matrix API, the distance between the longitude and latitude of the current location and the petrol bunk will be calculated and returned ,the returned value will be displayed on the LCD .The air pressure sensor 0 – 40kpa by using this sensor air pressure present in the tyre could be known. There is formula for calculating, the mileage of the vehicle should be known and based on the below formula the program is run and is displayed on LCD.

V.   COMPONENTS

The main components required for the functioning of the above proposed solution are elucidated below.

A. Raspberry pi

The raspberry pi 3 is a 64-bit ARM cortex A53 clocked at 1.2GHz.

- Memory: 900MHz
- USB ports: 4
- Network:10/100Mbps ethernet and 802.11n wireless LAN

B. Pressure sensor

The air pressure sensor 0-40kpa providing a very accurate and linear voltage output.the pressure sensor as the sensing element, which integrates digital conditioning chip. It has signal processing circuit chip, and make the digital compensation to sensor drift sensitivity. It is small in size, easy to install.

C. Ultraviolet sensor

The ultrasonic sensor has a better accuracy and it is easy to calibrate and interface it with Raspberry pi controller which is used. The ultrasonic sensor sends ultrasonic waves and reflects it back to the receiver unit of the ultrasonic sensor. In this way we can find the level of fuel in the tank .

D. GPS Module

The ublox Neo 6m is a complete GPS engine module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

- The operating voltage of the NEO-6M chip is 2.7 to 3.6V
- Serial baud rate 4800 – 230400
- Navigation update rate 1Hz

E. Google API

Google APIs is a set of application programming interfaces developed by Google which allow communication with Google Services and their integration to other services.The APIs provide functionality like analytics, machine learning as a service or access to user data. Another important example is an embedded Google map on a website, which can be achieved using the Static maps API, Places API or Google Earth API

E. LCD

We are using a high quality 20 characters by 2 line display module, with back lighting. The 20 *4 LCD is a flat panel display or other electronically modulated optical device that uses light modulating properties of liquid crystals combined with polarizers.LCD are available to display arbitrary images or fixed images with low information content, which can be displayed such as pre set words, digits and seven segment displays as in digital clock.

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VI.   RESULTS

Since in today's real world the fuel level in vehicle (car or motorcycle) is measured analogously, by design and implementation of this project the fuel in the tank of vehicle is measured digitally and displayed on the LCD screen. The infrared sensor present in the fuel tank of the vehicle detects the quantity of the fuel and the raspberry internally Converts the received analog signal into digital form and displays it on LCD in digital numeric form. Then the GPS module detects current location of the vehicle using google API, it find out the nearest Petrol bunk .Then air pressure sensor detects the air present in the tyre ,

VII.   CONCLUSION

This project gives the quantity of the fuel in the fuel tank in the form of numeric digits more accurately.Thus, due to this we can find out to what distance the vehicle can cover by the remaining fuel in the tank. The implementation of this system was very smooth, easy and very effective at a very low cost compared to all other techniques. The results will be stored in Raspberry pi to keep track of the efficiency. The readings are unaffected by any Physical orientations and chemical changes of the liquid. All the equipment's have a long life, durable and quality materials.

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