Iot Based Fuel Efficiency Monitoring System For A Vechile

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Abstract: *The IOT based fuel efficiency monitoring system is for four wheeler, aimed at the improvement of efficiency in four wheeler especially in car. From our application, the user will come to know about their car efficiency in the graphical format. Mainly how the fuel is being consumed at various factors like increase in speed, worst road conditions, engine getting heat after long time ,frequent change of gear, during traffic ,not having proper maintenance, also due to some bad petrol/diesel/oil in which the fuel is consumed more and it will give less mileage .In some cases the according to the driving and other factors the fuel is less consumed and mileage is give more .To find all this system helps to track their mileage with the help of speed sensor and terrain sensor. From tracking the mileage the user will come to know about their car's efficiently properly and maintenance of the car is easy. Through our website the user can view their mileage graph .The graphical view makes the user to understand better. From this the proper analysis is made and maintained properly.*
Keywords – *Internet of Things, Cloud Computing, Wireless Sensor Network, CPLD.*

I.   Introduction

It is IOT based web application that aims to optimize the Fuel consumption by tracking the mileage graph in four wheelers especially in car. Our project is an IOT based web application. It enables you to control the fuel consumption of car by tracking the mileage graph of a car. A web based application is a software package that can be accessed through the web browser. The software and database reside on a central server rather than being installed on the desktop system and is accessed over a network. The system comprises different modules which operate together. The conventional system does not display the mileage graph, does not describes the factors why the fuel level decreases and the efficiency of fuel consumption. These can be implemented in fuel efficiency monitoring system. This is aimed to improve the efficiency of mileage in four wheeler devices especially in car thus fuel consumption in car can be maintained by tracking the mileage graph.

II.   Related Work

SachinS. Aher, Kokate R. D. proposed fuel monitoring and vehicle tracking system which explains in today's world, actual record of fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. To avoid this we are implementing a microcontroller based fuel monitoring and vehicle tracking system. We have used the reed switch which works according to the principle of Hall Effect for sensing the amount of fuel filled in the vehicle and amount of fuel consumed. Then this record is stored in the system memory.[1] S. Overington and S. Rajakaruna, worked on High Efficiency Control of Internal Combustion Engines in Blended Charge Depletion/Charge Sustenance Strategies for Plug-in Hybrid Electric Vehicles where it realizes a novel control strategy for the fuel consumption reduction in plug-in hybrid and hybrid electric vehicles having an internal combustion engine (ICE) and one more motor/generators. The proposed control strategy combines power balancing and variable speed control to achieve a more efficient utilization of fossil fuel energy that is consumed over standardized drive cycles. Furthermore, a high-efficiency region in the ICE performance map is utilized to aid with energy management decisions.[2] D. F. Opila, X.Wang, R. McGee, R. B. Gillespie, J. A. Cook, and J. W. Grizzle written on An Energy Management Controller to Optimally Trade Off Fuel Economy and Drivability for Hybrid Vehicles that describes Hybrid vehicle fuel economy performance is highly sensitive to the energy management strategy used to regulate power flow among the various energy sources and sinks. Optimal non-causal solutions are easy to determine if the drive cycle is known a priori.

III.   Existing System

At present, there are no systems which help to identify the exact mileage of the four wheelers and view them in a graph format. It monitors approximate usage of fuel by the vehicle and Mileage is not resourcefully and accurately calculated. Cars can only tracks the speed and kilometer through meters but does not keep a record of it. It does not offer daily monitoring of the mileage.

IV.   Proposed System

The proposed system has an ability to accurately measure the Mileage of the car in the graph format. This application provides user, a Graph in the dashboard, by which the users are able to interpret their car's

Mileage, speed, fuel consumption and finally time for maintenance. The user can also view at which time they get high mileage with less fuel consumption. They also know the difference between before maintenance and after maintenance of the car. It will be easy for the user to get the exact measures instead of using meter. The main functions of the project are to collect the mileage calculating factors through sensors and through wireless network send those values to the module for calculation of mileage and displays in the graph in the dashboard which is user friendly

V.   System Design

The system comprises of overall architecture and the components that involved in it.
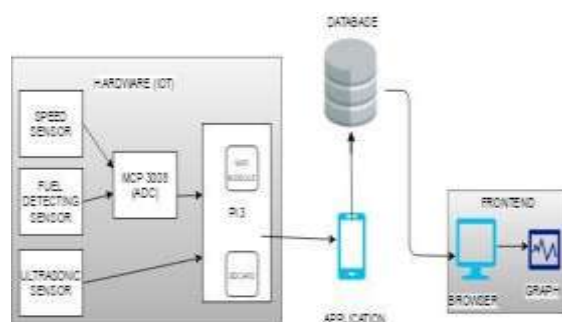
Module Description

(1)Software
a. Java is an object-oriented, platform-independent, multi threaded programming environment. It is the foundation for Web and networked services, applications, platform-independent desktops, robotics, and other embedded devices. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page.
b. J2ME: J2ME is aimed squarely at consumer devices with limited horsepower. Many such devices (e.g., a mobile phone or pager) have no option to download and install software beyond what was configured during the manufacturing process. With the introduction of J2ME, "micro" devices no longer need to be "static" in nature. Not unlike a web browser downloading Java applets, an implementation of J2ME on a device affords the option to browse, download and install Java applications and satisfied.
c. SQL: The name SQL stands for Structural Query Language. SQL is a data access language, like any other language, it is used for communication. SQL communicates with database manager. The database manager could be Oracle, Informix, DB2 and SQL database.
d. HTML: Hyper Text Markup Language is the standard language for creating documents for the World Wide Web. An HTML document is a text file, which contains the elements, in the form of tags that a web browser uses to display text, multimedia objects, and hyperlinks using HTML; we can format a document for display and add hyperlinks to other documents. The user interface has been designed in HTML hence can be browsed in any web browser.
e. CSS: By using these style sheets throughout the project, a uniform look and feel can be maintained for all the HTML elements and tags that have been used in the project. If there is any revamp the way the content has been presented in the website, the changes can be made to the appropriate style

(2)Hardware
The Raspberry Pi :
   The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. While maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processer, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs

Ultrasonic Sensor:
   Ultrasonic sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively.

Dcmotor:

Direct current (DC) motors have variable characteristics and are used extensively in variable-speed drives. DC motor can provide a high starting torque and it is also possible to obtain speed control over wide range. It is important to make a controller to control the speed of DC motor in desired speed.

MPC3008/3004:

The Microchip Technology Inc. MCP3004/3008 devices are successive approximation 10-bit Analog-to-Digital (A/D) converters with on-board sample and hold circuitry. The MCP3004 is programmable to provide two pseudo-differential input pairs or four single-ended inputs. The MCP3008 is programmable to provide four pseudo-differential input pairs or eight single-ended inputs. Differential Nonlinearity (DNL) and Integral Nonlinearity (INL) are specified at ± 1 LSB.

VI.   System Implementation

Normally in fuel management system, the user calculates themileage in their testing road conditions and fixes it and does not take all the factors such as in our proposed system, but through   MILEAGE OPTIMIZER GRAPH, mileage calculation can be done in normal road conditions and monitored through the graph.

The following are the steps that are followed for implementing the system
1. The Raspberry Pi is enabled and the option "search for network" is selected and the device is selected.
2. Then a middleware application for pushing a data from database to graph server is connected to same network device which Raspberry Pi is connected and the "Start Server option" is clicked in the application
3.Now the Eclipse Toolkit is opened and then it is compiled and run option is selected.

4. Then the Engine in the sensor part is switched on and the sensors work and store the data in the Raspberry Pi.
5.Then the Engine is switched OFF and the option "save" is
clicked and then the data are being stored in database successfully.

6. Graph is being drawn from the datas and displays it on the users dashboard.

COMPLETE HARDWRAE DESIGN

VII.   Results
As by implementing the above process the results were executed successfully as follows

Web Application

Mileage Graph Display:

VIII.   Future Enhancement

In the proposed system for implementation of mileage graph, the important factors such has fuel, speed and terrain only considered in to account but in future many features such as engine condition can be considered. It is a Web based Application for displaying the mileage graph where in future it can be developed as a mobile application.

IX.   Conclusion

The main objective of our project is to track mileage under various circumstances is fulfilled. It is intended to help the end users to efficiently monitor the mileage in the graphical format and also help to maintaining the car and also to know well about your cars.

References

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[3]   Fuel monitoring and vehicle tracking" Sachin S. Aher, Kokate R. D. http://www.ijeit.com/vol%201/Issue%203/IJEIT141 2201203_35.pdf
[4]   System for remote monitoring of a vehicle and method of determining vehicle mileage, jurisdiction crossing and fuel consumption" https://docs.google.com/viewer?url=patentimages.st orage.googleapis.com/pdfs/US6714857.pdf