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IOT BASED FUEL LEVEL MONITORING SYSTEM

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ABSTRACT

In today's fast paced world, monitoring systems are necessary to track the changes in the environment for better understanding of current scenarios and predictions thereof. The same is true for fuel tanks in vehicles as well. By keeping strict track of fuel intake and consumption, vehicles can be made more fuel and cost efficient. This can be done using remote monitoring and data collection systems deployed at the site of the fuel storage tank. This proposed monitoring device is built on Atmega16 computer that takes fuel tank level information from its sensors and analyses this data at the sensor edge to find patterns using edge analytics technology. These patterns and data are streamed to the internet, either an android app or a website. This paper presents the implementation of such a monitoring system based on Internet of Things (IoT) technology to protect the fuel customers from theft at the gas stations and formulate better conservation strategies. By integrating software and sensors into vehicles, our initiative aims to bring about a shift in traditional fuel management systems, combining vehicle performance with congested traffic, road surfaces and driving behaviours. It aims to simplify the process of budgeting for fuel expenses.

INTRODUCTION

In current times, petroleum is a very limited resource. As a result, fuel prices climb higher every day. It has become more than difficult for the average human being to keep up with the skyrocketing prices of fuel every day. Adding to that are fuel thefts by fuel sellers/providers which result in more financial loss for the common people. Tampering of fuel apparatus at gas stations is not uncommon these days, resulting in customers paying more than the amount of fuel they actually purchase. This calls for a system on the customer's side to be put in place to track their fuel intake to avoid financial losses.

Many technologies provide the solution for the above-mentioned problem. Especially, Internet of Things (IoT) can help control and monitor the fuel consumption and level of fuel in the tank. Internet of Things (IoT) is a concept that allows a variety of things to have a presence in an environment and to be

interconnected by the virtue of wired or wireless connections and unique addressing schemes. These devices (things) are capable of interacting with each other and cooperate over this network resulting in new applications/services and reach varied goals. This concept converges the real, the digital and the virtual devices to create smart environments that make areas like energy, transport, cities, etc. more intelligent.

The primary goal of Internet of Things (IoT) is to enable devices to be connected anytime, anywhere using any path/network and service. Edge analytics is a new branch of data analytics that involves analysing the gathered data at the edge (or the site of the device, sensor, etc.) rather than transporting all the data to the main site. This not only helps save time but also saves space occupied by unnecessary data.

Identified the problems in current fuel measurement systems and took upon the research of the traditional fuel measuring systems alongside the technology of Internet of Things and Edge analytics. Proposes a novel fuel monitoring system by using Internet of Things and edge analytics method. Implemented the fuel measurement system using Atmega16.

The main objective ofproject is to design an IoT based fuel monitoring system which can detect the level of fuel in the fuel tanks of vehicles and be able to report fuel thefts. The amount of fuel in the tank can be stored in the cloud for monitoring monthly fuel consumption and would let the owner of the vehicle know what amount of money he should use for fuelling his vehicles and would let him save money on fuel consumption by understanding the trends by looking at the data in the database.

NODE-MCU OVERVIEW

NodeMCU is an open-source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits.

Both the firmware and prototyping board designs are open source.

The firmware uses the Lua scripting language. The firmware is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

The commonly used transducers are contact transducers, angle beam transducers, delay line transducers, immersion transducers, and dual element transducers. Contact transducers are typically used for locating voids and cracks to the outside surface of a part as well as measuring thickness. Angle beam transducers use the principle of reflection and mode conversion to produce refracted shear or longitudinal waves in the test material.

Delay line transducers are single element longitudinal wave transducers used in conjunction with a replaceable delay line. One of the reasons for choosing a delay line transducer is that near-surface resolution can be improved. The delay allows the element to stop vibrating before a return signal from the reflector can be received.

The major advantages offered by immersion transducers over contact transducers are Uniform coupling reduces sensitivity variations, Reduction in scan time, and increases sensitivity to small reflectors.

ARDUINO IDE

The Arduino IDE is open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment.

The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuino and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ino.'

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

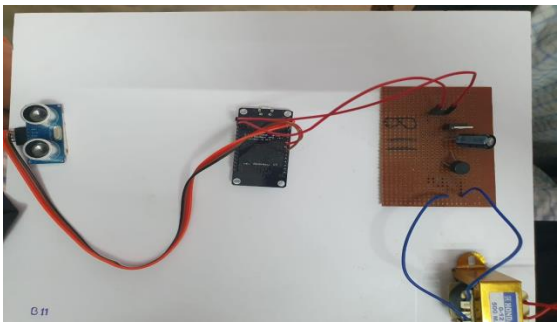
There are three major components in the platform:

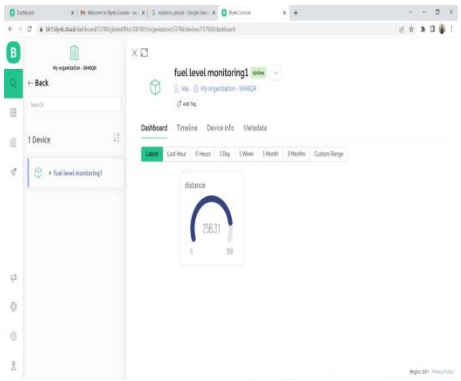
•Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

•Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

•Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

RESULT





ADVANTAGES

1. Get Alerts on Refuel and Drain

Nowadays drivers can easily manipulate the fuel bills. So, if you want to know what volume of fuel was refilled, at what time, where was it filled, then install our fuel level sensor it will reduce fuel wastage and abuse. You can get alerts through SMS or Email on refuel and drain.

Refuel & drain locations shown on the map.

Complete Reports on refuel and drain.

Alarms can be pre-set to alert you of high or low fuel levels.

2. Real-Time Fuel Level Monitoring

We provide a more accurate, reliable, and stable fuel level even under extreme conditions. It can be used to measure the real-time fuel level in the vehicle fuel tank and storage tanks.

3. Tracking Cost per Mile

A Fuel Monitoring System generates reports to calculate the miles traveled by the fleet and amount of fuel consumed by them, which in return empowers the user to simply figure out the Cost per Mile and achieve the mileage of the fleet and find out the performance levels

4. Track and stop Fuel Theft

The fuel monitoring reports support the management in finding out where and when a fuel theft has occurred. The management can also have fuel reconciliation reports at the click of a button to figure out the fuel losses and fuel short filled, which is rather impossible to do in a manual tracking environment.

5. Identify Inefficient Assets

With the help of various kinds of reports being generated by a Fuel Monitoring System, it's a boon for the decision-makers to actually identify which machine is not working properly/needs maintenance/or should be discarded/or declared scrap. The decision-makers can even schedule maintenance of the machines on the basis of run-hour reports.

6. Error-free Record Keeping

In this digital era where even heart-beats are being kept online, why should such important records be kept on registers manually? This is where a Fuel Monitoring System comes into the picture. The user can easily access, maintain records, keep data, and check reports on-the-go that too without errors on an online cloud platform.

CONCLUSION

The proposed system will provide an accurate and real-time fuel monitoring system. This is a suitable and practical solution for fuel monitoring.

Therefore, this system can be implemented in every vehicle to avoid facing fuel thefts and user also can predict the fuel levels whether the fuel is complete or not and necessary actions can take.

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