

# IOT Based Fuel Monitoring for Future Vehicles

Vaibhav Vidhate<sup>1</sup>, Sambhaji Ippar<sup>2</sup>, Shubham Patil<sup>3</sup>, Harshal Jagtap<sup>4</sup>, Prof. Puspendu Biswas<sup>5</sup>  
<sup>1,2,3,4,5</sup> Department of Computer Engineering Sanghavi College Of Engineering, Nashik, Savitribai Phule  
Pune University

**Abstract-** Nowadays, actual record of fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. To avoid this loss, monitoring and tracking system is implemented by an IOT based Fuel Monitoring in vehicle. The fuel monitoring system is built on ESP8266 Wi-Fi chip. This system uses Hall Effect Sensor to calculate the information about tank's current fuel level and also the ultrasonic sensor is used to calculate the amount of currently inserted fuel. It delivers data to the ESP8266 Wi-Fi chip. ESP8266 chip is a hardware which connect sensors and server, then server send that data on users android app. On the unavailability of device it stores data into memory. This system is based on IOT technology which provides security to user identity to authenticate access and identify impersonated devices or fake devices in the network. The purpose of the IOT is to make possible things to connect at any time, in any place, with anything and anyone ideally using Network and service.

**Index Terms-** IOT; ESP8266 Wi-Fi chip; Flow Sensor, Ultrasonic Sensor, cloud services.

## 1. INTRODUCTION

As fuel prices are rising, there are some issues people are facing about fuel theft at petrol pumps. To avoid this, we are implementing such system which monitors current Fuel Measuring by using Flow Sensor. Internet of Things (IOT) is a concept that considers pervasive presence in the environment of things and unique addressing scheme to interact with each other. Cloud computing is an emerging computing technology that uses the central remote server to maintain data and application. Internet Of Things (IOT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things to create new applications/services and reach common goal. A world where the real, digital and the virtual are converging to create smart environments

that make energy, transport, cities and many other areas more intelligent. The goal of the Internet of Things is to enable things to be connected anytime, anyplace, with anything and anyone ideally using any path/network and any service.

## 2. LITERATURE SURVEY

Use of IOT technology and Raspberry PI computer and sensors but it can't show how much fuel is currently deposited in vehicle. To get information about balanced fuel use of GSM/GPS for bus tracking .Some defects are came in scenario because use of GPS, Sometimes the GPS signals are not accurate due to some obstacles to the signals. GSM provides limited data rate capability. Technologies use telematics for wireless communication and informatics as well as fuel level sensor (ultrasonic sensor), Useful only for large fuel tanks not for vehicle fuel tanks. It provides solution not only for hybrid energy storage system (HESS) for electric vehicle but Smartphone app does not support also Hardware are more Costly. So here we find a solution as ESP8266 Wi-Fi chip and flow sensors which estimate currently fuel filled in the vehicle and this hardware are less expensive as compared to previously used Raspberry.

## 3. SYSTEM ARCHITECTURE

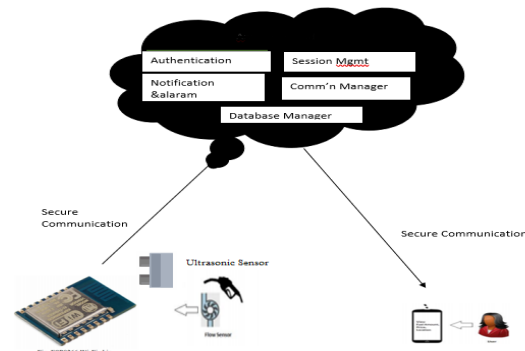


Fig -1: System Architecture

IOT based fuel monitoring and tracking system has implemented for overcome Fraud at petrol-pumps. At a instant, when agent start filling fuel in vehicle tank the flow sensor get activated and provide a series of pulses proportional to instantaneous flow rate. It converts pulses into liters and send it to the ESP8266. It works on Hall-Effect sensor model. ESP8266 is hardware which stores data send it to server throw Wi-Fi setup. It is cheaper than other hardware. The ESP8266 sends the data to the cloud server. The communication between ESP8266 and cloud servers occurs by HTTP protocol. Different algorithm is used in this communication to increase security like SHA (secure hashing algorithm) and AES (Advanced Encryption Standard). The cloud server stores data and further sends it to user application. Since, users get information about currently inserted fuel. User application is based on ECLIPSE, MYSQL and HIDE SQL. User application also locate the user throw GPS. Due to localization, there is advantage for reorganization of petrol prices.

1) ESP8266 is a Wi-Fi chip

ESP8266 is a Wi-Fi chip having complete TCP-IP stack and micro control unit. In this small system there are microcontrollers which can be connected to the Wi-Fi network and TCP-IP connection occur. This chip is very light and very cheap than external other component.



Fig. ESP8266 Wi-Fi chip

2) Flow Sensor (YFS201)

Flow sensor works on Hall Effect method. It acts like simple frequency counter. It produces a series of pulses which are proportional to instantaneous flow rate. The equation of flow rate of fuel can be shown as follows:  $Q = V \cdot A$  • Q is flow rate/total flow of fuel through the pipe. • V is average velocity of the flow. • A is the cross-sectional area of the pipe. 1) Pulse

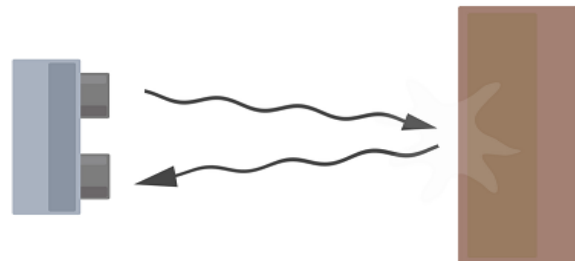
frequency (Hz) =  $7.5Q$ , Q is flow rate in Liters/minute. 2) Flow Rate (Liters/hour) = (Pulse frequency x 60 min)/7.5Q.



Fig. Flow Sensor

3) Ultrasonic Sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.



4) Cloud Service

Cloud Products & Services offers a broad set of global compute, storage, database, analytics, application, and deployment services that help organizations move faster, lower IT costs, and scale applications.



5. ADVANTAGES

There are a number of advantages like:

- [1] We can cross check how much fuel is deposited.
- [2] We can also check where we have deposited fuel.
- [3] Instant Notification.

6. ALGORITHM

k-NN is a type of instance-based learning, or lazy learning, where the function is only approximated locally and all computation is deferred until classification. The k-NN algorithm is among the simplest of all machine learning algorithms.

Both for classification and regression, a useful technique can be to assign weight to the contributions of the neighbors, so that the nearer neighbors contribute more to the average than the more distant ones. For example, a common weighting scheme consists in giving each neighbor a weight of  $1/d$ , where  $d$  is the distance to the neighbor.<sup>[2]</sup>

The neighbors are taken from a set of objects for which the class (for k-NN classification) or the object property value (for k-NN regression) is known. This can be thought of as the training set for the algorithm, though no explicit training step is required.

A peculiarity of the k-NN algorithm is that it is sensitive to the local structure of the data. The algorithm is not to be confused with k-means, another popular machine learning technique.

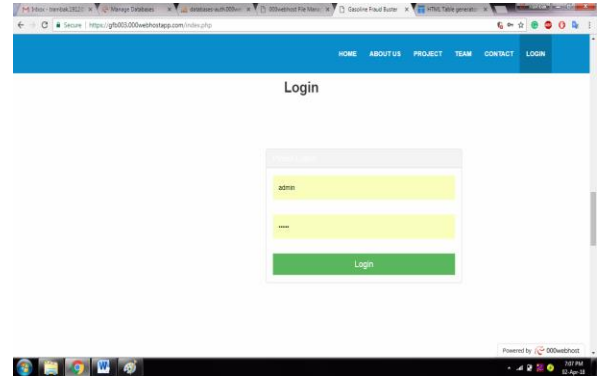
7. CONCLUSION

The study of this paper shows that it calculate the current fuel filled in vehicle tank. The application is based on the IOT technology, ultrasonic Sensor flow sensor and ESP8266. At that instant, the information of fuel transaction can be stored in the database of system. This system overcomes the disadvantage of existing system by calculating current filled fuel. The system application is developed on android smart phone; it can also give information of current location. As price of fuel vary at different location. In existing system there is use of ESP8266 NodeMCU which is more Costlier than ESP8266. There is also limitation in this system. Due to slow internet speed, there may be delay in information transformation and representation of web-application. In future further there will be enhancement of this application.

Enhancing the system security from unauthorized access is also open issue to develop.

8. RESULTS

Website Portal Design:-



Ultrasonic Sensor Values:-

Ultrasonic Sensor

ID	Petrol In Tank(in LTR)	Time
1394	1	2018-04-01 19:07:43.096827
1395	0	2018-04-01 19:07:46.964903
1396	0	2018-04-01 19:07:50.694600
1397	0	2018-04-01 19:07:59.713623
1398	0	2018-04-01 19:08:03.375826
1399	0	2018-04-01 19:08:12.278197
1400	0	2018-04-01 19:08:21.249199
1401	0	2018-04-01 19:08:30.325236
1402	0	2018-04-01 19:08:34.078069
1403	0	2018-04-01 19:08:42.896209
1404	0	2018-04-01 19:08:52.394035
1405	0	2018-04-01 19:08:55.727180
1406	0	2018-04-01 19:09:04.853766
1407	0	2018-04-01 19:09:08.616253
1408	0	2018-04-01 19:09:17.392911
1409	0	2018-04-01 19:09:26.517873
1410	0	2018-04-01 19:09:30.395935
1411	0	2018-04-01 19:09:34.088862
1412	0	2018-04-01 19:09:43.000250
1413	0	2018-04-01 19:09:59.164552
1414	0	2018-04-01 19:10:02.822911
1415	0	2018-04-01 19:10:11.781858
1416	1	2018-04-01 19:10:20.554687

Flow Sensor Values:-

Flow Sensor

ID	Petrol	Time
2156	0	2018-04-01 19:07:38.918914
2157	0	2018-04-01 19:07:47.881912
2158	0	2018-04-01 19:07:51.633382
2159	0	2018-04-01 19:08:00.392843
2160	16	2018-04-01 19:08:09.242081
2161	116	2018-04-01 19:08:17.912831
2162	116	2018-04-01 19:08:26.944949
2163	116	2018-04-01 19:08:30.451781
2164	116	2018-04-01 19:08:39.297935
2165	116	2018-04-01 19:08:47.989924
2166	116	2018-04-01 19:08:56.915531
2167	116	2018-04-01 19:09:00.629691
2168	116	2018-04-01 19:09:09.520052
2169	232	2018-04-01 19:09:13.353914
2170	332	2018-04-01 19:09:16.976615
2171	348	2018-04-01 19:09:25.907621
2172	348	2018-04-01 19:09:30.054846
2173	348	2018-04-01 19:09:33.346545

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