

Filling Fuel Quantity Measurement Systems Using Internet Of Things

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Abstract: *Internet of Things (IoT) is a network between things, objects and human. The applications of IoT extending like smart city to smart wearable and smart wearable to smart healthcare etc. IoT improves the life style quality of consumers. Industries are also started to use IoT applications to enhance the Quality of the product. Petrol bunk fraudulence like quantity cheating is increasing every day. Even though the petrol bunks are digitalized, there are some loopholes for cheating. The propose work gives a solution for petrol bunk fraudulence by an IoT application. This proposed IoT application measures quantity of the fuel while filling using a sensor and sends the quantity to the user mobile.*

Keywords: *IoT, IoT Applications, Flow sensor, Arduino.*

I. INTRODUCTION

The Internet of Things (IoT) refers to the use of intelligently connected devices and systems to leverage data gathered by embedded sensor devices and other physical objects [1]. The Internet of Things (IoT) applications span a wide range of domains including homes, cities, environment, energy systems, retail, logistics, industry, agriculture, education and health. Internet of Things has recently risen in prominence due to significant advances in enabling device technologies, such as Radio Frequency Identification (RFID) tags and Readers, Near Field Communication (NFC) devices, embedded sensor/actuator nodes [2].

Every day the people are facing lots of problem in real life, as well as cheated by others. Internet of Things not only connected with systems, devices, objects and it is also connected with people. Nowadays, the growing of vehicles is reaching the high level in cities, because it is essential for humanity. This paper has taken the problem of people who are cheated by the petrol pump employees [3] [4]. The user needs

to fill fuel from petrol bunk. He/she will go to petrol bunk and ask the petrol bunk employee to fill either for particular price like Rs 200/300 or particular quantity like 1L\2L. The petrol bunk employee need reset the previous reading and start from 000 but they try to cheat customer by starting from previous reading. Some of the cheating tricks of petrol bunk employees are explained below,

SCENARIO A [5]

- ✓ The customer ask for fuel worth Rs. 1000/-.
- ✓ Attendant fills till 300 and pulls out. Cashier tells him loudly Rs 1000.
- ✓ Attendant goes on to set the meter at 700 and smiles apologetically.
- ✓ Starts pumping petrol again BUT the meter isn't set to 0. It is still at 300.
- ✓ Pumping auto stops at 700.

SCENARIO B

- ✓ Customer arrives at an empty petrol pump. Attendant tells you to wait because there is no power and that they need to start the generator.
- ✓ Customer wants Rs. 1000 worth of fuel. Attendant yells for the cashier and says Rs. 1000 worth of fuel is required.
- ✓ At the 210 mark, the meter stops.
- ✓ Attendant tells Customer that the power is back on and that they are shifting from generator mode to normal power.
- ✓ Cashier in the meanwhile comes and asks Customer to pay Rs. 10 extra. You ask him why and he smiles at Customer warmly and says that they will fill the remaining 800 as round figure.
- ✓ While Customer is still talking to the cashier, the power is back on and the attendant resumes filling. The customer don't see him zero-ise the meter and he stops at 800.
- ✓ If Customer paid 1000 and left, well, Customer just got robbed off Rs. 210

The scenario explained above is faced by moreover everyone who are all filling fuel, not only this scenario. There are also some other related cheating exists[6][7][8]. How to detect this problem? This is the research question of this paper; with the help of IoT applications the proposed work gives a solution for this problem. The remaining paper is organized as follows; the section II explains few IoT applications. In Section III the working mechanism of the proposed work is explained. Section IV gives the details about sensing unit and Section V concludes this paper.

II. RELATED WORKS

IoT applications are applied to different fields, such as home automation, cities, environment, industry, education etc. IoT applications are connected with a number of devices like smart phones, laptops; PDA, computers etc. These devices are uniquely identified. This section describes the various related works on IoT applications.

Borgia [9] described the key features and the driver technologies of IoT. This paper also identifies the application scenarios and the correspondent potential applications, focused on research challenges and open issues to be faced for the IoT realization in the real world.

Matharu et al. [10] described the general layered architecture of IoT along with its constituent elements. Further, this paper provided for a secure construction of the IoT architecture. This paper concluded by mentioning the potential applications of the IoT technologies in fields ranging from intelligent transportation to smart home to e-health care and green agriculture.

Xiaohui et al. [11] addressed the security issues and key technologies in IoT. It elaborated the basic concepts and the principle of the IoT and combined the relevant characteristics of the IoT.

Atzoriet al. [12] addressed the Internet of Things technologies, issues and challenges. This survey defined

different visions of Internet of Things paradigm are reported and enabling technologies are reviewed.

III. PROPOSED WORK

IoT applications of IoT extending from smart city to smart wearable to smart healthcare etc. The IoT makes things, objects as smart by providing interconnection between them. The proposed work is to avoid the quantity fraudulence while fuel filling. The flow measurement sensor is used to measure the quantity. The measured data of fuel is sent to the customer smart phone, which is already paired with the sensing unit. The total cost need to be paid is calculated using the data received and getting the current fuel price from the internet.

STEP 1: The fuel sensing unit measures quantity of fuel filled.

STEP 2: The measured data is sent to the user mobile.

STEP 3: The user mobile gets the current fuel price from the internet.

STEP 4: the user mobile calculates the price that need to pay.

IV. WORKING OF SENSING UNIT

The sensing unit consists of Arduino kit and flow sensor. Arduino kit is a combination of open source software and hardware used to interact with the sensors and actuators. The flow sensor works in the principle flow rate by change in velocity of fuel. Velocity depends on the pressure of incoming fuel from fuel filling pump. The Liquid Flow (LF) rate is calculated as $LF = VF * A$ where VF is the velocity of the fuel flow and A is the cross sectional area of the fuel incoming pipe. The flow sensor consist of three wires, namely power supply (+ve, -ve) and data. These wires are connected with Arduino as shown in figure 1.

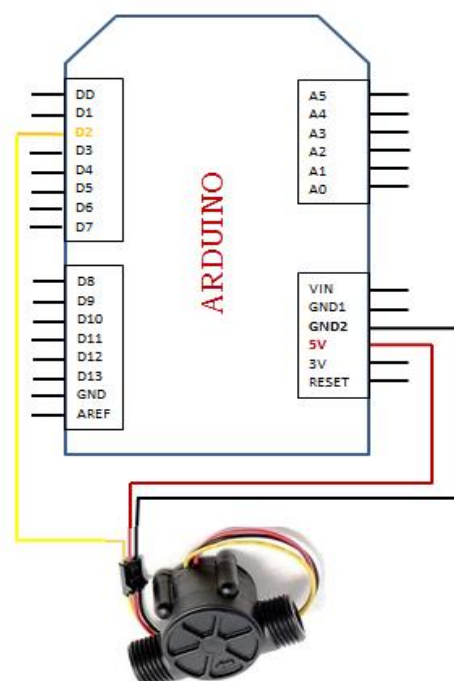


Figure 1: Sensing unit

```

Arduino programming
volatile int flow_frequency;
unsigned int l_hour;
unsigned char flowsensor = 2;
unsigned long currentTime;
unsigned long loopTime;
void flow ()
{
    flow_frequency++;
}
void setup()
{
    pinMode(flowsensor, INPUT);
    Serial.begin(9600);
    attachInterrupt(0, flow, RISING);
}

```

The flow is converted into liters and sent to user mobile, the user mobile request current fuel price from the internet as shown in figure 2. For example the flow sensor returns the value as 4.86l, the user mobile gets the current fuel price as 61.64Rs and returns the result as “Rs 300 you need to pay”. The user can verify these details before paying.

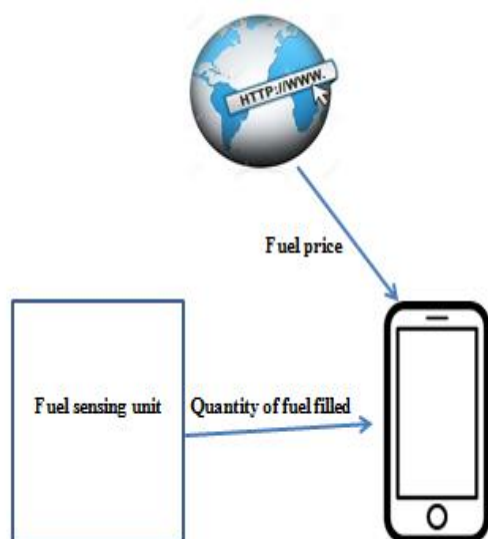


Figure 2: Filling Fuel Quantity Measurement System

V. CONCLUSION

The things connected with internet to send and receive data forms an IoT application. The IoT applications change the life style of human. The proposed IoT application “Filling Fuel Quantity Measurement Systems” avoids the petrol bunk cheating. In future this application need to be enhance in way to communicate with the fuel filling pump too, so the petrol bunk fraudulence can be controlled more efficient.

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