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IOT BASED FUEL STATION MONITORING

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Abstract:* We deal with the implementation of new technologies we can atomized the fuel stations with efficient working devices and also monitoring. In this new era everyday life is filled with technology from the start up till to bed. In today's life most probably utmost 50% of products all came with automation and making the consumers/users to access those products from anywhere by using their mobile or gadgets. In this paper, it deals with automation of fuel station retail outlet; this system will give the sales and stock report to the owner for every hour. The main problem is customer complaints about less quantity of fuel is issued or filled for money and proper time tank refilling and given and customers get diverted theirs attention by operators and refill the fuel without they resetting the nozzle. Nowadays to overcome these problems they replaced some electronic and computerized fuel dispensers but there is no way to identify inside the rotary valve adjustments by fitter.

***Keywords:* Cloud Computing, Global Positioning System (GPS), General Packet Ratio Services (GPRS), Global System for Mobile Communications (GSM), Internet of Things (IOT), Open-Source Hardware (OSH)**

I.INTRODUCTION

The underlying principleofInternet-of-Thingsistomake real-timetransferandsynchronizationofdatapossibleamong many dissimilar types of devices. For example, rooms equipped with IOT sensors can automatically report back to central systems if they are occupied or if there has been any change in temperature at any point of time. IOT makes it possible for inter-communication between any equipment or vehicle embedded with controllers and sensors inreal-timeandoveranynetworkpathordigitalservices[1,2].Cognizant of rising costs per liter of fuel and combined with thirst for fuel across cities and semi-urban landscapes, fuel-filling station owners are keenly aware that theft of fuel can Be lucrative for many who are out to make quick ille-galprafits.todaymany fuel filling stations are equipped with sensors that communicate with controllersthathavemicro-proc to process sreal-timedataonfuelenteringorexitingfueltanks at any given point of time.

While IOT has made the idea of electronics-enabled devices and equipment to communicate with eachotherandtocentral controllers possible, evolution in Cloud Computing technology has taken it further to a point where real-time information streamed back from IOT-enabled devices are stored in servers that may be hundreds or even thousands of miles away. Information processed by those remote servers can either be downloaded or consumed for taking decisions either immediately or strategically or transmitted to the same or different IOT-enabled devices to respond to changing stimuli or under dynamic environmental conditions [3. 4]. Fromthepointofviewofconstructionfirms,thereisnosingle system that can help monitor and report fuel consumption, distancetravelled,andactualenginerunninghoursofatransit mixer,andviewalltheseinformationatacentrallocationina proper format [5]. Our research has revealed that there is a need for a system that can not only report a close approximationonfuelconsumptionofatransitmixer–either inoperation,atstandby/idlingmode,orinparkedcondition, but also keep a daily track of all the metrics involved related to engine operational hours, distance travelled, fuel consumed,etc.Ourresearchobjectivehas,therefore,focused ontheneedtodevelopanIOT-basedreal-timefuelmonitoring solution for constructioncompanies.

II.ARCHITECTUREOFINTERNETOFTHINGS

The architecture of IOT is a composite of various technologies layered in a manner such that each are able to communicate with one another. Thus, IOT-based systems can adapt to changing scenarios involving modularity, scalability and configuration [6]. The image shown below depicts functionality of each layer in an IOT-based system:

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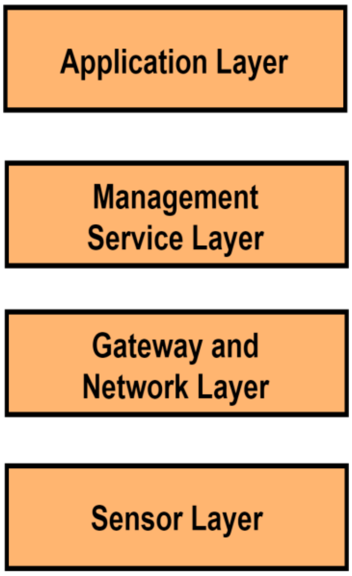


A. Sensor Layer

The fundamental unit of an IoT-based system is thesensor layer. At this layer, capacitive sensors are embedded in equipment to stream back data. In the case of transit mixer – which is a heavy construction vehicle that requires large amounts of diesel fuel to stay in operations, sensor devices collect and stream back information either statically or dynamically across theInternet.

B. Gateway and NetworkLayer

Positioned on top of sensor layer is the Gateway and Network Layer. This is required to handle huge volumes of unstructured data that would pour in from sensors. Networks with robust protocols are deployed at this layer to aid in seamless machine-to-machine (M2M) network communication [7].

C. Management Service Layer

The purpose of this layer is to place security and access controls to data generated by the sensors. Iti salsoatthislayer that process modeling, and management of devices takes place. An importantfeatureofthislayerisalsoestablishment ofbusinessandprocessruleengines.Withthislayerinplace, information and analytical insights on data generated and stored can be viewed, aggregated and monitored[8].

D. Application Layer

The application layer is positioned at the very top for facilitating in delivery of associated software applications to users requiring access to data streamed from IOT-enabled equipment and vehicles. Using IP basednetworkstoprovidea stable communication interface and robust end-users Services, this layer accords process-to-process communications [9].

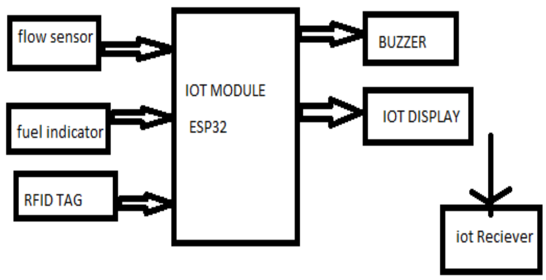
III.EXISTING SYSTEMS

- Handy control for fuel dispense
- Manual monitoring using digital displays
- Manual billing and accounting
- Regular checkup for tank refilling

IV.PROPOSED SYSTEM

- to measure the flow of the fuel using fuel flow sensor
- To measure the fuel availability fuel indication sensor
- To have the billing data at server for further analytics

V.BLOCK DIAGRAM



The digital sensor units are interconnected it IOT module..The fuel flow sensor detects the liquid flow and check the constant value of flow if any deviation occurs it will alert user with buzzer sound..The fuel indicator sensor senses the fuel level in tank and it alerts the user for refilling at the prompt time..An alert message is sent to the user via IOT module and refilling can be done without fail .The RFID tag is used to show purchase details The total sale in the station can be monitored easily as soon as the billing is done the value is added to the server and the total value is stored in cloud We can use inverter power supply available at station WIFI module available for security systems

VI.COMPONENTS ANDTECHNOLOGIES

Fuel flow sensor

•A flow meter (or flow sensor) is an instrument used to measure linear, nonlinear, mass or volumetric flow **rate** of a liquid or a gas1/2 inch Water Flow Sensor - YF-S201**Flow sensors** are able to detect leaks, blockages, pipe bursts, and changes in liquid concentration due to contamination or pollution

Fuel indication sensor

These **sensors** are mechanically connected to a float which moves up or down depending on the **fuel level.** As the float moves, the resistance of the **sensor** changes.This **sensor** is part of a current balance circuit of the **fuel gauge** display circuit which typically consists of coils for actuation of the display needle.

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Fuel level sensors, also known as **fuel** gauges, allow drivers to monitor **fuel** consumption and help them to determine when to refill the tank.They consist of two main components: the sensing system itself (also known as the sender) The indicator and we are going to indicate it in an IOT page.

RFID TAG

RFID tags are a type of tracking system that uses smart barcodes in order to identify items. **RFID** is short for "radio frequency identification," and as such, **RFID tags** utilize radio frequency technology An **RFID tag** may also be called an **RFID chip**

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC).**RFID tags** contain an integrated circuit and an antenna, which are used to transmit data to the **RFID** reader (also called an interrogator).The reader then converts the radio waves to a more usable form of data

BUZZER

A **buzzer** or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of **buzzers** and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

IOT

The Internet of things describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet. They are able to collect and exchange data in real time using embedded sensors. Thermostats, cars, lights, refrigerators, and more appliances can all be connected to the **IoT**.

1) Resolution of 1 mm enables sensor to obtain accurate readings.
2) Enabling data from three memory registers simultaneously allows it for fast sensor reading.
3) Algorithms ensure that even in conditions of changing temperatures and resultant volumetric changes, the sensor is able to compensate and obtain readings accurately.
4) On-board temperature compensation mechanismenables sensor to counter temperature-related drifts in circuit of the sensor.
5) Since, transit mixers or any vehicle as such may halt in any incline, the sensor is equipped with circuits and hardware to accommodate gravitational angles and still provide accurate readings.
6) The sensor does not require strap chart for calibration .A fuel tank can have any shape or even uneven surfaces, and yet the sensor can be calibrated by markinghigh-and low-level of fuel inside the tank.
7) Thesensorisequippedwith42registerstostorereadings such as diameter of the tank, height of tank, high- and low-level calibration marks,etc.
8) Since, many vehicles may sharefueltankdimensionsthat are the same, a common profile can be saved in central software application. This profile can bere-usedtospeed up process of calibration to save time and maintain consistently accurate readings.

VII.GPS-GPRSFUELMONITORINGCONTROLLER

1) The controller has been built to withstand sudden electrical changes from equipmentbatteries,ignitionsystems, etc. It has twin level of protection circuits at the supply end making it c apable tofunctionevenincaseoffrequentvoltage fluctuations.

2) It also has a device hardening feature such as a signature-based circuit. This enables seamless recovery even in case of device becomingnon-responsive.

3) The controller is equipped with an external serial flash device capable of storing 8 MB of data. Considering that GPRSnetworksareintermittentorevennon-existentinmany regionsinIndia,thedeviceisabletostoresensordataoffline.

4) It is then able to transmit data to Cloud as soon as a stable Internet connection is detected making it suitable for operationalconditionsinthecountrysideandthemostremote surroundings.

5) On-board sensors and electronics such as accelerometer enable detection of linear motion. It also provides inputs for gatheringaccurategeo-positionalcoordinatesalongwithdateandtime,tosupportcalculationsinvolving speed anddistance covered.

6) Firmware and configuration upgrades can be sent over-the-air. Algorithms built-in ensure that in case transmissions are lost while in the process of bulk data firmware upgrades, data integrity checks are conducted so as to ensure that only remaining portion of upgrades need only be transmitted either offline or over-the-air. This is a significant factor as it can help lower network connection costs and increase operationalefficiency.

7) Since, the controller supports cellular, Bluetooth and Wi-Fi networks, it is possible to collect data from the controller using a Smartphone even in areas where vehicle may be out of mobile network coverageareas.

8) The controller uploads and downloads data to the Cloud. Algorithms used in the controller ensure that data is compressed and secured in small data packets. This feature enables speeding in data transfer. In regions where mobile networkispoor,thiscanbeaninvaluablefacettotransmitas much data aspossible.

9) Toimprovesignalreception,a3-meterexternalantenna is coupled to the controller.

VIII.CONCLUSION

Our proposed IOT based design for a real-time fuel monitoring system involving transit mixer trucks in operational use at construction projects and at remote sites can be of significant use for construction companies in India. Our primary goal was to extend a solution that would allow managers and supervisors to monitor any number of transit mixer vehicles in operation, from a central location using a Cloud computing infrastructure. Through our research, we have been able to show average running hours, fuel consumed, fuel removed and other related parameters. However, the crucial factor of removal of fuel (whether authorized or unauthorized) is of significant concern for most construction companies as it is one of those parameters that have direct financial consequences. The benefits of our research can be extended to similar other industries where fuel monitoring is of critical concern. Through use of our novel IOT-based fuel monitoring system, we have demonstrated that it is possible to have a detailed operational view of vehicles and engines requiring fuel to operate, across cloud computing systems using cheap yet reliable capacitive sensors.

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