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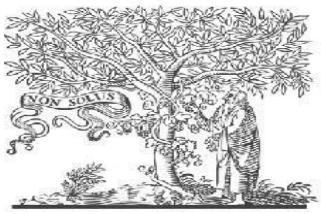

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VEHICLE FUEL LEVEL MONITOR AND LOCATE THE NEAREST PETROL PUMPS USING IoT

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Abstract – IoT is extensively used in everyday object and its popularity is increasing day by day. In this project it includes the design and development of an IoT and mobile-based vehicle fuel activities such as real time fuel monitoring and GPS tracking system. The proposed IoT device measures the amount of fuel by using ultrasonic fuel sensor. When the vehicle tank of fuel reaches a certain level, driver gets notification through mobile application and also searches the nearest pump location for reloading fuel. The proposed system used GPS tracking for showing current location of vehicle and finding nearest pump location. Unlike an existing system for the fuel level monitoring. It differs by monitoring the fuel level and provide the access to monitor the vehicle in any place with the use of (IoT). Automatically updates the information of fuel entering inside the tank. Main Purpose Of this device is to prevent fuel theft identification and track the petrol pumps near by our location.

Index Terms - IoT, Accelerometer Sensor, Ultrasonic Sensor.

1. INTRODUCTION

The phrase Internet of Things (IoT) refers to connecting various physical devices and objects throughout the world via internet. The internet of things or IoT, is a system which connects computing devices, machines etc. that are provided with unique identifiers (UIDs) and IoT provide ability to transfer data over a network without requiring any interaction. IoT is basically expansion of services provided by Internet [1]. The Internet of Things (IoT) is the network of physical objects like devices, vehicles, instruments and other items embedded with electronics, circuits, software, sensors and network connectivity that enables these objects to collect and exchange data over a network without requiring human-to-human or human-to-computer interaction [2]. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, also creating opportunities for more direct integration of the physical world intocomputer-based systems and resulting in improved efficiency and accuracy [4]. The evolution of the IoT we can classify it into five eras:

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- The Internet of Documents: e-libraries, etc.

- The Internet of Commerce: e-commerce, etc.
- The Internet of Applications: Web 2.0
- The Internet of People: Social networks.
- The Internet of Things : connected devices.

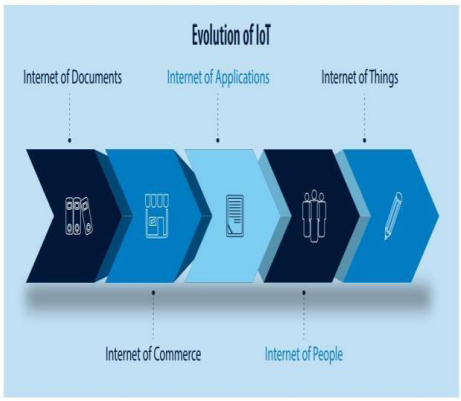

Fig : Introduction to IoT

IoT is able to interact without human intervention. Some primary IoT applications have been already developed in different fields. IoT technologies are at their infant stages; however, many new developments have occurred in the integration of objects with sensors in the Internet [5].

One of those IoT systems is smart parking. It is to know the condition of parking slot via internet. This is related to parking problems which one of them is the difficulty of knowing the condition of vacant space in the parking area. Due to this problem, the driver spends his time in finding a parking place. Problems related to parking can be solved if driver can be able to know the availability of parking space before reaching the destination.

Various approaches and research have beendone to overcome parking problems. Since the early 1970s, smart parking has been implemented throughout various countries. The initial system will be displaying parking information such as availability status and/or the amount of space available. More complex smart parking incorporates more advanced technology to serve customers with advanced information like slot status, slot number which is empty. And also providing an efficient feature of slot booking. Currently, there are certain parking systems that are able to provide real-time information about available parking spaces [6-11]. Such systems require efficient sensors to be placed in parking lots to monitor parking spaces and rapid data processing units to collect the data from different sources.

Hence, the IoT has been the trend of the next Internet. Every available thing is getting smart.There is a wide scope for research in IoT. The future of IoT is very bright. From our bills to vehicles everything would be connected providing a better lifestyle.

2.LITERATURE SURVEY

Earlier there are various methods to monitor the quantity of fuel namely, level sensors, float switch, load Cell analog, and digital meters.

To overcome this issue, this system is proposed to know the number of liters present inside the tank with the help of the Ultrasonic sensor and GSM to indicate the level in case of full/empty and theft. The disadvantages observed here are it requires continuous electric energy for the production and display of signal. It also requires an amplification circuit for the generation of display because the signals produced by the gauge itself are of very much

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low voltage almost in millivolts. It cannot be used highly reactive or corrosive materials because they can damage the gauge. It cannot be used for the measurement of very high pressure if the diaphragm use is made of plastic.

3.PROPOSED SYSTEM

We use Node MCU for processing all user commands. Node MCU is used since it has inbuilt WIFI module which is used to connect to the internet and receive user commands. Device will monitor with the help of internet, information is send to the server using Wifi- Our system is cost-effective and easy to deploy.

A fuel level sensor in the petrol tank to sense the level of petrol and it is connected to the microcontroller. When the petrol tank is full the floating level sensor will reach the top edge which is used to indicate that the petrol is full. In the similar manner, when petrol is low in the tank it reaches the bottom indicating the microcontroller that petrol is low. All the data will be sent to the particular person through IOT which is programmed in our microcontroller. This is suitable and practical solution. It is to implement in every vehicle to avoid facing fuel theft, indicating the nearest petrol pumps when fuel in our vehicle reaches a certain level, accident identification and alerting before it leads to major damage, so these are the objectives of our project.

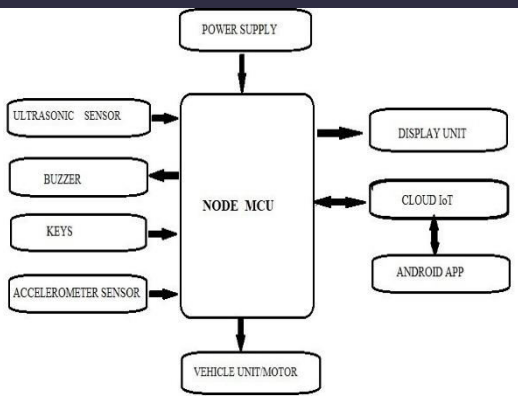

Fig: Block diagram

4. Hardware Requirements

4.1.1.NodeMCU:

NodeMCU is an open-source software & hardware development environment that is built around a very inexpensive System-on-a Chip (SoC) called the ESP8266. NodeMCU development board comes with the ESP8266 module chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency.

NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. NodeMCU have 11 digital I/O pins, 1 analogy pin and supports SPI, UART and I2C. The operating voltage of ESP8266 is 3 to 3.3v. Its high processingpower with in-built.

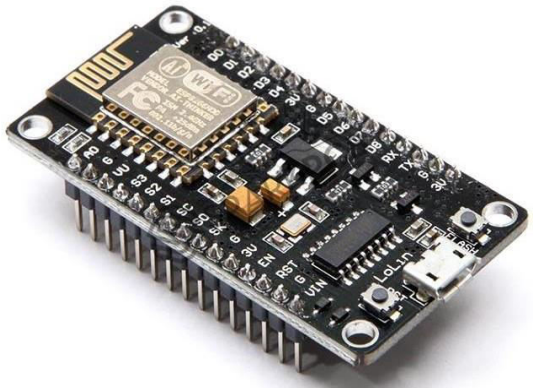

Fig: NODEMCU

4.1.2.Ultrasonic Sensor:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns. Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo.

The working principle of this module is simple. It sends an ultrasonic pulse out at 40kHz which travels through the air and if there is an Wi-Fi and Deep Sleep Operating features make it ideal for IoT project. In this prototype we used NodeMCU module which was programmed using Arduino IDE. obstacle or object, it will bounce back to the sensor. By calculating the travel time and the speed of sound, the distance can be calculated.

Fig : Ultrasonic Sensor

4.1.3 Accelerometer Sensor:

An accelerometer sensor is a tool that measures the acceleration of any body or object in its instantaneous rest frame. It is not a coordinate acceleration. Accelerometer sensors are used in many ways, such as in many electronic devices, smartphones, and wearable devices and also can be used to measure vibration on cars, machines, buildings, process control systems and safety installations. They can also be used to measure seismic activity, inclination, machine vibration, dynamic distance and speed with or without the influence of gravity.

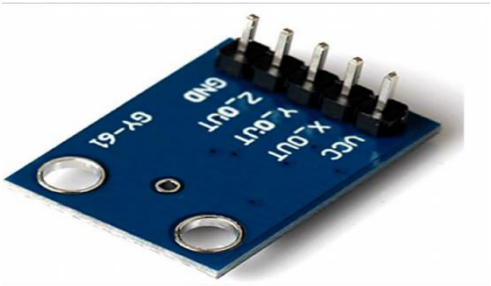

Fig : Accelerometer Sensor

4.1.4.Buzzer:

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong . Often these units were anchored to a

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wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high- pitched tone.

Fig : Buzzer

4.1.5 16*2 LCD Display:

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc. It includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) intotal & every character will be made with 5×8 (40) Pixel Dots. So, the total pixels within this LCD can be calculated as 32 x 40 otherwise 1280 pixels.

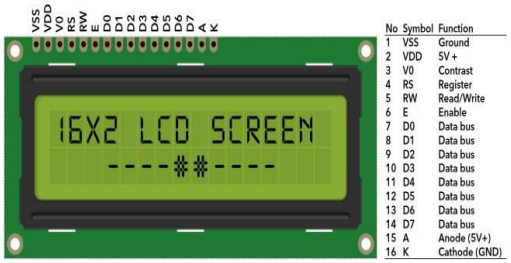

Fig : 16*2 LCD

4.1.6. DC Motor Fan:

Fig : DC motor Fan

This DC 12V Mini Submersible Noiseless Water Pump is a low cost, small size Submersible Pump Motor which can be operated from a 12V power supply. It can take up to 120 liters per hour with a very low current consumption of 220mA. Just connect the tube pipe to the motor outlet, submerge it in water, and power it. Make sure that the water level is always higher than the motor. Flow Rate : 80~ 120 L/H .Maximum Lift : 40 ~ 110 mm.

4.2 Software Requirements

4.2.1.Arduino IDE:

The Arduino Integrated Development Environment contains a text editor for writing code, a message area, a text console, a toolbar

with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor. It supports C/C++ language. Programming can be done for different boards usingArduino IDE.

4.2.2.Firebase

Firebase is a platform developed by Google for creating mobile_and web applications. It was originally an independent company founded in 2011. In 2014, Google acquired the platform and it is now their flagship offering for app development. Firebase first product was the Firebase Realtime Database, an API that synchronizes application data across iOS, Android, and Web devices, and stores it on Firebase's cloud. The product assists software developers in building real-time, collaborative applications.

4.2.3 .MIT App Inventor:

MIT App Inventor is a web application integrated development environment which is originally provided by Google, and now maintained by the Massachusetts Institute of Technology. MIT allows to create software application (apps) for operating systems (OS): Android, and iOS. It is free and open-source software. It uses a graphical user interface (GUI) very similar to the programming languages which allows users to drag and drop visual objects to create an application that can run on Android devices, while a App-Inventor Companion(The program that allows the app to run and debug on) that works on iOS running devices are still under development. MIT App Inventor is an intuitive, visual programming environment that allows everyone even children to build fully functional apps for smartphones and tablets.

5. IMPLEMENTATION & WORKING

Fuel management system designed to effectively measure and management the uses of fuel within the transportation. This information can be stored in the computerized systems and reports generated with data to inform management. This enable consumption control, cost analysis and tax accounting for fuel purchases. Modern vehicle tracking system commonly used GPS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. As fuel cost is raising constantly, people are facing fuel theft at petrol pumps. In that, vehicle owner don't calculate how much quantity of fuel needs in a day or in a week. Time is important for efficient goods transportation system such as a real time tracking and reducing financial fuel loss of vehicle is rapidly increased. This can be overcome by using real time fuel via mobile application. This android application helps to find nearest fuel pumps. A driver can easily target the nearby pump fuel and reach there within a few times. Using this approach, a vehicle owner will monitor and control the vehicle from via mobile application. In the present situation project plays a vital role in vehicle activities. The vehicle activities monitoring system is reliable, easy to implement and user friendly, which keeps

monitoring through the mobile application.

6.RESULTS & DISCUSSIONS

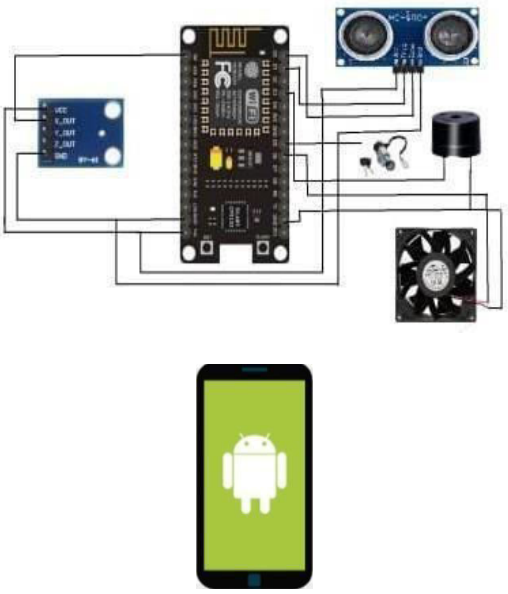

Fig: Schematic Diagram

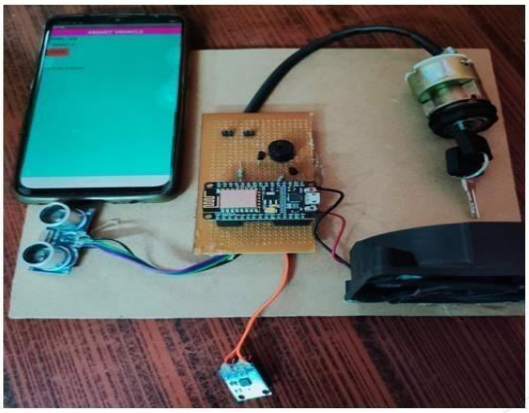

Fig : KIT

7.CONCLUSION AND FUTUTRE SCOPE

The proposed system will provide an accurate and real-time fuel monitoring system. This is suitable and practical solution for fuel monitoring and location tracking. People can't tolerate in one situation when they stuck up in the middle of the road due to lack of fuel, unawareness, some leakage and fuel theft. By helping or guiding them with a correct solution. Therefore this system can be implemented in every vehicle to avoid fuel theft, finding nearest fuel pump. we used a central monitoring system to control vehicle by using the mobile application, if fuel level drops at particular level, we designed an application to fuel the vehicle by sending a message to the users mobile. we also included applications like accident identification, so that people who uses this applications can reach their destination in a safe and secured.

We can use our kit to assist the traffic. By keeping the kits in the entire vehicles and by knowing the location of all vehicles.

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