

DESIGN OF BUS TRACKING AND FUEL MONITORIZATION

Submitted in partial fulfilment of the requirements for the award of
Bachelor of Technology degree in Information Technology
by

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DEPARTMENT OF INFORMATION TECHNOLOGY
SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

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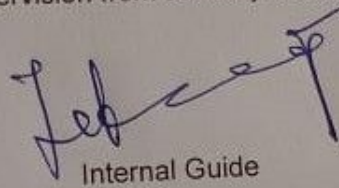
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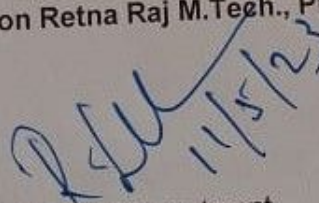
BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of L.SUSHANT KUMAR(Reg. No: 39120125) and B.MADAN MOHAN REDDY(Reg. No: 39120063) who underwent the professional training in "DESIGN OF BUS TRACKING AND FUEL MONITORIZATION" under my supervision from January 2023 to May 2023.



Internal Guide

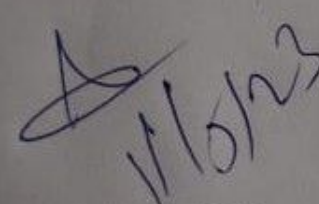
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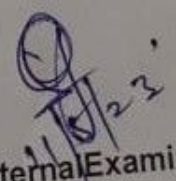
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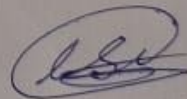
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DECLARATION

I, L Sushant Kumar (Reg No:39120125) declare that the project Phase-2 Report entitled "DESIGN OF BUS TRACKING AND FUEL MONITORIZATION" done by me under the guidance of Dr.R.Jeberson Retna Raj M.Tech., Ph.D is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in INFORMATION TECHNOLOGY.

DATE: 11/05/23

PLACE: CHENNAI



SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** for their kind Encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E.,Ph.D,Dean**, School of Computing,**Dr. R.Subhasini M.E.,Ph.D.**,Head of the Department of Computer Science and Engineering for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. R.Jeberson Retna Raj M.Tech.,Ph.D.**, for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my phase-2 project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Information Technology** who were helpful in many ways for the completion of the project.

ABSTRACT

The need to implement this public transportation system as buses are rapidly increased due to the increase in population, The passengers need to know the accurate arrival time of the particular bus to particular station and then plan their journey from their home Fuel monitoring have been the major problem that most of bus companies looking to solve. This project developed a bus tracking and monitoring the fuel and speed system to provide a facility for the management requirements by the administrator. The proposed system based on NODEMCU over Wi-Fi through an Arduino Uno. The design also enables the owner of the buses to monitor the bus instantaneously because the system administrator can easily maintain data.

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CHAPTER 1

INTRODUCTION

When it comes to public transportation, time and patience are essential. In other words, many people using public transport buses have experienced time loss because of waiting at the bus stops. Millions of Students need to travel from home to college and vice versa every day. For parents, obtaining a safe transport for their Student is a critical issue. Crime against Student is increasing and every parent is requesting the respective college for the security of their Student while traveling from college to home and vice versa in college bus. The system will notify parents by SMS whenever Student enters or leaves college bus, this will assure parents that Student are safely reached to destination. Count through IR sensor will ensure that college bus is vacant or still any Student are inside the college bus.

This system will issue the messages to parents to convey them that their Student are reached to college safely, and they are in the college and also give an alert message if any fire accident occurs. LCD displays the message about the speed of the college bus. The tracking system includes the location and speed of the vehicle in current movement, speed of the vehicle .

1.1 AIM OF THE PROJECT

The proposed system's aim is to measure the fuel in the vehicle tank using a fuel level sensor. The ultrasonic sensor and IR sensor has better accuracy, and it is easy to calibrate and interface it with the Arduino controller, which is used. In this way, we can find the level of fuel in the tank. The system also uses GPS for tracking the location of vehicle; initially, information about vehicles' locations acquired from the GPS module should undergo a transformation into a form that will make it adequate for further usage in the system for analysis and prediction. The device is designed to decrease the fuel usage and efficient utilization of fuel consumption by enabling fleet operators. When the system is mounted to the fuel tank, the amount of fuel level consumption is monitored by the

sensor in the device which allows you to get consumption data any time with accuracy. The proposed machine makes use of generation that integrates a cellphone application with a microcontroller.

1.2 OBJECTIVE

- To discover the location of a vehicle, or an asset with the help of Global Positioning System and other navigation systems operating by satellite .
- To identify the existence of alcohol in the breath. And prevent from accidents while drowsy state.
- To measure the heat of an object as well as detecting the motion.
- To measure fluctuating accelerations or speeds or for normal vibration measurement .
- To measure the stable and reliability with high precision, the viscosity and density of the fuel

CHAPTER 2

LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system.

In [1], the author stated that the vehicle performance has been continuously improved and the study results relating to the safety of car driving have also been continuously reported and demonstrated, it is trying to find a balance point between the development of vehicle speed limit and the protection of driver's safety.

J. Deshpande et al. stated that the Fatal Road accidents can be easily avoided by understanding the psychological state of drivers. Majority of road accidents occur during night driving due to drowsiness state of vehicle drivers[2].

In [3], it is stated that the actual record of fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. To avoid this we are implementing a microcontroller based fuel monitoring and vehicle tracking system.

F. D. Franzis et al. stated that the almost of the public having an own vehicle, theft is happening on parking and sometimes driving insecurity places. The safe of vehicles is extremely essential for public vehicles. An authorized man or woman must ship the ticket to the controller to reset the auto and open the door. It is safer, more dependable and much less expensive[4].

In [5], the proposed device is based totally on Arduino, GSM/GPS and a board suitable for ASP.MVC that works with arrival time further to graphically

displaying the bus place on Google map. The layout additionally permits the owner of the bus to control the bus right now, due to the fact the system administrator can effortlessly keep statistics approximately the objects and gadgets of the database in the cloth database at any time.

In [6], it is stated that the implementation of a microcontrollers for sensing and controlling the liquid fuel level. The work is to automate the process of fuel pumping in a tank storage system and has the ability to detect the level of fuel in a tank, and accordingly display the status on the LCD screen digitally and raises an alarm.

Pengfei Zhou et al. recorded that the bus arrival time is primary information to most city transport travelers. Excessively long waiting time at bus stops often discourages the travelers and makes them reluctant to take buses so it can be easily [7].

In [8], the Waiting time of remote users for bus. A system is used to track the bus at any location at any time. All the current information is stored to the server and it is retrieved to remote users via web. Arduino is shown on based application. This System is a web based system but nowadays people mostly tends to use Android app.

M. A. Hannan et al. proposed an system that uses Artificial intelligence with the help of RFID module which is used in-order to reduce the manual work carried out in the Bus-Management & Monitoring System. In this a RFID is used to track a bus when it crosses the bus stop. Hence the exact location of the bus is not shown, only an approximate location is shown based on the bus stops [9].

In [10], The author derived an Bus tracking system, that any passenger with Smartphone can scan QR code placed at bus stop to view estimated bus arrival times, current location of the bus. The drawback in this project was that the user had to be physically present at the bus stop to scan the QR code.

C. Jayakumari et al. proposed an bus tracker application to track a bus using GPS transceiver has been proposed in this paper. The objective of this

work is to develop a system that manages and controls the transport using a tracking device to know the scheduled vehicle and the current location of the vehicle via SMS using a GPS tracking device.[11]

In[12],The system contains single android mobile that is equipped with GPS and GSM modems along with processor that is installed in vehicle. During vehicle motion its location update can be continuously reported to a server using GPRS service. This location information will be plotted using Google maps on monitoring device .

In [13], The manufacturers of vehicles have been trying to implement different methods in order to provide better security systems. Security for the vehicle can be provided by the use of GPS and GSM technologies. GPS stands for the Global Positioning System, which is a satellite based communication system and provides the details of particular location. GSM, the Global System for Mobile Communication is used for communication between different GSM devices. Vehicle monitoring is also done by the monitoring of different parameters like temperature.

In [14] it is stated that the present age requires the data time to time. The utilization of innovation have been expanding step by step. So we are making arrangements for the mix of present innovation with the prerequisite of data transmission, we got ready for the imaginative methodology of “Plan of Bus Tracking and Fuel Monitoring System”. To beat the disadvantages of the past techniques for paper based and we acquaint a task with track a vehicle utilizing GPS and GSM. This Vehicle Tracking System can likewise be utilized for Accident Detection Alert System, Soldier Tracking System and some more, by simply rolling out not many improvements in equipment and programming and broadly in following Cabs/Taxis, taken vehicles, school/universities transports and so on. The transport following framework is a practical and productive framework.

P.Siva Nagendra Reddy et al .proposed that the main aim of this paper is monitor fuel in vehicles and provides security to the vehicles. Vehicle tracking and

accident alert system also implemented in this design. This system contains GSM module, GPS, IR sensor, Ultra Sonic sensor, Vibrate sensor, Fuel flow sensor, Arduino Mega, Motor and keypad. Fuel flow sensor is used to detect the amount fuel filling at petrol bunk and it will display filled amount of fuel on LCD. Ultrasonic sensor is used to measure fuel level in vehicle. GSM is used to send messages about fuel levels, vehicle location, security password and accident alerts. Whenever ignition will be ON, one time password (OTP) will be send to registered mobile number. After entered correct OTP using keypad, then only vehicle will starts. If anyone entered wrong password it will give an alarm. Vibration sensor is used to detect accidents to the particular vehicle. Whenever accident happens to particular vehicle it will send an alert message to the concerned persons about current location of the vehicle[15].

In [16] it is recorded that the fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. To avoid this we are implementing a microcontroller based fuel monitoring and vehicle tracking system. We have used the reed switch which works according to the principle of Hall Effect for sensing the amount of fuel filled in the vehicle and amount of fuel consumed. Then this record is stored in the system memory. This system stores the record for several logs. We have used the MSP430F149 microcontroller for our system. It is a ultra low power, 16 bit RISC architecture controller. It contains inbuilt 12 bit ADC, serial communication interface. Real Time Clock (RTC) is also provided to keep the track of time. Also we have used the GPS technology to track the vehicle. In this paper, the implementation of embedded control system based on the microcontroller is presented. The embedded control system can achieve many tasks of the effective fleet management, such as fuel monitoring, vehicle tracking. Using GPS vehicle tracking technology and viewing interactive maps enable us to see where it was losing money, time & fuel.

Aurthor Mr M. Desai et al stated that the advances in technologies and availability of economical open source hardware systems are setting a new trend in system designing. Use of technologies like Internet of Things (IoT) can ease the process of data collection and analysis. The main objective of the paper is to

describe a system which can monitor or track the location and vehicle parameters of different test vehicles from a centralized place for research and development purposes and to store data of testing parameters of those vehicles on the server for further analysis and records. System design will be generalized for monitoring different parameters like Location, Vehicle speed, Engine compartment temperature, Fuel consumption and many[17].

In [18] the approach are imagined any road tankers that transport petrol transport End customers, such as service stations, get petrol in oil warehouses. However, as code, this technique is reliant on hardware. Shipment electronics, Diy on-board, Wireless communications, and Gp modules are all included. make up the hardware version 0.5. whereas LabView is used for data functions in PC code. This approach proposes the use of an Automatic Electronic System (AES) to replace manual fuel monitoring. This system

M. Shanmugasundaram et al discussed that the An embedded device is designed and fabricated into PCB. The embedded device having SIM908, integrated GSM/GPS module, is kept inside vehicle which acquires the speed and location of the vehicle and send data to the server. The fuel level detection circuit calculates the fuel level from the fuel gauge which is present in all the vehicles. Connecting to internet requires additional money deducted by internet provider and the more use of battery. In order to be efficient, SMS function is included to start/stop internet connection. When the owner needs to track the vehicle, a SMS is sent to the device which then establishes the connection to the TCP server through GPRS. Data such as location speed and fuel level is sent to the server and stored in a database[19].

In [20] the authors stated that the ability to track vehicles is useful in many applications including security of personal vehicles, public transportation systems, School buses and others. Therefore, the development of vehicle tracking system using the Global Positioning System (GPS) and Global System for Mobile Communications (GSM) modem is with the aim of enabling users to locate their vehicles with ease and in a useful manner. The system will provide users with the capability to track vehicle remotely through the mobile network. This project mainly deals with concept of Vehicle tracking, Monitoring and so gives a better

supervision to the target vehicle. This system is based on ARM7, GSM and GPS. GSM technology is used to send information about the vehicle. This information contains exact location of the vehicle.

Mrs.S.A.Chiwhane et al discussed that the 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 amount of currently inserted fuel. It delivers data to the ESP8266 Wi-Fi chip. ESP8266 chip is a hardware which connect flow sensor 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[21].

In [22],the publishers used RFID technology for tracking the bus and Thingspeak web server for displaying location of the bus and seat availability in android application in a smart phone. This system enables the commuters to know the exact location of the bus, and occupancy level in the bus, which enable the commuters to take decision, whether to board this bus or next. This reduces the waiting time and overcrowding at bus stops, the risk of accidents and thefts.

Joe Reodus et al found that the Fuel checking has been the serious issue that the greater part of transport organisations hopes to address. To tackle this issue in a practical manner, we have built up an IoT based transport global positioning framework to show the ebb and flow area of the transport and seat accessibility in the showing up transports. The above system proposed has been approved utilizing Android in this examination which permits workers towards following transports and realizing the normal appearance time. Applications are worked by forming those administrations and conveying into administration stages dispersed and facilitated in the Cloud that awards secure admittance to the information shared by these gadgets in compliance. The framework has been

effectively and progressively planned and executed so it tends to be facilitated and utilized by any organization without the need to make any significant[23].

In [24] it is stated that due to increased in number of kidnapping and road accident cases, parents always worry about their children's security. This project recommends an android based solution which assists parents to track their children location in real time. To track the location Active RFID module is used and to identify the identity of the child a biometric identification is used which is in built in the system. Whenever a child boards a bus, the biometric identification is done in the bus, and the system will identify the child and update log on a server will send notification to the parents which consist of current location and time. Parents can see the location of bus, they will be notified when the children is getting into a bus or getting down from a bus.

These all 24 papers and surveys suggests that the maximum number of surveys and innovations consist of either RFID based module,GPS and GSM based tracking for detecting and locating the vehicles.Thus,given us the references of Wi-fi modules like EPS8266 and Arduinio Microcontroller which provide us High-paced system for monitoring some essential functions like detecting objects , accidents and thefts etc. And also acquired that the Fuel monitoring in vehicles are varied in different technologies in

2.1 OPEN PROBLEMS IN EXISTING SYSTEM

The existing system in low power designs in Electronics have allowed us toundertake this work which involved the use of Texas Instruments ultra-low poweredMSP430 seriesmicrocontroller. Instead of using the conventional methods like use of popular 8051 seriesmicrocontroller and having a complex application we went for a simple application butwith a modern technology involving the usage ofMSP430 microcontroller.

The software was written by keeping in mind standard software engineering practices like modularity, code reuse and portability. Most of the C language functions, especially written for LCD interface are fully portable and can be reused for any other microcontroller platform with little or no change at all. The MSP430 specific code is also optimized for efficient execution

CHAPTER 3

REQUIREMENT ANALYSIS OF MODEL

3.1 SOFTWARE USED:

- Blynk IOT Application Version 1.8.1
- Arduino IDE Version 2.1.0

3.2 HARDWARE USED:

- Arduino uno controller
- Ultrasonic sensor
- IR sensor
- Vibration sensor
- Gps module
- Lcd display
- Alcohol sensor
- Power supply

The above requirements are the integral part of our project, The above Hardware & Software Requirements will be briefly discussed in the next chapter (i.e: Chapter-4) since these are the core modules and entities of our project. Hence the above mentioned disclosure will combinedly give us the final outcome of the project.

CHAPTER 4

EXPERIMENTAL ANALYSIS

The implementation of the proposed system would help presents experimental results of the system to efficiently track and monitor the school bus, and also if any accident occurs vibration sensor send that information to controller it will communicate with the application sends alerts message to the bus depo.

A vehicle monitoring system is implemented for tracking the movement of a bus from any location at a specific time Speed of the bus also can be calculated and send a message to the parents through GSM. The system consists of three main units, bus unit, parent unit and college unit.

The bus unit is used to detect when a Student enters/exits from the bus using IR sensor. This information is communicated to the parent unit and college unit that identify the presence of Student. The system tracks the college bus by the IOT and also gets an alert if the bus crosses the speed limit.

- Fuel sensor is used to monitor the fuel level.
- IR Sensor is used to monitor number of students inside the bus.

ADVANTAGES OF PROPOSED SYSTEM

- In a proposed system we monitoring both fuel level and gps location
- If the fuel level or if the driver miss the road means it automatically send the data to owner

4.1 SELECTED METHODOLOGY OR PROCESS MODEL :

The project titled “Design of bus tracking and fuel monitoring system” is a model which contains two modules one is bus tracking unit and another one is fuel monitoring unit. The bus tracking module is done with the help of gps receivers. The fuel monitoring module is done with the help of fuel level sensor. Bus Tracking System and fuel monitoring system resulted in improving overall productivity with better fleet management that intern offers better return on your investments. IR is used for the identification of the Student. IR sensor will detect each student is here are not in bus the student can monitored by their parents and also by college. When the student enters or exits from the bus the reader records and transfer data in the database. Ultrasonic sensor will detect the level of the fuel. In this system they monitor only the fuel level if the fuel level is low means it shows only the information in LCD. And in an LCD screen it shows only the GPS location if the driver miss the exact route means it ever give any alert to driver

Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living

4.2 ARCHITECTURE OF PROPOSED SYSTEM:

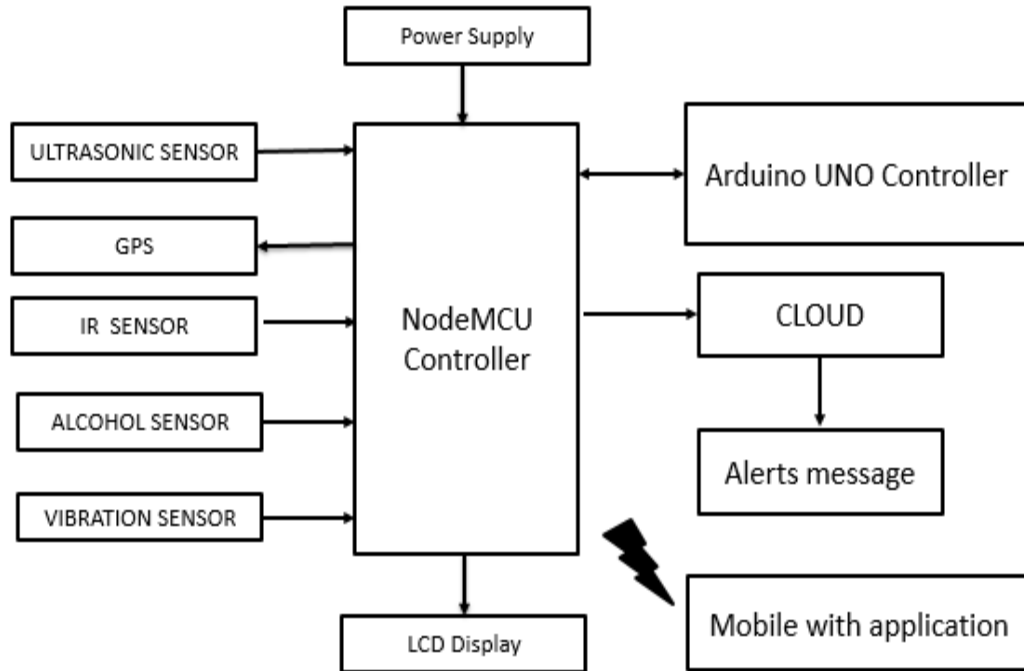


Fig 4.1: System Architecture

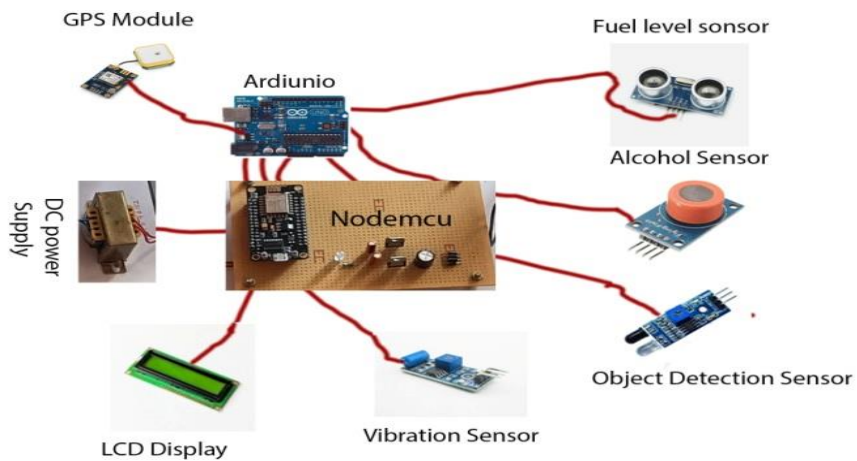


Fig 4.2: Circuit Diagram

4.3 DESCRIPTION OF SOFTWARE IMPLEMENTATION OF IOT (Internet of Things):

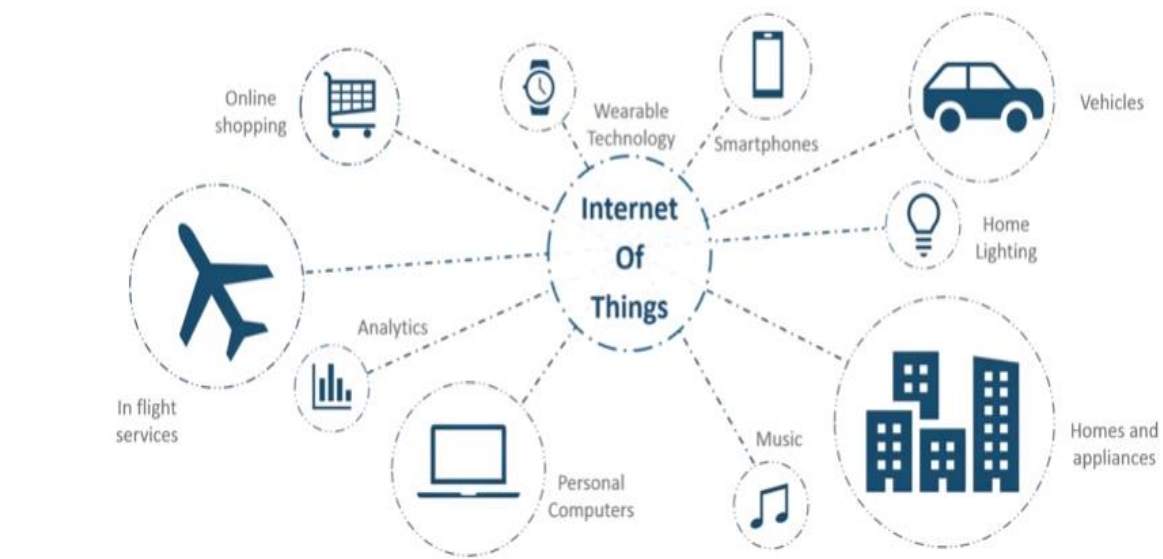
IoT stands for Internet of Things, which means accessing and controlling daily usable equipments and devices using Internet. Our IoT tutorial includes all topics of IoT such as introduction, features, advantage and disadvantage, ecosystem, decision framework, architecture and domains, biometric, security camera and door unlock system, devices, etc.

4.2.1 INTERNET OF THINGS (IOT)

Let's us look closely at our mobile device which contains GPS Tracking, Mobile Gyroscope, Adaptive brightness, Voice detection, Face detection etc. These components have their own individual features, but what about if these all communicate with each other to provide a better environment? For example, the phone brightness is adjusted based on my GPS location or my direction.

Connecting everyday things embedded with electronics, software, and sensors to internet enabling to collect and exchange data without human interaction called as the Internet of Things (IoT).

The term "Things" in the Internet of Things refers to anything and everything in day to day life which is accessed or connected through the internet.



IoT is an advanced automation and analytics system which deals with artificial intelligence, sensor, networking, electronic, cloud messaging etc. to deliver complete systems for the product or services. The system created by IoT has greater transparency, control, and performance.

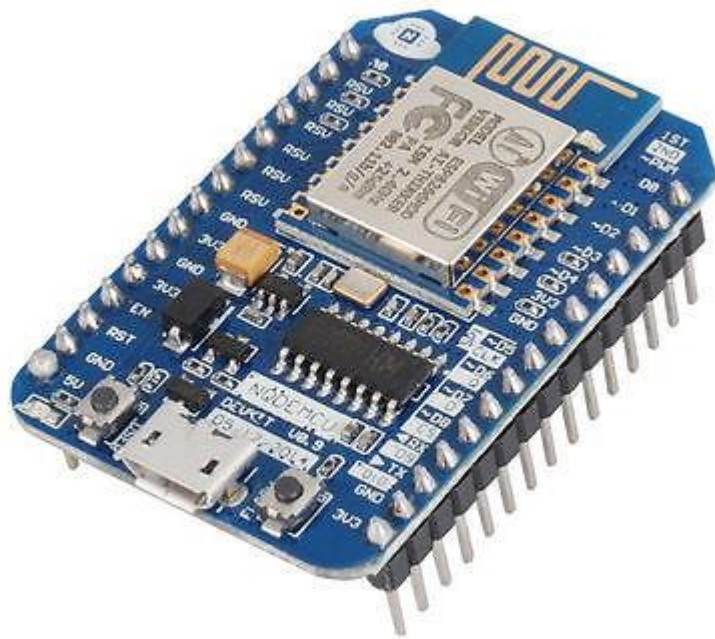
As we have a platform such as a cloud that contains all the data through which we connect all the things around us. For example, a house, where we can connect our home appliances such as air conditioner, light, etc. through each other and all these things are managed at the same platform. Since we have a platform, we can connect our car, track its fuel meter, speed level, and also track the location of the car.

4.4 NODE MCU :

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It 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

NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, EspressifSystems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,^[citation needed] widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub.^[11] Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9.^[12] Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays.

NodeMCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit i.e. NodeMCU Development board.



NodeMCU Development Board/kit v0.9 (Version1)

Since NodeMCU is open source platform, their hardware design is open for edit/modify/build.

NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The **ESP8266** is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer ESP8266 WiFi Module.

There is Version2 (V2) available for NodeMCU Dev Kit i.e. NodeMCU Development Board v1.0 (Version2), which usually comes in black colored PCB.

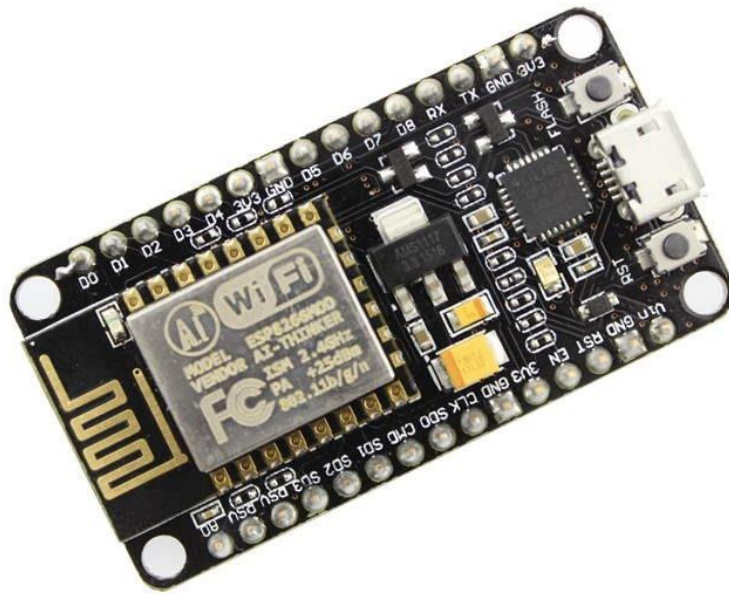


Figure 4.3 NodeMCU Development Board/kit v1.0 (Version2)

For more information about NodeMCU Boards available in market refer NodeMCU Development Boards

NodeMCU Dev Kit has **Arduino like** Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards etc.

4.4.1 HOW TO START WITH NODEMCU

NodeMCU Development board is featured with wifi capability, analog pin, digital pins and serial communication protocols. For more information about how to write Lua script for NodeMCU refer Getting started with NodeMCU using ESPlorerIDE

4.4.2 NODEMCU WITH ARDUINO IDE

Here is another way of developing NodeMCU with a well-known IDE i.e. Arduino IDE. We can also develop applications on NodeMCU using Arduino development environment. This makes easy for Arduino developers than learning new language and IDE for NodeMCU.

In Arduino IDE when we write and compile code, ESP8266 toolchain in background creates binary firmware file of code we wrote. And when we upload it to NodeMCU then it will flash all NodeMCU firmware with newly generated binary firmware code. In fact, it writes the complete firmware.

That's the reason why NodeMCU not accept further Lua scripts/code after it is getting flashed by Arduino IDE. After getting flashed by Arduino sketch/code it will be no more Lua interpreter and we got error if we try to upload Lua scripts. To again start with Lua script, we need to flash it with NodeMCU firmware.

Since Arduino IDE compile and upload/writes complete firmware, it takes more time than ESPlorer IDE.

4.5 ARDUINO UNO MICROCONTROLLER

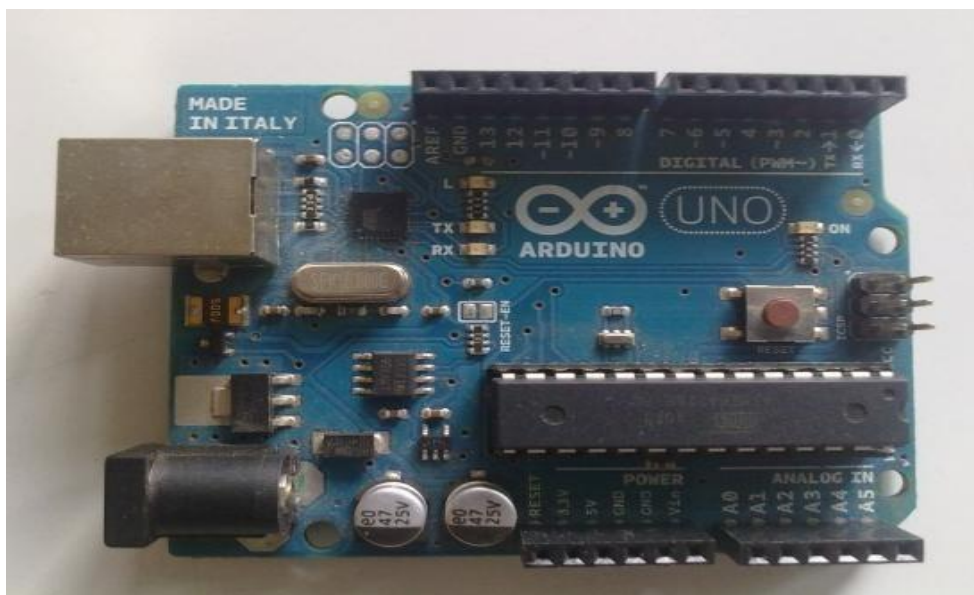


Figure 4.4 Arduino Microcontroller

4.5.1 OVERVIEW:

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, scroll the web to find lots of resources. This guide covers the Arduino Uno board (Sparkfun DEV-09950, \$29.95), a good choice for students and educators. With the Arduino board, you can write programs and create interface circuits to read switches and other sensors, and to control motors and lights with very little effort. Many of the pictures and drawings in this guide were taken from the documentation on the

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The Duemilanove board features an Atmel ATmega328 microcontroller operating at 5 V with 2 Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing parameters. The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second. The board has 14 digital I/O pins and 6 analog input pins. There is a USB connector for talking to the host computer and a DC power jack for connecting an external 6-20 V power source, for example a 9 V battery, when running a program while not connected to the host computer. Headers are provided for interfacing to the I/O pins using 22 gauge solid wire or header connectors.

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

4.5.2 Pin Configuration

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and VIN pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may over heat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

VIN: The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board.

4.6 IR(INFRARED)SENSOR

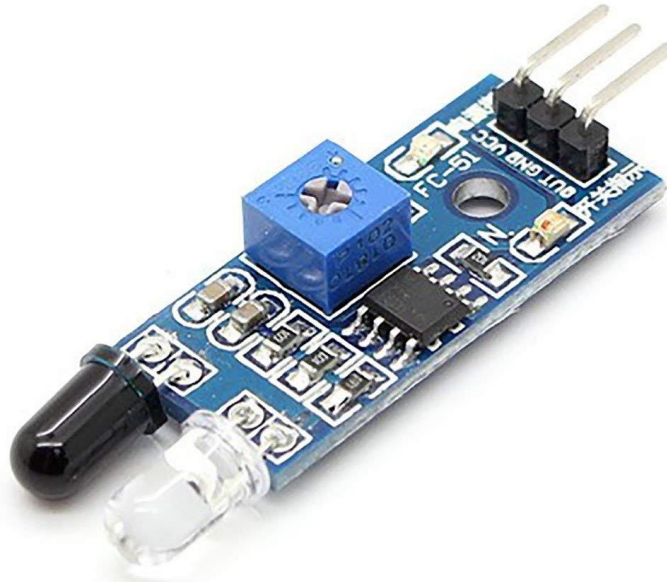


Figure 4.5 IR SENSOR

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photo diode which is sensitive to IR light of the same wave length as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

IRSensor Circuit Diagram and Working Principle:

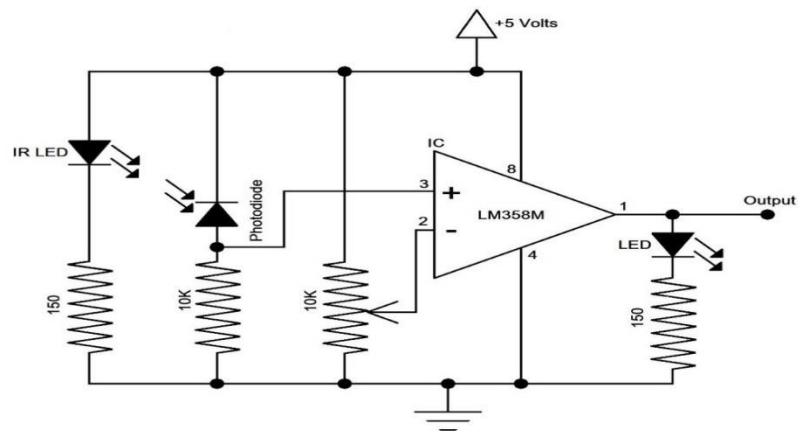
An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's

visionary senses, which can be used to detect obstacles and it is one of the common applications in real time. This circuit comprises of the following components

- LM358 IC 2 IR transmitter and receiver pair
- Resistors of the range of kilo ohms.
- Variable resistors.
- LED (Light Emitting Diode)

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit. When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module to the potential at the inverting input goes low. Thus the output (LM339) goes high and the LED starts glowing.

IR Sensor circuit



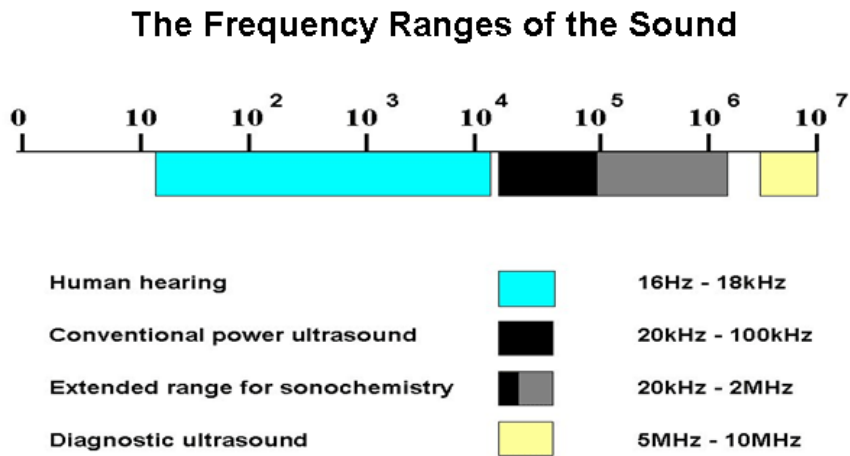
Resistor R1(100), R2(10k) and R3(330) are used to ensure that minimum 10 mA current passes through the IR LED. Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit. Diagram. Read more about IR sensors.

4.7 ULTRASONIC (UV) SENSORS OR FUEL LEVEL SENSOR

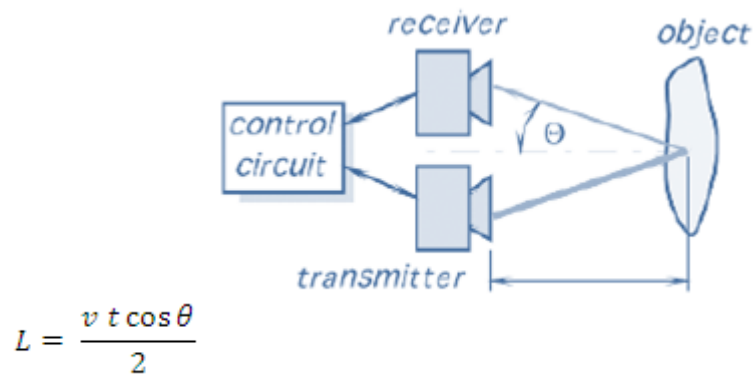


Figure 4.6 ULTRASONIC SENSOR

Ultrasonic sensors are devices that use electrical–mechanical energy transformation, the mechanical energy being in the form of ultrasonic waves, to measure distance from the sensor to the target object. Ultrasonic waves are longitudinal mechanical waves which travel as a succession of compressions and rarefactions along the direction of wave propagation through the medium. Any sound wave above the human auditory range of 20,000 Hz is called ultrasound. Depending on the type of application, the range of frequencies has been broadly categorized as shown in the figure below:



When ultrasonic waves are incident on an object, diffused reflection of the energy takes place over a wide solid angle which might be as high as 180 degrees. Thus some fraction of the incident energy is reflected back to the transducer in the form of echoes and is detected. The distance to the object (L) can then be calculated through the speed of ultrasonic waves (v) in the medium by the relation



Where 't' is the time taken by the wave to reach back to the sensor and 'θ' is the angle between the horizontal and the path taken as shown in the figure. If the object is in motion, instruments based on Doppler shift are used. Get all the details about internal structure and working of an ultrasound sensor at [Insight-How Ultrasonic Sensors Work](#).

4.8 MQ3 ALCOHOL SENSOR :



Figure 4.7 MQ3 / ALCOHOL SENSOR

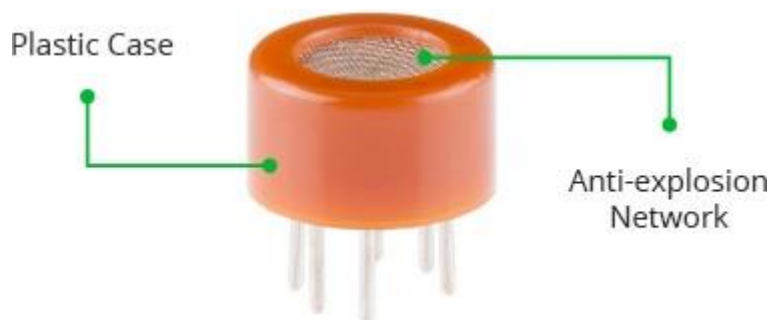
The MQ3 sensor is one of the most widely used in the MQ sensor series. It is a MOS (Metal Oxide Semiconductor) sensor. Metal oxide

sensors are also known as Chemiresistors because sensing is based on the change in resistance of the sensing material when exposed to alcohol.



The MQ3 alcohol sensor operates on 5V DC and consumes approximately 800mW. It can detect alcohol concentrations ranging from 25 to 500 ppm. It also protects the sensor and filters out suspended particles, allowing only gaseous elements to pass through the chamber.

The MQ3 is a heater-driven sensor. It is therefore covered with two layers of fine stainless steel mesh known as an “anti-explosion network”. It ensures that the heater element inside the sensor does not cause an explosion because we are sensing flammable gas (alcohol).

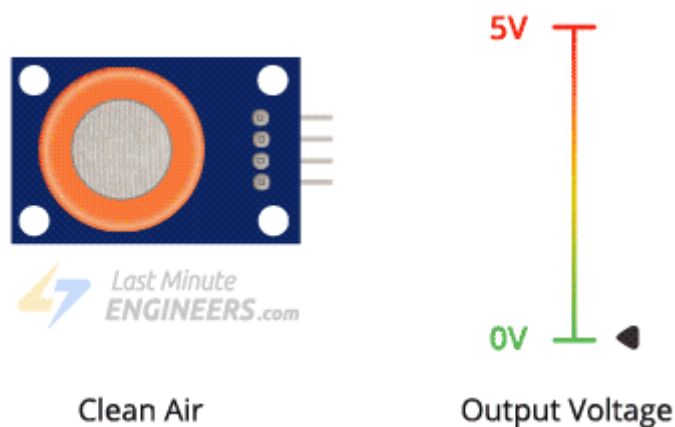


The remaining four signal-carrying leads (A and B) are connected with platinum wires. These wires are connected to the body of the sensing element and convey slight variations in the current flowing through the sensing element.

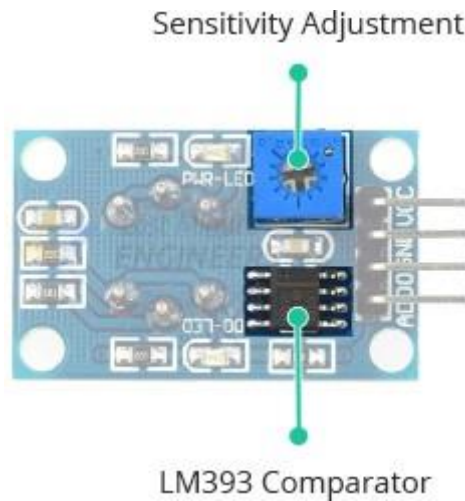
4.8.1 HOW DOES THE MQ3 ALCOHOL SENSOR WORK

When a SnO₂ semiconductor layer is heated to a high temperature, oxygen is adsorbed on the surface. When the air is clean, electrons from the conduction band of tin dioxide are attracted to oxygen molecules. This creates an electron depletion layer just beneath the surface of the SnO₂ particles, forming a potential barrier. As a result, the SnO₂ film becomes highly resistive and prevents electric current flow.

In the presence of alcohol, however, the surface density of adsorbed oxygen decreases as it reacts with the alcohol, lowering the potential barrier. As a result, electrons are released into the tin dioxide, allowing current to freely flow through the sensor.



This analog signal is digitized by an LM393 High Precision Comparator and made available at the Digital Output (D0) pin.



The module includes a potentiometer for adjusting the sensitivity of the digital output (D0). You can use it to set a threshold so that when the alcohol concentration exceeds the threshold value, the module outputs LOW otherwise HIGH.

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4.9 VIBRATION SENSORS :

The Vibration Sensor(piezoelectric sensor) is used for flex, touch, vibration and shock measurement. Its principal, at the risk of oversimplification, is as follows: whenever a structure moves, experiences acceleration. A piezoelectric shock sensor, in turn, can generate a charge when physically accelerated. This combination of properties is then used to modify response or reduce noise and vibration. Because vibration and shock can shorten the life of any electronic and electro mechanical system. Delicate leads and bond wires can be stressed, especially after exposure to long term vibration. Solder joints can break free and PCB traces can ever so slightly tear from impact and impulse shock, creating the hardest type of system failure to debug; an intermittent failure.

4.9.1 WORKING PRINCIPLE OF VIBRATION SENSOR

Still, the ability of certain crystals to exhibit electrical charges under mechanical loading was of no practical use until very-high-input impedance amplifiers enabled engineers to amplify the signals produced by these crystals. Several materials can be used to make piezoelectric sensors, including tourmaline, gallium phosphate, salts, and quartz. Most electronic applications use quartz since its growth technology is far along, thanks to development of the reverse application of the piezo electric effect the quartz oscillator.

Sensors based on the piezoelectric effect can operate from transverse, longitudinal, or shear forces, and are insensitive to electric fields and electromagnetic radiation. The response is also very linear over wide temperature ranges, making it an ideal sensor for rugged environments. For example, gallium phosphate and tourmaline sensors can have a working temperature range of 1,000°C. The physical design of the piezoelectric sensor depends on the type of sensor you wish to create. For example, the configuration of a pressure sensor, or a shock (impulse) sensor, would arrange a smaller, but well-known mass of the crystal in a transverse configuration, with the loading deformation along the longest tracks to a more massive base . This assures that the applied pressure will load the base from only one direction.

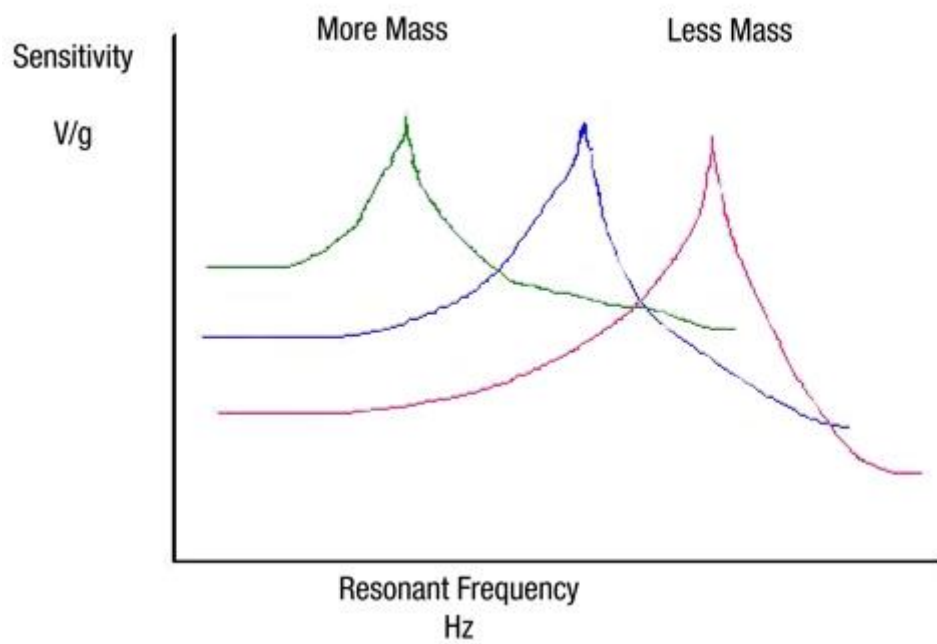
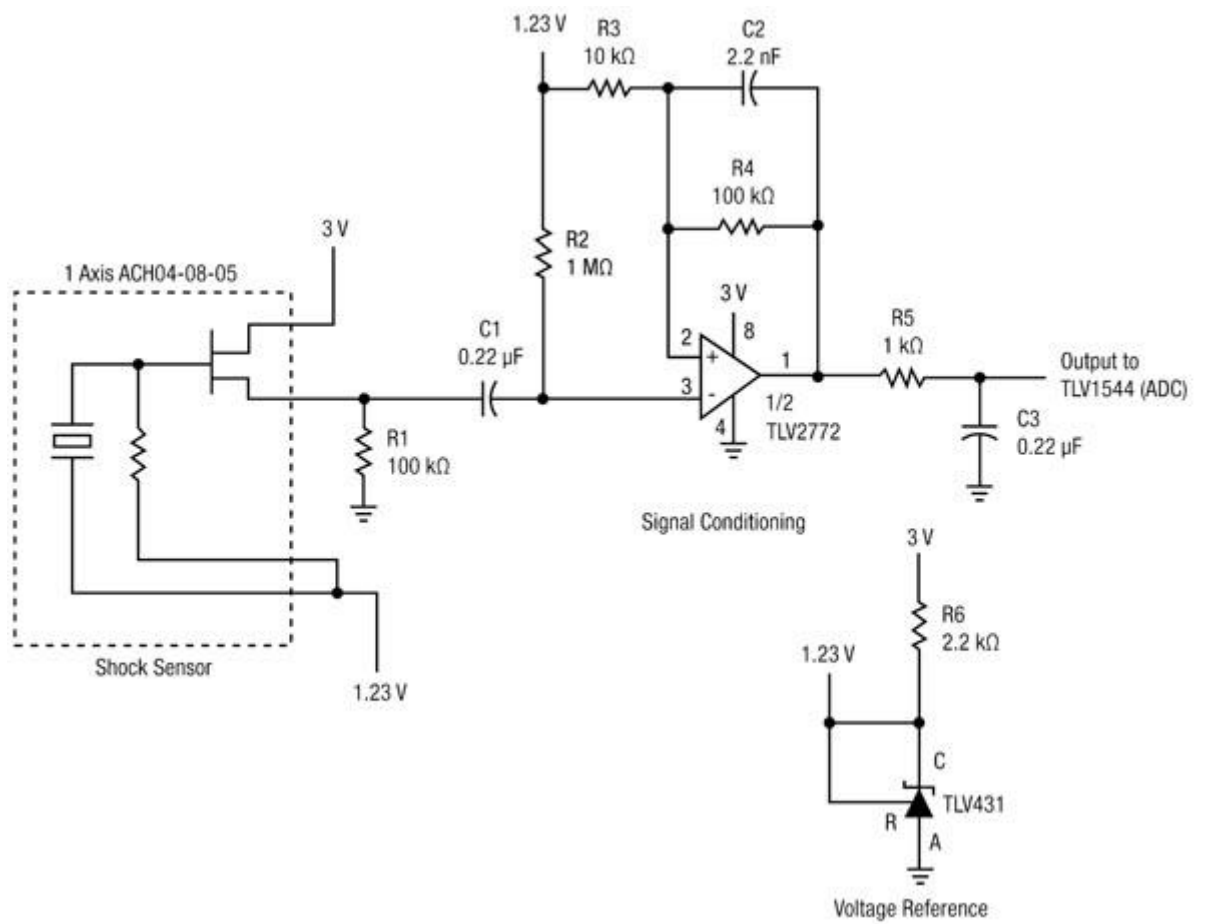


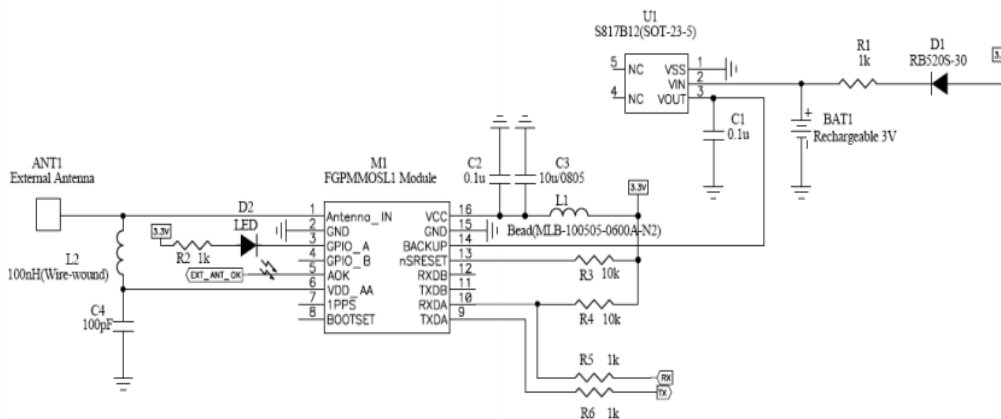
Figure 6: Loading a sensor with mass changes its resonant frequency and sensitivity in a predictable and repeatable way.

4.10 GLOBAL POSITIONING SYSTEM (GPS) :

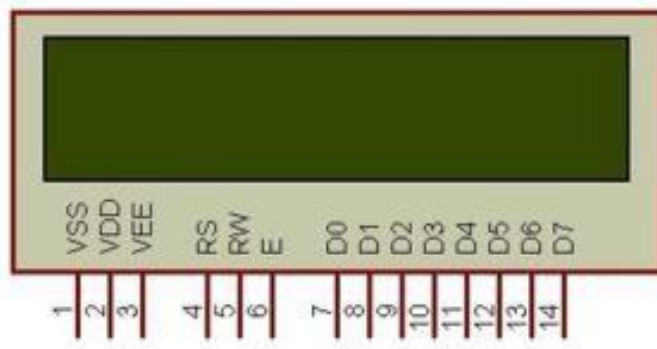


Figure 4.8 GPS MODULE

A variety of GPS modules designed for many different applications. The modules are classified into two families: FGPMOSLx and FGPMOPAx series (x denotes the model number). The major difference between these two families is the inclusion of smart patch antenna. PAX comes with the ceramic antenna, while SLx does not. These GPS modules provide a complete GPS solution that excels in position, speed, and accuracy performances as well as high insensitivity and tracking capabilities in urban environment. The GPS module are powered by MediaTek Inc. GPS chipset, the world's leading digital media solution provider and largest fab-less IC Company in operate with acceptable performance. And place the matching circuit between antenna and GPS module to compensate the frequency shift due to PCB layout.



4.11 LCD Display :



Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal materials sandwiched in between them. The inner surface of the glass plates are coated with transparent electrodes which define symbols or patterns to be displayed. Polymeric layers are present in between the

electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

One each polarisers are pasted outside the two glass panels. These polarisers would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarisers and the liquid crystal, such that the light rays come out of the LCD without any orientation, .

When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarisers, which would result in activating / highlighting the desired characters.

The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations.

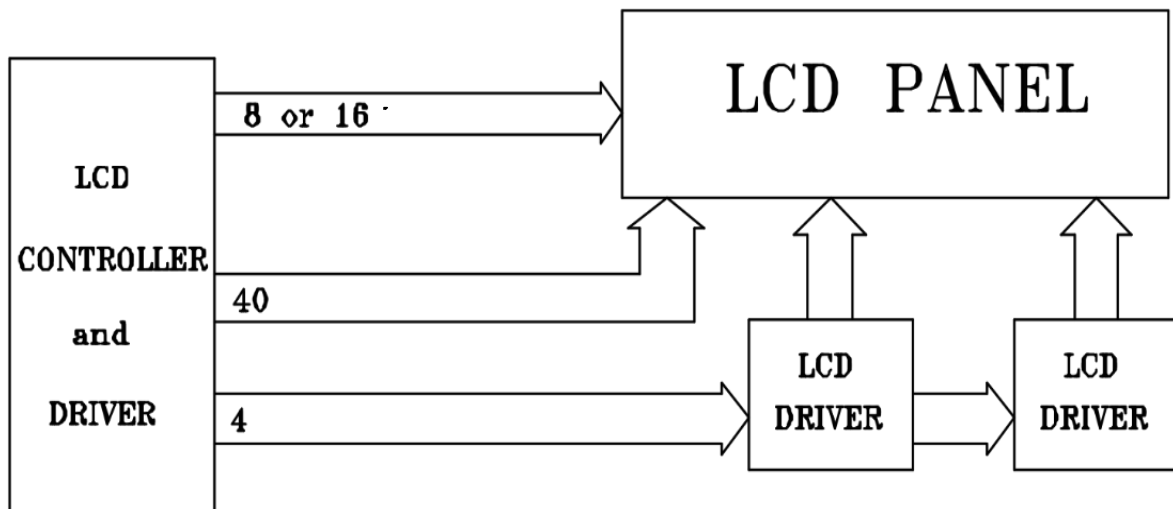
The LCD's don't generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly.

The LCDs used exclusively in watches, calculators and measuring instruments are the simple seven-segment displays, having a limited amount of numeric data. The recent advances in technology have resulted in better legibility, more information displaying capability and a wider temperature range. These have resulted in the LCDs being extensively used in telecommunications and entertainment electronics. The LCDs have even started replacing the cathode ray tubes (CRTs) used for the display and graphics, and also in small TV applications.

The dot matrix liquid crystal display controller and driver LCD displays alphanumeric, Japanese kana characters, and symbols. It can be configured

to drive a dot-matrix liquid crystal display under the control of a 4- or 8-bit microprocessor. Since all the functions such as display RAM, character generator, and liquid crystal driver, required for driving a dot-matrix liquid crystal display are internally provided on one chip, a minimal system can be interfaced with this controller/driver.

4.11.1 BLOCK DIAGRAM



4.12 ARDUINO UNO AND ITS PROGRAMMING :

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicate with software running on your computer. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

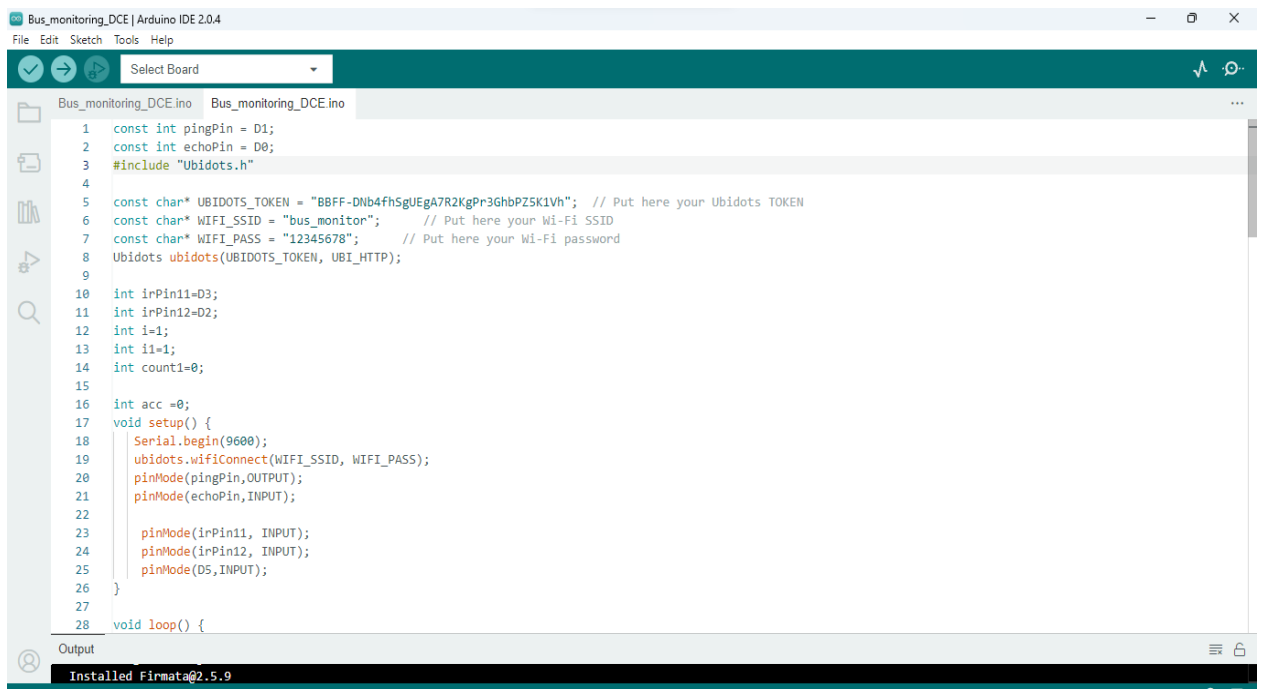
The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

This is what the Arduino ide looks like.



This is what the Arduino ide looks like the Duemilanove board features an Atmel ATmega328 microcontroller operating at 5 V with 2 Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing parameters. The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second. The board has 14 digital I/O pins and 6 analog input pins. There is a USB connector for talking to the host computer and a DC power jack for connecting an external 6-20 V power source, for example a 9 V battery, when running a program while not connected to the host computer. Headers are provided for interfacing to the I/O pins using 22 g solid wire or header connectors.

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

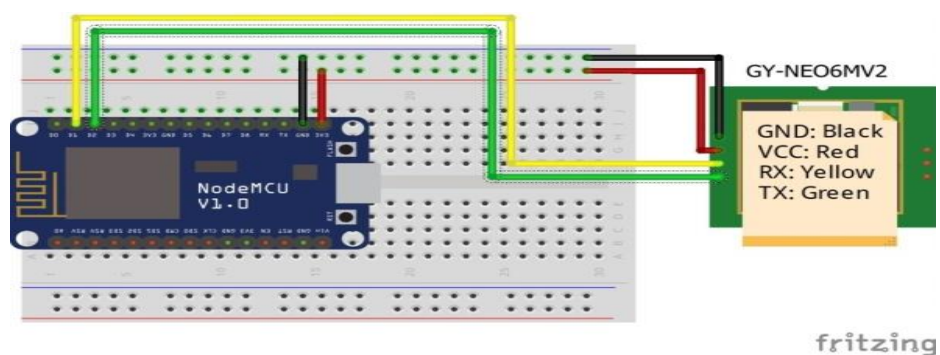


Arduino Software (IDE)

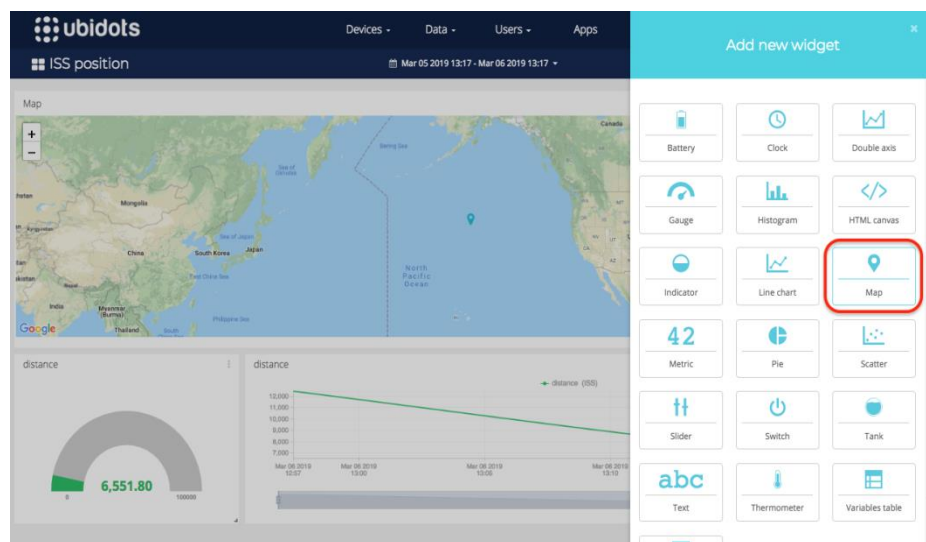
The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them..

4.13 SETTING UP GPS For Tracking

1. Wire up the GPS module as shown in schematic below in Figure.



2. Install the Ubidots library for ESP8266(NODEMCU).
3. Create an account at Ubidots. In the dashboard, choose the dropdown from the top-right dropdown and you will find your API credentials. Copy the token from there and replace it in the code provided below, along with your wifi ssid and password.
4. After running the code, open up the serial monitor. After successfully connecting to Ubidots you will find "OK" being printed every time data is sent successfully.**Note:** GPS module may take some time to start returning data.
5. From the dashboard, add a map widget by clicking on the plus sign, select your device.



CHAPTER 5

IMPLEMENTATION DETAILS

5.1 ASSEMBLEING OF SENSORS:

To assembling of all the sensors can be done by soldering of Ribbon cables with all the sensors and Wi-fi module i.e EPS8266 (Nodemcu) and Arduino uno respectively. After inter-connecting all the hardware assets on the circuit board .we have to give power supply to circuit board in order to working of the model. We give power supply through DC converter power generator ,which converts AC current into 5V current to the circuit to genetare electricity to the kit.

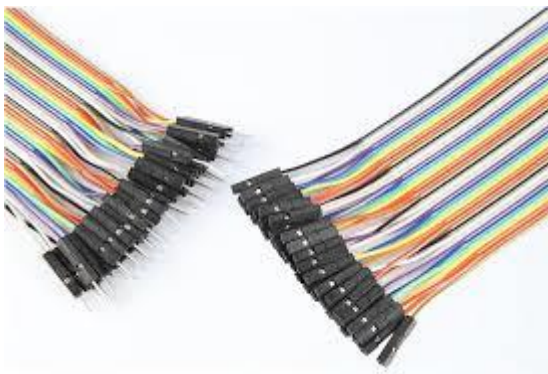


Figure 5.1 Ribbon cable wires



Figure 5.2 DC converter

After successfully giving connection to the circuit, we have to connect our kit to blynk iot application ,which can be easily available on playstore app in mobile .

5.1.1 BLYNK IOT APPLICATION:

Blynk is an internet of things platform which allows controlling electronic devices remotely using its iOS and android apps. It provides dashboard by which user can create graphic interface using different widgets. Blynk can also store and display sensor data. Blynk provides libraries for most of the popular hardware platforms like Arduino, ESP8266 , Raspberry pi, SparkFun etc .Arduino is the main

components in the above diagram. It is connected with external power source with cable. Next important component is relay. Here we use 5V DC relay as switch. Using the relay, we can convert DC power to AC. Relay is connected with aurdino and bulb. Using the blynk app we can operate the all devices using the blynk server. In blynk app different button are added, using those buttons we can on/off the switch.

5.2 CONNECTING TO THE IOT SOFTWARE:

After successfully giving connection to the circuit,we have to connect our kit to blynk iot application ,which can be easily available on playstore app in mobile .

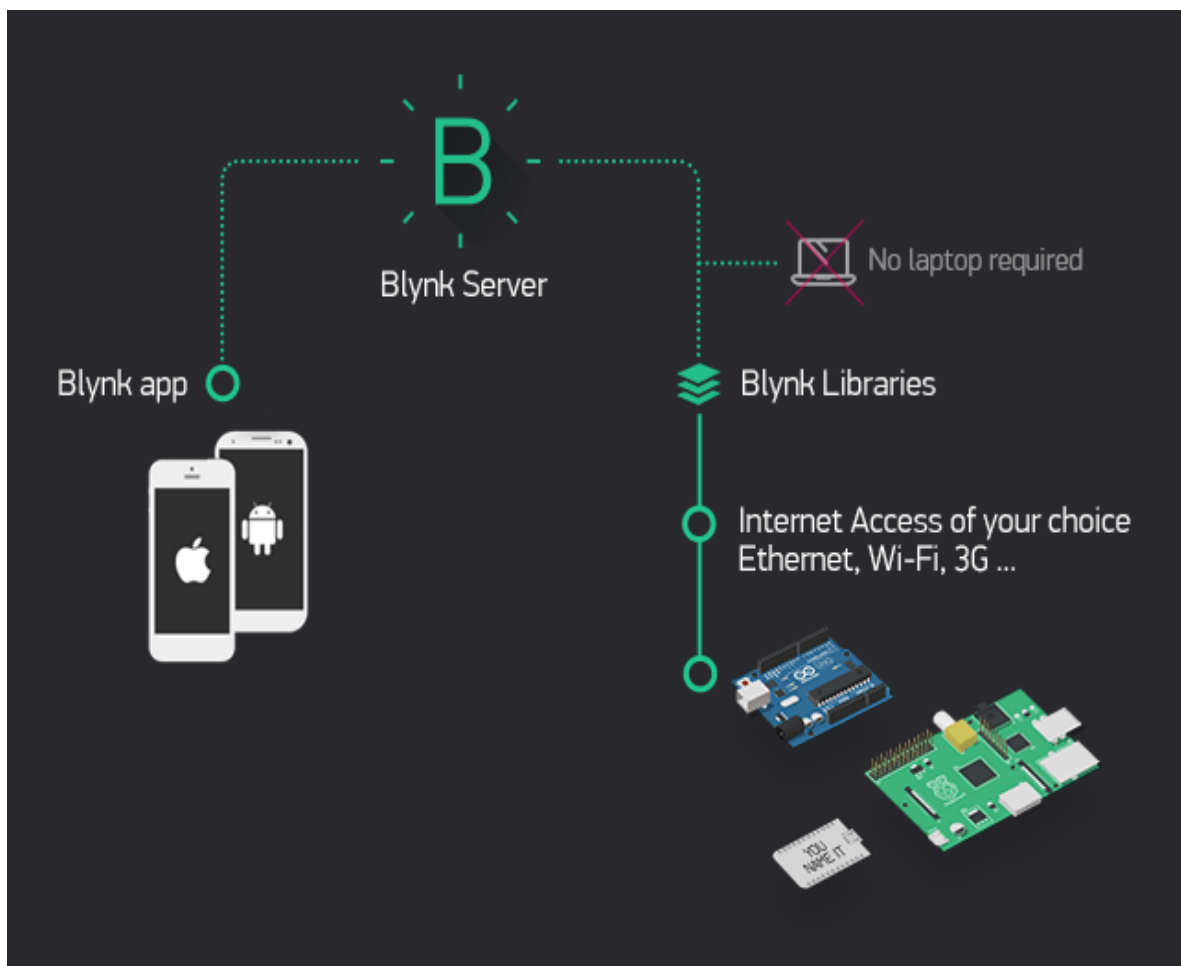


FIGURE 5.3 BLYNK APP WORKING ARCHITECTURE

5.2.1 BLYNK IOT APPLICATION:

Blynk is an internet of things platform which allows controlling electronic devices remotely using its iOS and android apps. It provides dashboard by which user can create graphic interface using different widgets. Blynk can also store and display sensor data. Blynk provides libraries for most of the popular hardware platforms like Arduino, ESP8266, Raspberry pi, SparkFun etc. Arduino is the main components in the above diagram. It is connected with external power source with cable. Next important component is relay. Here we use 5V DC relay as switch. Using the relay, we can convert DC power to AC. Relay is connected with Arduino and bulb. Using the Blynk app we can operate all devices using the Blynk server. In Blynk app different buttons are added, using those buttons we can on/off the switch.

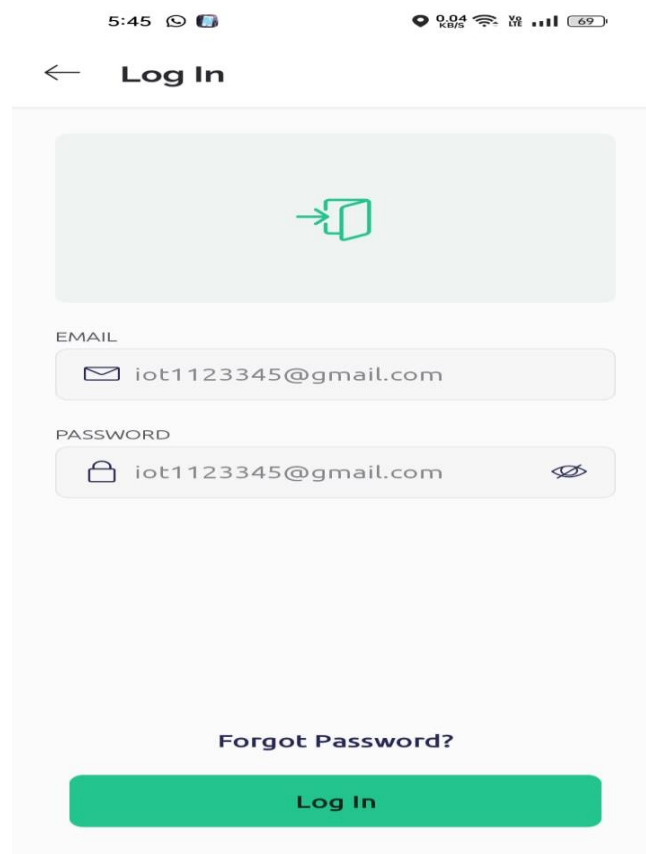


FIGURE 5.4 BLYNK LOGIN PAGE

CHAPTER 6

RESULTS AND DISCUSSIONS

Hence we can successfully monitor the fuel level and amount of fuel present in our vehicle and plan our route accordingly .Apart from fuel monitoring we can keep insights of accident occurency through Vibration sensor, Object and person detection by IR sensor and can detect weather Driver is drunk or not by using Alcohol sensor which can be fixed on centre of the steering wheel.

In our system Ardiunio and Nodemcu are combined to provide Serial communication which is required when you want to transfer sensor data or any data from one device **to** another device, In our case it is (ESP8266) NodeMCU and Arduino. The below shared screenshots are the instance of working system in Blynk App.When you login into the blink app ,you can test the working of all sensors mentioned on the screen .

The parameters present in the app (Fuel, Vibration, Object ,Alcohol) specify the model, As we can see the fuel percentage and Red dot/buzzer show on picture is to justify the working of sensors.If red dot blinks on every sensor.

CHAPTER 7

CONCLUSION

7.1 CONCLUSION

All of the traditional approaches have been modified in recent years due to technological advancements. Similarly, there are significant advancements in ticketing systems, such as RFID ticketing, QR code ticketing, and so on. Travelers may travel without stress thanks to the smart bus ticketing system. Converting public transportation into more comfortable modes of transportation increases accessibility and utilization. The efficient use of public transportation is one of the answers to the rising traffic problem in big cities. It also transforms the public transportation system. The logistics service provider can now gather ticketing data and track buses using digital technology thanks to digitalization. The method also eliminates from the logistics service as a whole.

7.2 FUTURE WORK

We believe that in future there might have many possibilities of new inventions and modifications on present model. Now a days many young ideas are in form and there are many people with yet innovative ideas. In future there might be chances that they may come up with new ideas on vehicle tracking and other various methods to implement on proposed theory. They might build more precise applications on tracking and fuel monitoring.

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APPENDIX

A.SOURCE CODE:

```
const int pingPin = D1;
const int echoPin = D0;
#include "Ubidots.h"

const char* UBIDOTS_TOKEN = "BBFF-I4gcERLVKuhhN7Ic8f7vGkVoitUhQP"; //
Put here your Ubidots TOKEN

const char* WIFI_SSID = "bus_monitor"; // Put here your Wi-Fi SSID
const char* WIFI_PASS = "12345678"; // Put here your Wi-Fi password
Ubidots ubidots(UBIDOTS_TOKEN, UBI_HTTP);

int irPin11=D3;
int irPin12=D2;
int i=1;
int i1=1;
int count1=0;
```

```

int acc =0;

void setup() {
  Serial.begin(9600);
  ubidots.wifiConnect(WIFI_SSID, WIFI_PASS);
  pinMode(pingPin,OUTPUT);
  pinMode(echoPin,INPUT);

  pinMode(irPin11, INPUT);
  pinMode(irPin12, INPUT);
  pinMode(D5,INPUT);
}

void loop() {
  int tilt = analogRead(A0);
  int vib = digitalRead(D5);
  if (tilt < 400 || tilt > 500 || vib == 0)
  {
    acc = 1;
    Serial.println("Accident");
    ubidots.add("Accident", acc);
    bool bufferSent = false;
    bufferSent = ubidots.send(); // Will send data to a device label that matches
the device Id

    if (bufferSent) {
      Serial.println("Values sent by the device");
    }
  }
  else

```

```

{
  acc = 0;
}

long duration, inches, cm;
pinMode(pingPin, OUTPUT);
digitalWrite(pingPin, LOW);
delayMicroseconds(2);
digitalWrite(pingPin, HIGH);
delayMicroseconds(10);
digitalWrite(pingPin, LOW);
pinMode(echoPin, INPUT);
duration = pulseIn(echoPin, HIGH);
cm = microsecondsToCentimeters(duration);

if (cm < 10)
{
  ubidots.add("Proximity", cm);
  ubidots.add("Accident", acc);
  bool bufferSent = false;
  bufferSent = ubidots.send(); // Will send data to a device label that matches
the device Id

  if (bufferSent) {
    Serial.println("Values sent by the device");
  }
}

delay(100);

```

```

if (!digitalRead(irPin11) && i==1 && i1==1){
    delay(100);
    i=2;
    i1=0;
}

```

```

if (!digitalRead(irPin12) && i==2 && i1==0){
    Serial.println("Entering Bus");
    delay(100);
    i=1;
    i1=1;
    count1++;
    ubidots.add("count1", count1);
    ubidots.add("Accident", acc);
    bool bufferSent = false;
    bufferSent = ubidots.send(); // Will send data to a device label that matches
the device Id

```

```

if (bufferSent) {
    Serial.println("Values sent by the device");
}
}

```

```

if (!digitalRead(irPin12) && i==1 && i1==1 ){
    delay(100);
    i=2 ;
    i1=2;
}

```

```

if (!digitalRead(irPin11) && i==2 && i1==2){
    Serial.println("Leaving Bus");
    delay(100);
    count1--;
    ubidots.add("count1", count1);
    ubidots.add("Accident", acc);
    bool bufferSent = false;
    bufferSent = ubidots.send(); // Will send data to a device label that matches
the device Id

```

```

    if (bufferSent) {
        Serial.println("Values sent by the device");
    }
    i=1;
    i1=1;
}

}

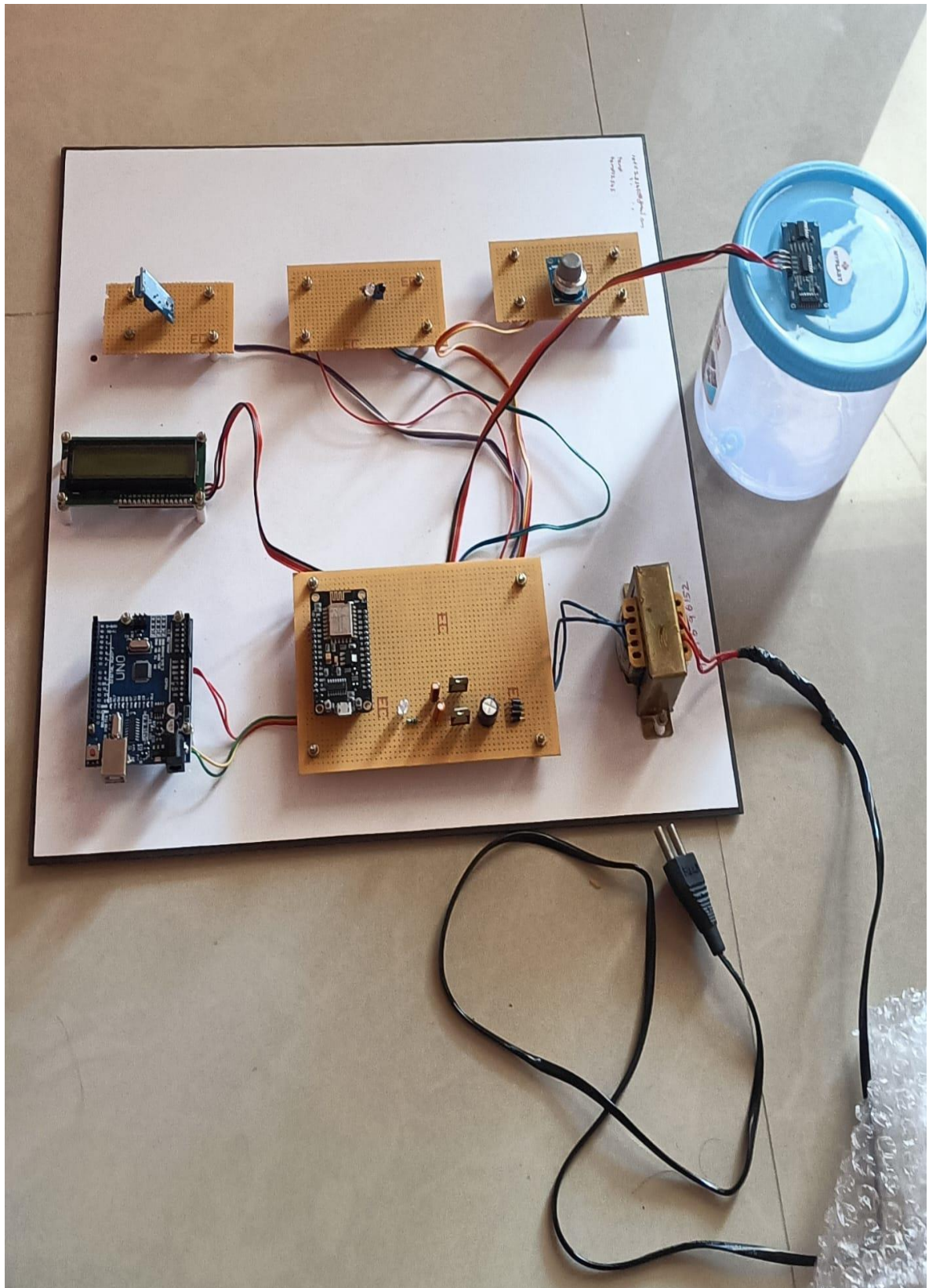
```

```

long microsecondsToCentimeters(long microseconds) {
    return microseconds / 29 / 2;
}

```

B.SCREENSHOTS



10:15  1

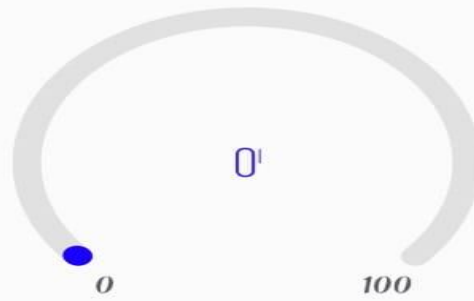
 1.00 KB/S     99



lotvehicle 7275E



FUEL



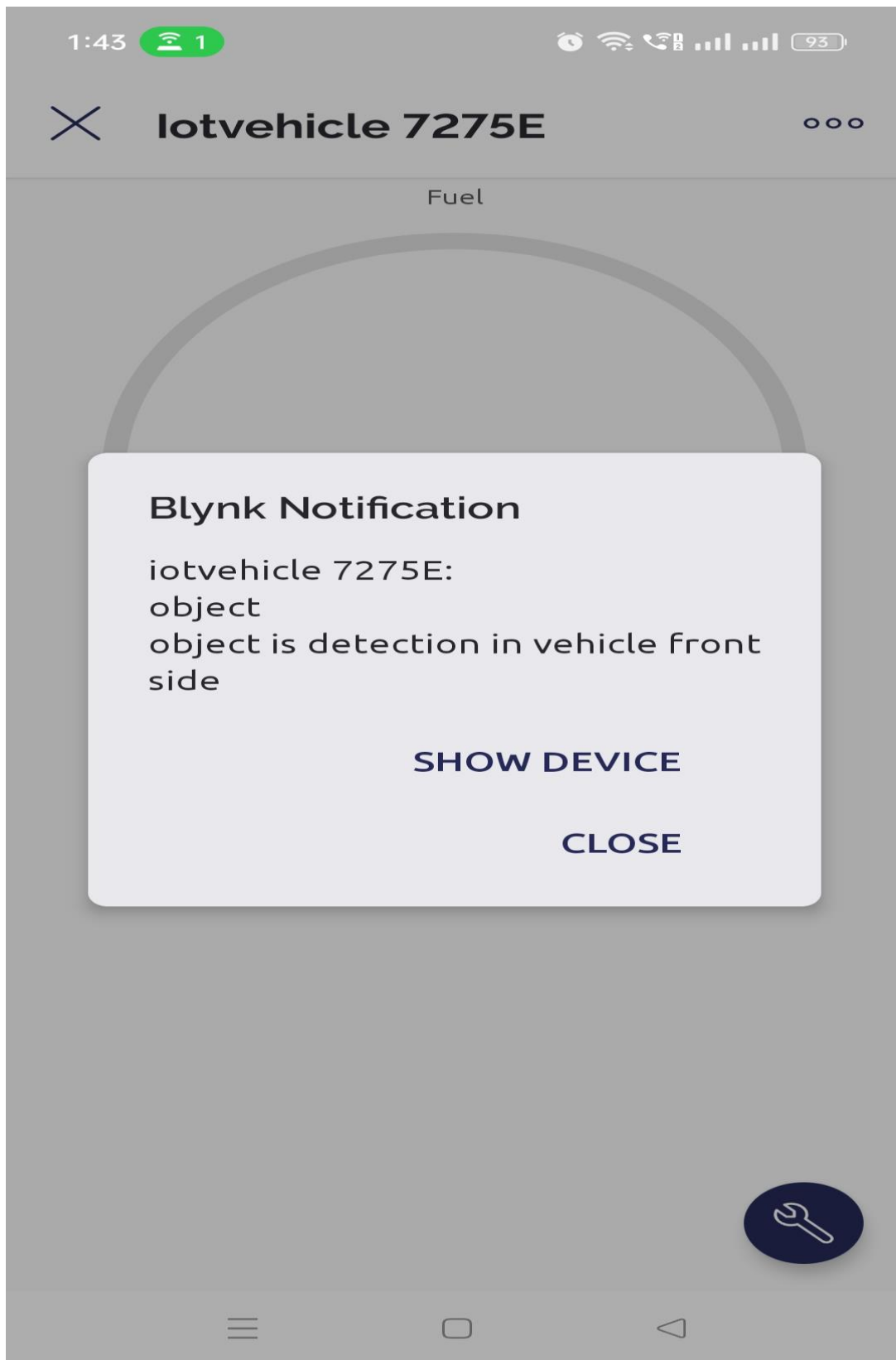
Vibration

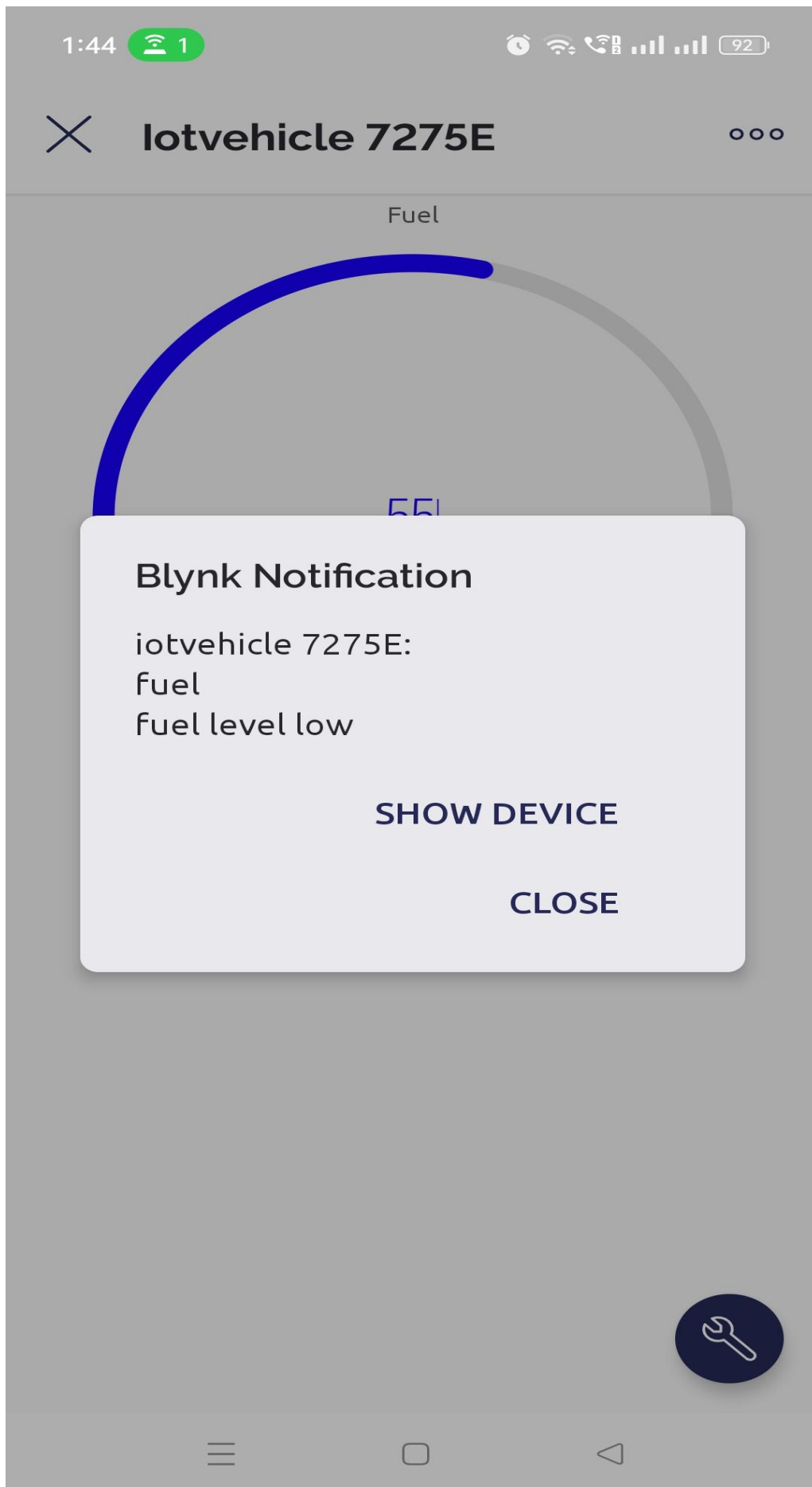


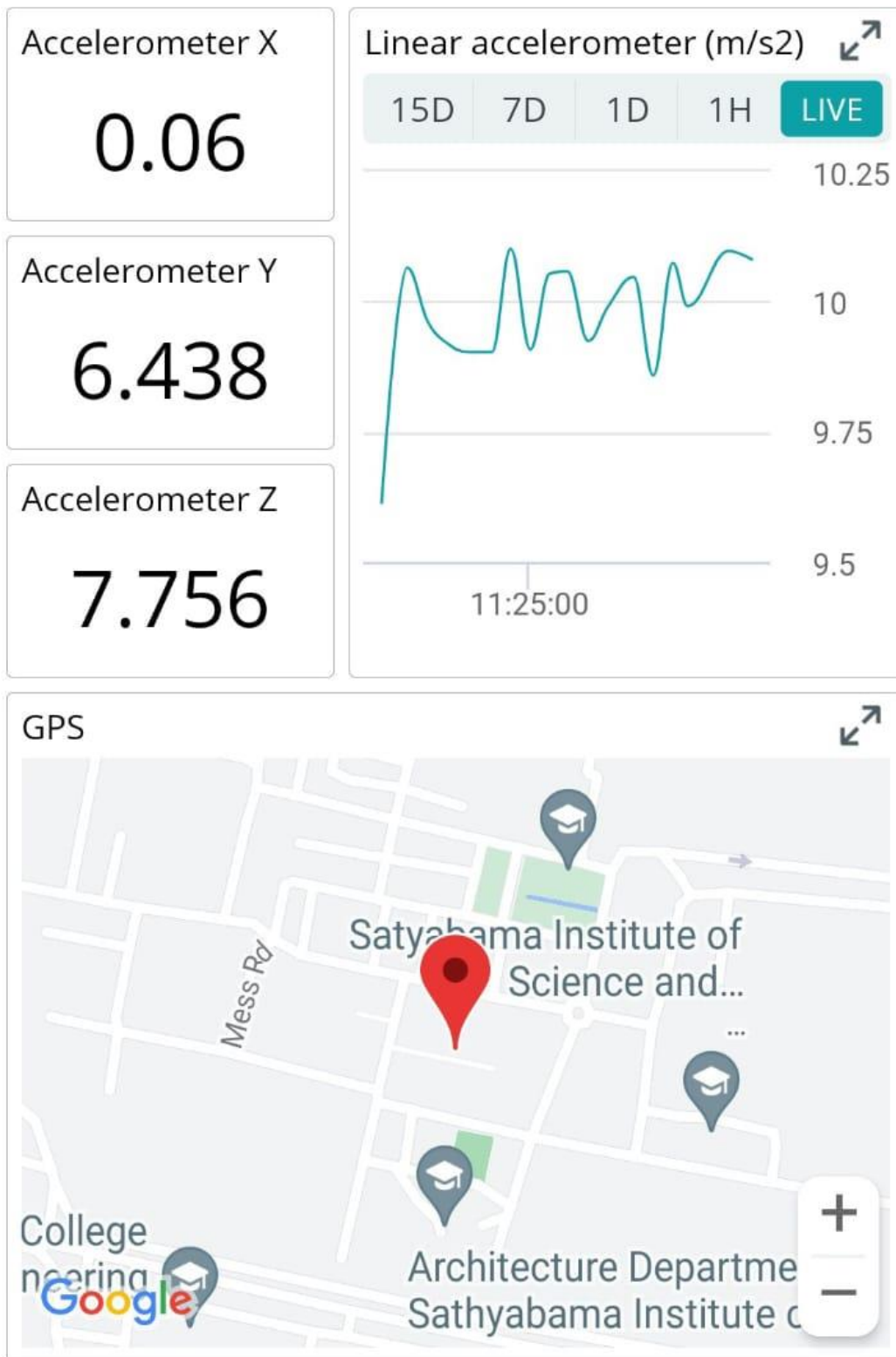
object



Alcohol







Design of Bus Tracking and Fuel Monitorization

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Abstract—The Need to implement this green public delivery machine is such that buses are increasing swiftly because of population growth . Travelers want to recognize the precise arrival time of a particular bus at a sure station and then plan a adventure from home. Bus tracking has been a prime problem that maximum bus corporations want to resolve. In this project , the device for monitoring transactions and monitoring the gasoline or fuel and pace is improved in order that the administrator can satisfy the control necessities. The proposed gadget is based on NODEMCU(ESP8266) and ARDIUNIO and the map is well matched with Ubidots maps that provide an active time of arrival similarly to graphically showing the bus location on a Google map. The plan additionally lets in the bus proprietor to manipulate the bus immediately, due to the fact the database machine administrator can without difficulty keep facts approximately the bus and its gasoline at anytime of provider.

Keywords—*Fuel monitorization; ESP8266; GPS; Ardiunio; Smart Systems.*

I. INTRODUCTION

With the increasing number of accidents, visitors injuries and accidents, parents are often worried approximately their infant's safety. The pressure will increase after they can't track the faculty bus. Not all schools have a tracking app, so it's far critical to put in force this system in as many faculties as viable. With the app, mother and father might be capable of monitor the college bus when it arrives and leaves the faculty. Live region can be tracked through mother and father. School management and mother and father can screen the bus at all times and screen the behavior of the driver. This will make certain the safety of the students on board and in protection. In case of emergency, the plan enables parents get hold of notifications of the nearest place. If the school installs this software in its buses, the variety of accidents may be extensively reduced. In the occasion of any herbal catastrophe, such as floods or rains, mother and father will recognize what their kids can do.

II. LITERATURE SURVEY

[1]According to the author, efforts are being made to strike a balance between the protection of driver safety and the setting of vehicle speed limits. Vehicle performance has steadily increased, and research findings pertaining to the safety of driving in cars have also been documented and exhibited continuously. [2]J.Deshpandeet al. stated that the Fatal By comprehending the psychological state of drivers, traffic accidents can be easily averted. The majority of traffic accidents happen at night because of drivers' fatigue.

[3]it is stated that Vehicle fuel consumption and real gasoline fill-up records are not kept. It causes a loss of money. We are putting in place a microcontroller-based fuel monitoring and vehicle tracking system to prevent this.F. D. Franzis et al. stated that Since most people own a car, theft frequently occurs in unsafe parking lots and sometimes while driving. Vehicle safety is incredibly important for public transportation vehicles. An authorized man or woman must ship the ticket to the control to start the car and unlock the door. It is far less expensive, safer, and more reliable. [4].In[5]The proposed device is based totally on Arduino, GSM/GPS and a board suitable using ASP.MVC that utilises arrival time in addition to graphically displaying the bus location on a Google map. The design also enables the bus owner to immediately operate the bus., due to the fact the system administrator can effortlessly keep statistics approximately the objects and gadgets of the database in the cloth database at any time.In[6]it is stated that the use of microcontrollers to sense and manage the level of liquid fuel. The task is to automate the gasoline pumping process in a tank storage system. It also has the capability to determine a tank's fuel level can be detected, and in response, an alarm and a digital representation of the status can be seen on the LCD screen. In[7]Pengfei Zhou el recordedthat for the majority of city transit users, the bus arrival time is crucial information. Extremely long wait times at bus stops frequently deter people from using buses, making it simple to adopt universal bus service methods without obtaining assistance from specific bus operating firms.

In[8]the duration of the bus wait for distant users. A technology allows for the bus to be tracked at any time and from any location. The server maintains the most recent data, which is then made accessible to remote users via web-based applications powered by Arduino. Although this method is web-based, most individuals these days prefer to use Android apposing.In[9]M. A. Hannaet al. presented a solution to reduce the amount of manual effort needed by the Bus-Management & Monitoring solution by fusing an RFID module with artificial intelligence. This depicts a bus. tracked using an RFID as it passes the bus stop. Consequently, just an estimated location of the bus is provided rather than its exact location.based on the bus stops[9].In[10],the creator By scanning a QR code placed at the bus stop, any passenger with a smartphone can view estimated bus arrival times and the current location of the bus thanks to an automated bus tracking system. The user had to physically be there at the bus stop in order to scan the QR code, which was a drawback of the idea. C. Jayakumari et al. recommended a bus tracker programme in this study that tracks buses using a GPS transmitter. By employing a tracking device to receive SMS information about the scheduled vehicle and the vehicle's current location, this effort aims to establish a system that supervises and regulates transportation. [11]...In[12], The system includes a single Android phone with a GPS and GSM modem, as

well as a vehicle-mounted processor. GPRS service can be used to continuously report the location update of the moving car to a server. Google Maps will be used to visualise this location data on the monitoring device. In [13] Vehicle makers have been experimenting with various techniques to offer improved security systems. The usage of GPS and GSM technology can provide security for the car. The Global Positioning System, or GPS, is a satellite-based communication system that delivers precise location information. The Global System for Mobile Communication, or GSM, is used for inter-GSM communication. The monitoring of several characteristics, such as temperature, is another method of vehicle monitoring.

In [14] it is stated that The information is occasionally needed in the modern era. The application of innovation has been growing gradually. As a result, we are preparing the "Plan of Bus Tracking and Fuel Monitoring System" creative technique for the fusion of current innovation with the requirement of data transmission. To overcome the drawbacks of earlier paper-based methods, we familiarise a task with vehicle tracking using GPS and GSM. By making only a few equipment and programming changes, this vehicle tracking system can also be used for other purposes, such as accident detection alert systems, soldier tracking systems, and the general monitoring of cabs, taxis, taken cars, school/university transports, etc. The following framework for transport is a practical and productive framework... P. Siva Nagendra Reddy et al. proposed that This paper's primary goals are to secure the cars and check gasoline in their tanks. This design also uses a vehicle monitoring and accident alarm system. The GSM module, GPS, IR sensor, ultrasonic sensor, vibration sensor, fuel flow sensor, Arduino Mega, motor, and keyboard are all included in this system. Fuel filling at gas stations is detected by a fuel flow sensor, which displays the amount of fuel loaded on an LCD. The level of fuel in a car is measured using an ultrasonic sensor. Fuel levels, car whereabouts, security passwords, and accident notifications are all sent through GSM. Every time the ignition is started, a one-time password (OTP) is transmitted to the registered mobile number. Only after the right OTP has been entered using the keypad will the vehicle start. [15].

In [16] It has been noted that automobiles do not maintain gasoline filled and fuel usage. It causes a loss of money. We are putting in place a microcontroller-based fuel monitoring and vehicle tracking system to prevent this. For measuring the amount of fuel utilised and the amount of fuel that has been poured into the vehicle, we have used a reed switch that operates on the Hall Effect principle. Following that, this record is kept in the system memory. This system keeps track of records for various logs. For our system, we used an MSP430F149 microcontroller. It is a 16-bit RISC architecture controller with extremely low power. A 12-bit ADC and a serial connection port are integrated in. To keep track of time, a Real Time Clock (RTC) is also offered. Moreover, we have utilized GPS tracking for the car. This study presents an embedded control system that is based on the microcontroller. The embedded control system is equipped to handle a wide range of tasks, including efficient fleet management tasks like fuel monitoring and vehicle

tracking. We can see where it was squandering time, money, and gasoline by using GPS vehicle tracking technologies and interactive maps.

Aurthor Mr M. Desai et al stated that the New trends in system designing are being driven by technological advancements and the availability of affordable open source hardware solutions. The collecting and analysis of data can be made easier with the Internet of Things (IoT) technology utilisation. The main objective of the study is to present a system that can, for research and development purposes, follow the location and vehicle characteristics of numerous test cars from a central location and store data on those characteristics on the server for subsequent analysis and recordkeeping. System design will be standardised for monitoring a variety of metrics, such as location, speed, engine compartment temperature, fuel usage, and many more. The suggested system relies on an open source controller and a GPS/GSM/GPRS module to transfer data. [17]... In [18] The strategy is imagined for any road tankers that transport petrol. Petroleum is purchased by end users like service stations from oil warehouses. However, this method depends on hardware because it is code. Included are ship electronics, DIY on-board, wireless communications, and GPS modules. make up hardware version 0.5, whilst data functions in PC code are performed using LabView. In this method, manual fuel monitoring would be replaced by an Automatic Electronic System (AES). This technology checks the fuel level and uses the GSM network to deliver the results to both the owner's device and mobile phone. In the event of a theft or discharge of petrol, it also provides a tool for identifying theft or fraud incidents. In addition, the gadget will keep an eye on things. Identifying the location of any occurrences that should have happened on any energy carrier...

M. Shanmugasundaram et al discussed that the A PCB is designed and constructed using an embedded device. Inside the vehicle is an embedded device with a SIM908 integrated GSM/GPS module that collects the vehicle's speed and location and transmits that information to a server. The gasoline level detecting circuit uses the fuel gauge found in all automobiles to determine the fuel level. The cost of connecting to the internet is higher, and the battery is used more frequently. In order to be effective, SMS capability is added to start/stop internet connection. When the owner needs to track the vehicle, an SMS is sent to the device, which then establishes a connection to the TCP server using GPRS. The vehicle's position, speed, and fuel level are all sent to the server. [19]... In [20] the authors stated that the Numerous applications, such as the security of private vehicles, public transportation networks, school buses, and others, benefit from the capacity to track vehicles. In order to make it simple and useful for users to locate their automobiles, vehicle tracking systems utilizing Both the Global System for Mobile Communications (GSM) modem and the Global Positioning System (GPS) have been created. The system will let customers track automobiles remotely using the mobile network. This project focuses on the notion of monitoring and tracking vehicles in order to provide the target vehicle with greater supervision. Based on ARM7, GSM, and GPS, this system. The transmission of the vehicle's information utilizes GSM technology. The precise

position of the car is included in this information. Mrs.S.A.Chiwhane et al discussed that the actual Vehicle fuel consumption and fuel fill-up records are not kept. It causes a loss of money. An IOT-based Fuel Monitoring system is used in the vehicle to implement a monitoring and tracking system to prevent this loss. The ESP8266 Wi-Fi chip is the foundation of the gasoline monitoring system. To determine the information regarding the tank's current fuel level and the quantity of fuel currently inserted, this system uses a Hall Effect Sensor. It feeds the ESP8266 Wi-Fi chip with data. The ESP8266 chip is a piece of hardware that links a flow sensor to a server, which subsequently sends data to a user's Android app. It stores data in memory in the event that the device is unavailable. Based on IOT technology, this system offers user identity security to authenticate access and identify false or impersonated devices in the network [21].

In [22],The publishers utilized RFID technology to track the bus, and a Thing speak web server to show the bus's location and available seats through an Android app on a mobile device. With the help of this system, passengers may make decisions about whether to board this bus or the next by knowing the precise location of the bus and its occupancy level. This lessens the likelihood of accidents and thefts, as well as the waiting time and crowds at bus stops.

Joe Redoes et al found that the Fuel checking has been the serious issue that the greater part of transport organizations hopes to address. To tackle this issue in a practical manner, we have built up an IoT-based global positioning system for transportation ebb and flow area of the transport and seat accessibility in the showing up transports. The above system proposed has been approved utilizing Android in this examination which permits workers towards following transports and realizing the normal appearance time. Applications are worked by forming those administrations and conveying into administration stages dispersed and facilitated in the Cloud that awards secure admittance to the information shared by these gadgets in compliance. The framework has been effectively and progressively planned and executed so it tends to be facilitated and utilized by any organization without the need to make any significant adjustments [23]. In [24]it is stated that due to Due to the rise in kidnapping and traffic accident instances, parents are constantly concerned about the safety of their children. This project suggests an android-based programmer that helps parents locate their children in real time. Active RFID modules are utilized to track the child's whereabouts, and the system's built-in biometric identification is used to determine the child's identity. Every time a child boards a bus, the system uses biometric identification to identify the child. It then updates the log on a server and notifies the parents, providing them with the child's current position and time. Parents may view the bus's location and will notified when the kids are getting on a bus or getting off one a bus.

These all 24 papers and surveys suggests that the maximum number of surveys and innovations consist of either RFID based module, GPS and GSM based tracking for detecting and locating the vehicles.Thus,given us the references of Wi-Fi modules like EPS8266 and Arduino Microcontroller

which provide us High-paced system for monitoring some essential functions like detecting objects , accidents and thefts etc. And also acquired that the Fuel monitoring in vehicles are varied in different technologies in every models Hence, we derived to make modifications in fuel system.

III. PROPOSED ARCHITECTURE

The suggested system's objective is to use a fuel level sensor to measure the amount of fuel in the vehicle tank. Better accuracy is provided by the IR and ultrasonic sensors, which are also simple to calibrate and connect to the Arduino controller. employed. We can determine the fuel level in the tank in this manner. The system also utilises GPS to track a vehicle's location; earlier, data regarding a vehicle's location was obtained from the GPS module should be transformed into a format that will enable the system to use it for additional analysis and prediction. The tool is created. by empowering fleet operators, to reduce fuel use and maximise fuel utilisation. once the system is mounted The sensor in the appliance keeps track of how much fuel is consumed from the fuel tank, giving you accurate access to consumption data whenever you need it.

The proposed machine makes use of generation that integrates a cellphone application with a microcontroller.

A device is placed using the Global Positioning System (GPS) to determine the bus's location inside the vehicle. The application will allow users to keep an eye on a moving vehicle whenever they choose. The system's experimental findings are presented in this project. to efficiently track and monitor the school bus, and also if any accident occurs vibration sensor send that information to controller it will communicate with the application send a alerts message to the bus depo or to school Administrator.

The live location can be followed by the parents. The school organization and parents can continuously monitor the bus and also keep in check with the driver's behavior. This will ensure the students safety while pick up and drop off.

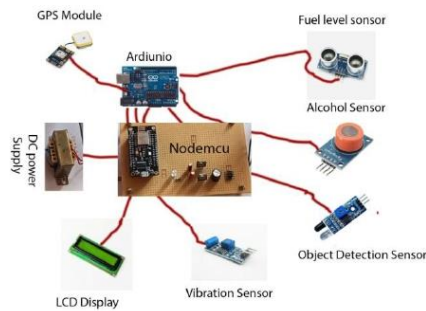


Figure-1 Circuit diagram

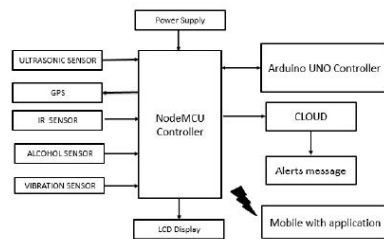


Figure-2 System Architecture

Three steps/processes make up the proposed system.

- Master controller
- Slave Node
- Web Application



A. Master controller

It acts as a brain within the system, Arduino uno sends data to and fro between slave nodes and web application for constant monitoring and visual display of the data. As Arduino Microcontroller is shown in Figure-3 Acts as Master controller.



Figure-3 Arduino Uno microcontroller

B. Slave-Node



Figure-4 Sensors

Each sensor is connected to the master controller and sensors to receive the relevant data about the status of the device. Based on the data sent by sensors to master controller, the slave node receives the instructions to perform the relevant task.

C. Web Application

The data from sensors is sent to microcontroller which in turns sends the data to the web application for constant monitoring and visualization control of the connected devices as well as the data system. Example : Blynk app (shown in Figure-6). The Blynk platform's main objective is to develop extremely simple applications that can communicate with your Arduino. It's simple to create an application using blynk. Using Blynk, you can easily control a LED or a motor with almost no amount of programming from your phone. Blynk is not only a simple software for little things; it can be scaled for usage by both industry and amateurs. Blynk's total access to the microcontroller is provided by being connected to it, sensors and the microcontroller.

We Use another IOT based web application for vehicle tracking, which is based in UBIDOTS software as shown in Figure-5.

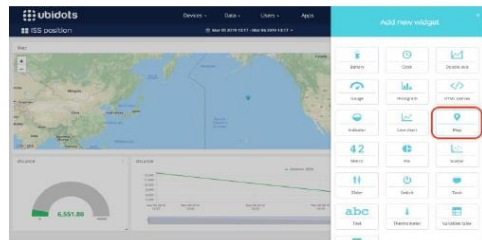


Figure-5 UBIDOTS Application

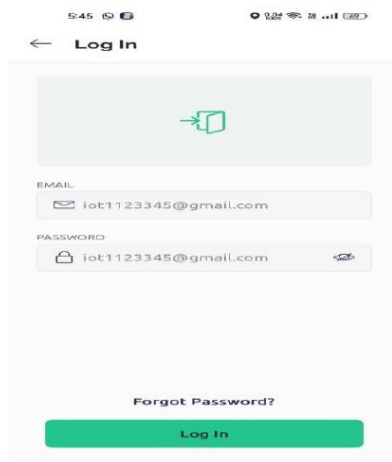


Figure-6Blynk Mobile Application(Login page)

D. GPS For Tracking

1. 1. Connect the GPS module as per the schematic in Figure 7 below.
2. Install the Ubidots library for ESP8266(NODEMCU).
3. Open a Ubidots account. Your API credentials can be found by selecting the selection from the top-right dropdown on the dashboard. Copy the token from there and enter it, along with your wifi SSID and password, in the code provided below.

4. Launch the serial monitor after the code has been executed. Every time data is successfully sent, "OK" will be printed after a successful connection to Ubidots. It can take some time for the GPS module to begin returning data.
5. Add a map widget from the dashboard by clicking the plus sign, then choose your device.

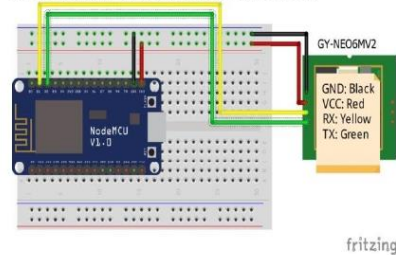


Figure-7 GPS fritzed with NODEMCU

IV. EXPERIMENTAL RESULT

Hence we can successfully monitor the fuel level and amount of fuel present in our vehicle and plan our route accordingly. Apart from fuel monitoring we can keep insights of accident occurrence through Vibration sensor, Object and person detection by IR sensor and can detect whether Driver is drunk or not by using Alcohol sensor which can be fixed on centre of the steering wheel.

In our system Arduino and NodeMCU are combined to provide Serial communication is necessary to send sensor data or any other type of data from one device to another. In our case it is (ESP8266) NodeMCU and Arduino. The below snippet (Fig-6) is the instance of working system in Blynk App. When you login into the Blynk app, you can test the working of all sensors mentioned on the screen.

The parameters present in the app (Fuel, Vibration, Object, Alcohol) specify the model. As we can see the fuel percentage and Red dot/buzzer shown on the picture is to justify the working of sensors. If red dot blinks on every sensor.

Future Scope

- If the driver is found to be drinking alcohol. We are then informed via the Blynk app. Administrator may prevent him from doing his duties and from driving.
- User can in-built this Fuel Monitorization system in other various transporting vehicles such as trucks, tempos etc.

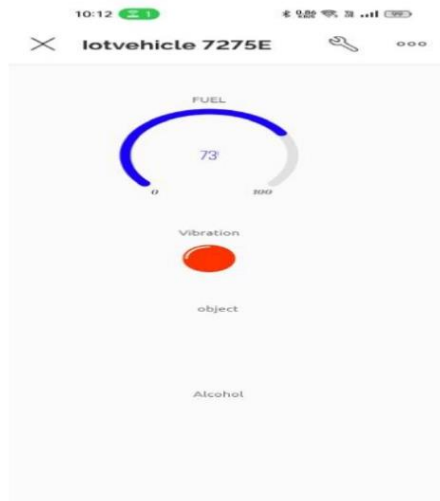


Figure-8 Readings of all Sensors(In Blynk App)

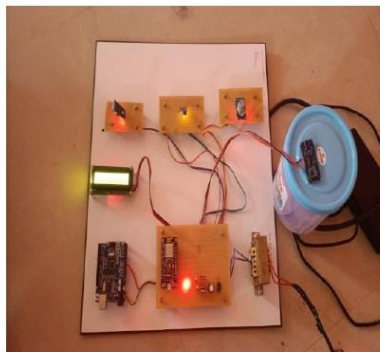


Figure-9 Circuit Design

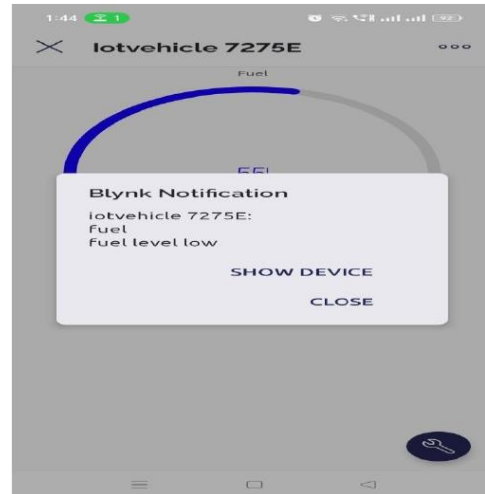


Figure-10 Alert Message

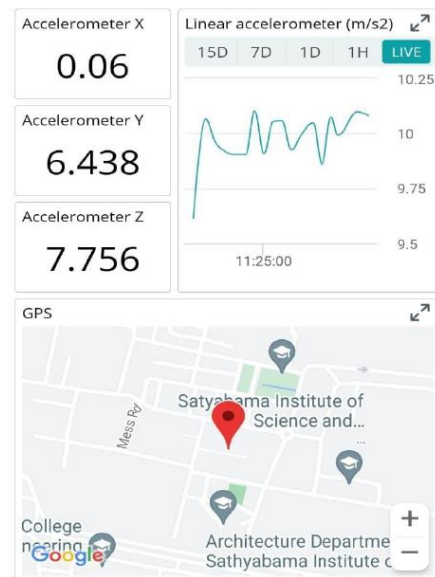


Figure-11 GPS Location of Vehicle

V.CONCLUSION

The Smart School Bus app is a on hand device that dad and mom can use to check on their children and faculty officials to song drivers. Thus, a college bus safety gadget become created as a part of this plan, offering comprehensive commuting security. The gadget has real-time tracking, pupil identity, and the capacity to play rush-hour traffic, road closures, delays, mishaps, and student absences. absolute development. The system is prepared for implementation after successfully completing the alpha and beta steps. Compared to NodeMCU and Ardiunio based systems, the characteristic is superior and more accurate because alerts may be immediately erased whereas GSM systems pick up spam messages.

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