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COLLEGE OF ENGINEERING
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
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Ministry of Human Resource Development, Government of India

Outer Ring Road, Bellandur, Bengaluru – 560103

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EEE84 Project - Phase I

Report on

INITIALISE OF COCKPIT VOICE RECORDER

Submitted in the partial fulfilment of the Final Year Project - Phase I

Submitted by

SUPROVO BANERJEE	**1NH16EE749**
SUMIT BHAWAL	**1NH17EE753**
DILKASH IMAM	**1NH16EE715**

2020-2021

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belgaum: 590018

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

CERTIFICATE

Certified that the Project work entitled **"INITIALISE OF COCKPIT VOICE RECORDER"** carried out by: **SUPROVO BANERJEE (1NH16EE749), SUMIT BHAWAL (1NH17EE753), DILKASH IMAM (1NH16EE715),** bonafide student(s) of New Horizon College of Engineering submitted report in the partial fulfilment for the award of Bachelor of Engineering in **Department of Electrical and Electronics Engineering, New Horizon College of Engineering** of Visveswaraiah Technological University, Belgaum during the Year 2020-2021.

It is certified that all the corrections / suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for said Degree.

Name & Signature of the Project Guide	**Name & Signature of Head of the Department**	**Signature of Principal**
Mr. MUNIPRAKASH T	Dr. MAHESH M	Dr.MANJUNATHA

SEMESTER END EXAMINATION

Internal Examiner **External Examiner**

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ACADEMIC YEAR: 2020 – 2021

DEPARTMENT OF ELECTRICAL AND ELCTRONICS ENGINEERING

DECLARATION

Certified that the final year phase-I project work entitled "**INITIALISE OF COCKPIT VOICE RECORDER**" carried out by:

1.) SUPROVO BANERJEE - 1NH16EE704
2.) SUMIT BHAWAL - 1NH17EE753
3.) DILKASH IMAM - 1NH16EE715

Bonafied students of New Horizon College of engineering, submitted report in completion of final year phase-I project under the guidance of Dr. MAHESH M HOD of Department of Electrical and Electronics, New Horizon College of Engineering during the academic year 2020-2021. It is certified that all the corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department. The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the said degree.

Project Co – ordinator	**Head of the Department**
Prof. GUNAPRIYA	**Dr. MAHESH M**

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ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of this project would be incomplete without the mention of the people who made it possible, without whose constant guidance and encouragement would have made efforts go in vain. We consider ourselves privileged to express gratitude and respect towards all those who guided us through the completion of this project.

We are also grateful to Dr. MAHESH M, the Head of Department, Electrical and Electronics, for the brainwave and encouragement given.

We also convey our thanks to our project guide Mr. Muniprakash T of Electrical and Electrical engineering Department for providing encouragement, constant support and guidance which was of a great help to complete this project successfully.

Last but not the least, we wish to thank our parents for financing our studies in this college as well as for constantly encouraging us to learn. And also to our friends for their cooperation and compliance.

ABSTRACT

Automobiles and technologies square measure making a brand new level of the info services in vehicles. The Cockpit Voice Recorder box has functions that is {analogous|is comparable} to an aeroplane recording equipment. it's wont to analyse the explanation for accidents. This project proposes a model of a automobile recording equipment system which will be put in into the cars. The aim of the project is to attain accident analysis by objectively chase what happens within the vehicles. additionally to the present, the Cockpit Voice Recorder system sends associate alert message to the user mobile that's connected through Bluetooth module, just in case of incidence of associate accident. The recording equipment system conjointly uses,GPS device together location knowledge.

The automobile recording equipment system in the main helps the insurance firms with their automobile crash investigations and conjointly records the road standing so as to forestall or decrease death rates. during this project we are going to be endlessly watching the vehicle performance mistreatment sensors and also the behaviour of the driving force with the employment of IoT technology.

LIST OF THE FIGURES

Chapter -2

Chapter-2

Chapter-5

NOMENCLATURES:

V_{d0} : Ideal no load direct voltage

α : Delay or ignition angle

V_d : Direct voltage per pole

I_d : Direct current per pole

E_{ac} : AC line voltage

P,Q : Active and reactive power transmitted from bus

I_s : AC current drawn from bus

φ : Phase angle difference between E_{ac} and I_s

T : Converter transformer tap ratio

X_c : Commutating reactance per bridge/phase

R_c : Commutating resistance per bridge/phase

B : No. of bridges in series

γ : Extinction angle

I_m : Current margin

I_{ord} : Current order

α_{min},γ_{min} : Minimum firing angle of rectifier and inverter respectively

Subscripts r, i refers to rectifier and inverter side respectively.

Chapter 1

INTRODUCTION

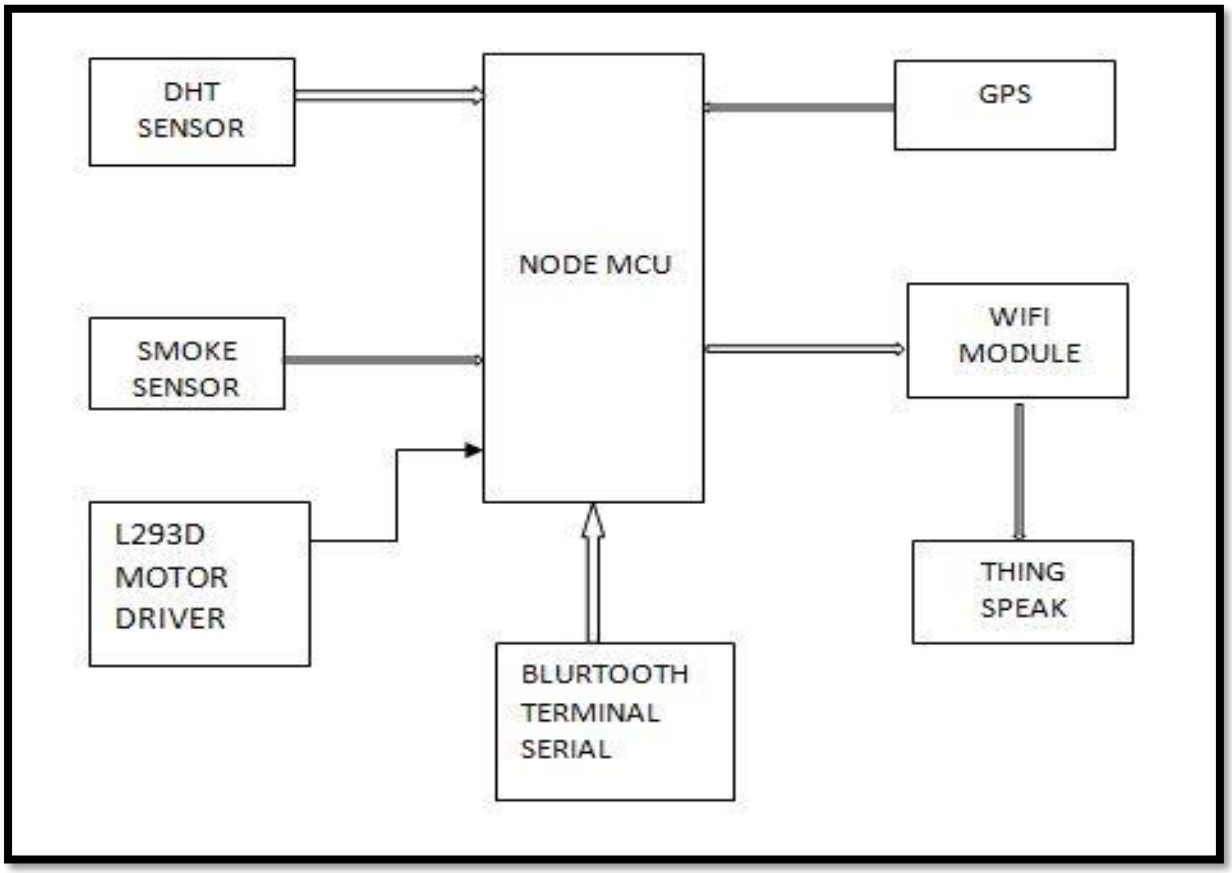
According to the WHO (World Health Organization), millions of people die every year because of the vehicle-related accidents. In order to prevent these situation, the car black box system is introduced. Like all flight related accident datas are recorded in “Black Box” similarly, the car Voice Recorder technology can now play a vital role in vehicle crash investigations. That is why it is significant to have recorders which will track all the activity in vehicles during and after accident or crash. This car black box system is mainly classified in two sections. First section detects and collects the information from the vehicle. And it is implemented by using various types of sensors.

Second section presents the data to the user in simplified way. And it is implemented by using the Node MCU (microcontroller) which is programmed in a way that it not only record the data but also retrieve the data from the Node MCU.

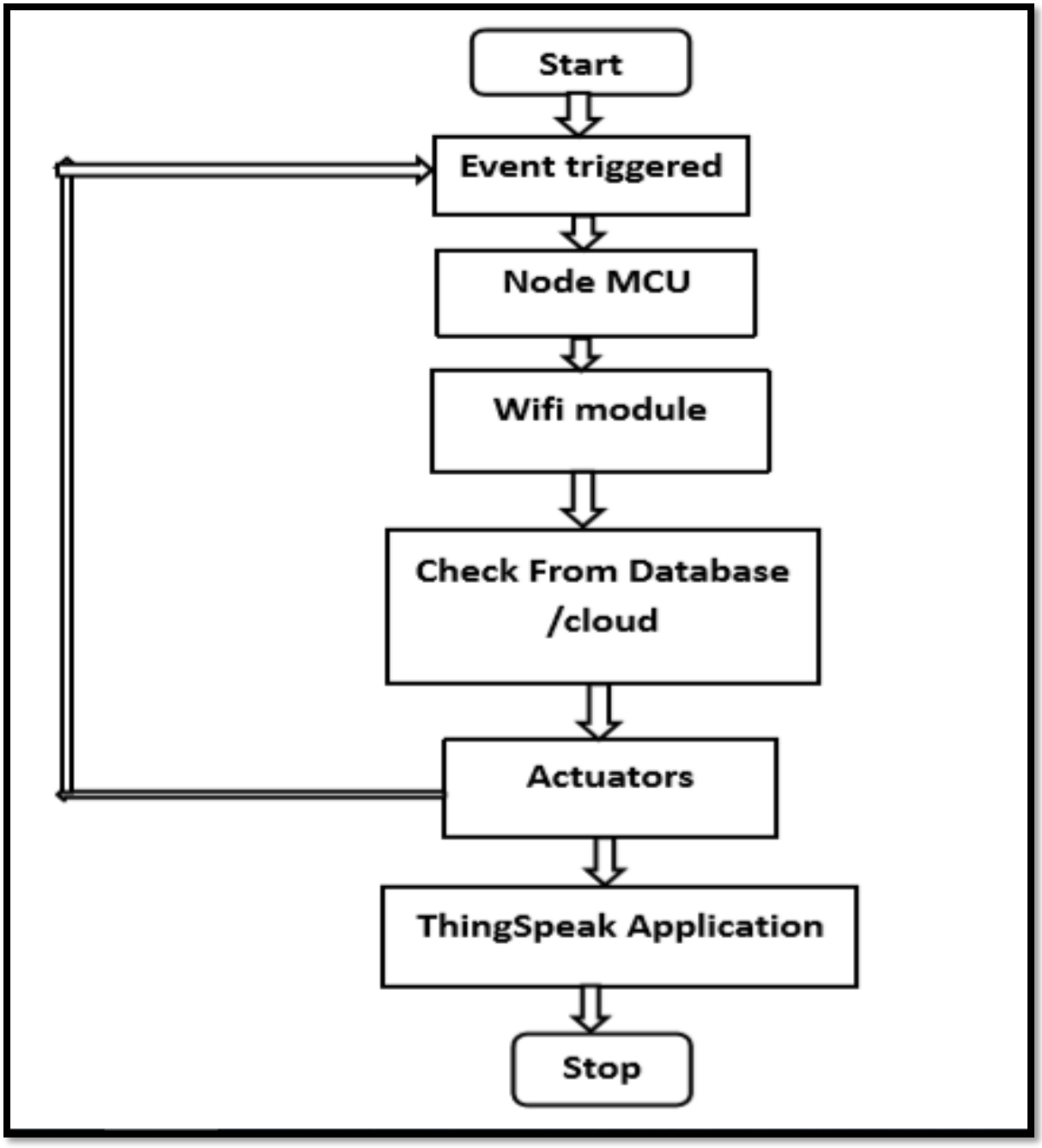
If any vehicle crashes, the geographical co-ordinates or location is sent to the pre-stored mobile number to seek help. The investigators can use this recorded data obtained from the car black box to identify the actual reason of the accident.

Chapter 2

BLOCK DIAGRAM



FLOWCHART


Start
Event triggered
Node MCU
Wifi module
Check From Database /cloud
Actuators
ThingSpeak Application
Stop

EXPLANATION OF BLOCK DIAGRAM

In this car black box system we are mainly using three sensors: Temperature sensor, Humidity sensor and Smoke sensor.The input which is provided to the microcontroller is in the form of analog data.The fundamental capacity of the microcontroller program is to take input tests from various ports. These inputs can betaken from the sensors introduced in the vehicle. In order to control all the inputs of the sensor, digital process is introduced. After that, every sensor test is spared into the microcontroller's EEPROM.This data is converted by the microcontroller to the digital format and then this data is shown on the android phone via Bluetooth module.

The temperature of the vehicle can be detected using the temperature sensor. This sensor mainly detects two types of temperatures such as: abnormal temperature and engine temperature. L293d Motor Driver works on the concept of H-bridge. H-bridge is a circuit which enables the voltage to be flown in either direction. As we are aware of the fact that voltage need to change its direction to turn the engine in clockwise or anticlockwise direction. Hence H-bridge IC are perfect for driving a DC engine.In a solitary L293D chip there are two H-bridge circuit inside the IC which can turn two dc engine autonomously. Due its size it is especially utilized in mechanical application for controlling DC engines.

The GPS (Global Positioning System) is a fast growing technology, which provides flexibility of positioning for surveying and navigation of data captured. The GPS provides continuous positioning of the data throughout the day. Once the position of the user is determined, the GPS calculate other useful datas such as speed, trip distance, distance to the destination etc. When any accident occurs the GSM will send SMS on the mobile number which was stored earlier.

COMPONENTS REQUIRED

SL.NO.	COMPONENT NAME
1.)	Node MCU
2.)	DHT11 Sensor
3.)	Smoke Sensor
4.)	L293D Motor Driver
5.)	DC Motor
6.)	Thing Speak cloud
7.)	Bluetooth Module
8.)	GPS Smart Antenna

1. NODE MCU

The Node MCU (Node MicroController Unit) is an open source programming and equipment improvement condition that is worked around an economical System-on-a-Chip (SoC) called the ESP8266. The ESP8266, structured and fabricated by Espressif Systems, contains every single vital component of the advanced PC: CPU, RAM, organizing (wifi), and even a cutting edge working framework and SDK.

ESP8266 is a low-cost wifi module that is configured to connect to internet for Internet of Tings (IoT) and similar technology. Normally any electrical or mechanical equipment cannot connect to the internet on their own so they have to build a setup for analysing, monitoring and controlling of equipment and this can be done by connecting ESP8266 to Internet of Things.

The NodeMCU Development board consists of wifi capability, analog pin, digital pins and serial communication protocols.We have to code in C\C++ programming language if Arduino IDE is used for developing Node MCU applications and Lua language is used if ESPlorer IDE is used.Fundamentally, Node MCU is Lua Interpreter, so it can comprehend Lua content effectively. At the point when we compose Lua scripts for Node MCU and send/transfer it to Node MCU, at that point they will get executes successively. It won't fabricate binary firmware record of code for Node MCU to compose. It will send Lua content all things considered to Node MCU to get execute.

In Arduino IDE when we compose and gather code, ESP8266 toolchain in foundation makes binary firmware record of code we composed. What's more, when we transfer it to Node MCU then it will streak all Node MCU firmware with recently produced binary firmware code. Truth be told, it composes the total firmware.

2. DHT11 SENSOR

DHT11 is a minimal effort digital sensor for detecting temperature and humidity. This sensor can be effectively interfaced with any small scale controller, for example, Arduino, Node MCU, Raspberry Pi and so forth… to quantify humidity and temperature momentarily.

DHT11 humidity and temperature sensor is accessible as a sensor and as a module. The contrast between this sensor and module is the draw up resistor and a power-on LED. DHT11 is a relative humidity sensor. To quantify the encompassing air this sensor utilizes a thermistor and a capacitive humidity sensor.DHT11 sensor comprises of a capacitive humidity detecting component and a thermistor for detecting temperature. The humidity detecting capacitor has two anodes with a dampness holding substrate as a dielectric between them. Change in the capacitance esteem happens with the adjustment in humidity levels. The IC measure, process this changed resistance esteems and change them into digital form.For estimating temperature this sensor utilizes a Negative Temperature coefficient thermistor, which causes a lessening in its resistance esteem with increment in temperature. To get bigger resistance esteem in any event, for the littlest change in temperature, this sensor is normally comprised of semiconductor earthenware production or polymers.DHT11 sensor consists of four pins: VCC, GND, Data Pin and a not associated pin. A resistor of 5k to 10k ohms is given to communicate between sensor and microcontroller.This sensor is utilized in different applications, for example: measurement of humidity and temperature esteems in warming, ventilation and air conditioning frameworks. Climate stations likewise utilize these sensors to anticipate climate conditions. The humidity sensor is utilized as a preventive measure in homes where individuals are influenced by humidity. Workplaces, vehicles, galleries, nurseries and enterprises utilize this sensor for estimating humidity esteems and as a security measure.Each DHT11 sensors includes very precise adjustment of humidity alignment chamber.

The alignment coefficients put away in the OTP program memory, inner sensors distinguish flag simultaneously, we should call these adjustment coefficients. The single-wire sequential interface framework is incorporated to turn out to be speedy and simple. Little size, low power, signal transmission separation up to 20 meters, empowering an assortment of uses and even the most requesting ones. The item is 4-pin single column pin bundle. Helpful association, exceptional bundles can be given by clients need.

The DHT11 also estimates relative humidity. Relative humidity is the measure of water vapour in air to the immersion purpose of water vapour in the air. At the immersion point, water vapour begins to gather and aggregate on surfaces framing dew.

The immersion point changes with air temperature. Cold air can hold less water vapour before it gets soaked, and sight-seeing can hold more water vapour before it gets immersed.

The relative humidity is calculated by:

$$\text{Relative Humidity} = \frac{\rho_w}{\rho_s} * 100$$

Where,

ρ_w:Density of water vapour

ρ_s :Density of water vapour at saturation

3. SMOKE SENSOR

A smoke sensor is a device which is used to detect smoke, commonly as a pointer of fire. Business security devices issue a sign to a fire alarm control board as a major aspect of a fire alarm framework, while family smoke detectors, otherwise called smoke alarms, for the most part issue a neighbourhood discernible or visual alarm from the detector itself or from various detectors if there are numerous smoke detectors interlinked. There are mainly two types of smoke detectors: Ionization smoke detector and Photocell smoke detector.

Ionization smoke detector uses radioisotope to ionize air. Ionization detectors are highly sensitive to the flaming phase of fires than optical detectors, while optical detectors are progressively sensitive to fires in the early seething stage.The smoke detector has two ionization chambers, one open to the air, and a reference chamber which doesn't permit the passage of particles. The radioactive source discharges alpha particles into the two chambers, which ionizes some air atoms. There is a potential difference (voltage) between sets of electrodes in the chambers; the electrical charge on the particles enables an electric current to stream. The currents in the two chambers ought to be equivalent to they are similarly influenced via gaseous tension, temperature, and the maturing of the source. On the off chance that any smoke particles enter the open chamber, a portion of the particles will connect to the particles and not be accessible to convey the current in that chamber. An electronic circuit recognizes that a current difference has created between the open and fixed chambers, and sounds the alarm.The circuitry likewise screens the battery used to supply or back up power, and sounds a discontinuous admonition when it approaches weariness. A client worked test button mimics an irregularity between the ionization chambers, and sounds the alarm if and just if control supply, electronics, and alarm gadget are useful. The current drawn by an ionization smoke detector is low enough for a little battery utilized as sole or reinforcement control supply to have the option to give capacity to months or years without the requirement for outside wiring.Ionization smoke detectors are generally less expensive to make than optical detectors. They might be progressively inclined to bogus alarms activated by non-dangerous occasions than photoelectric detectors, and have been seen as much more slow to react to normal house fires.

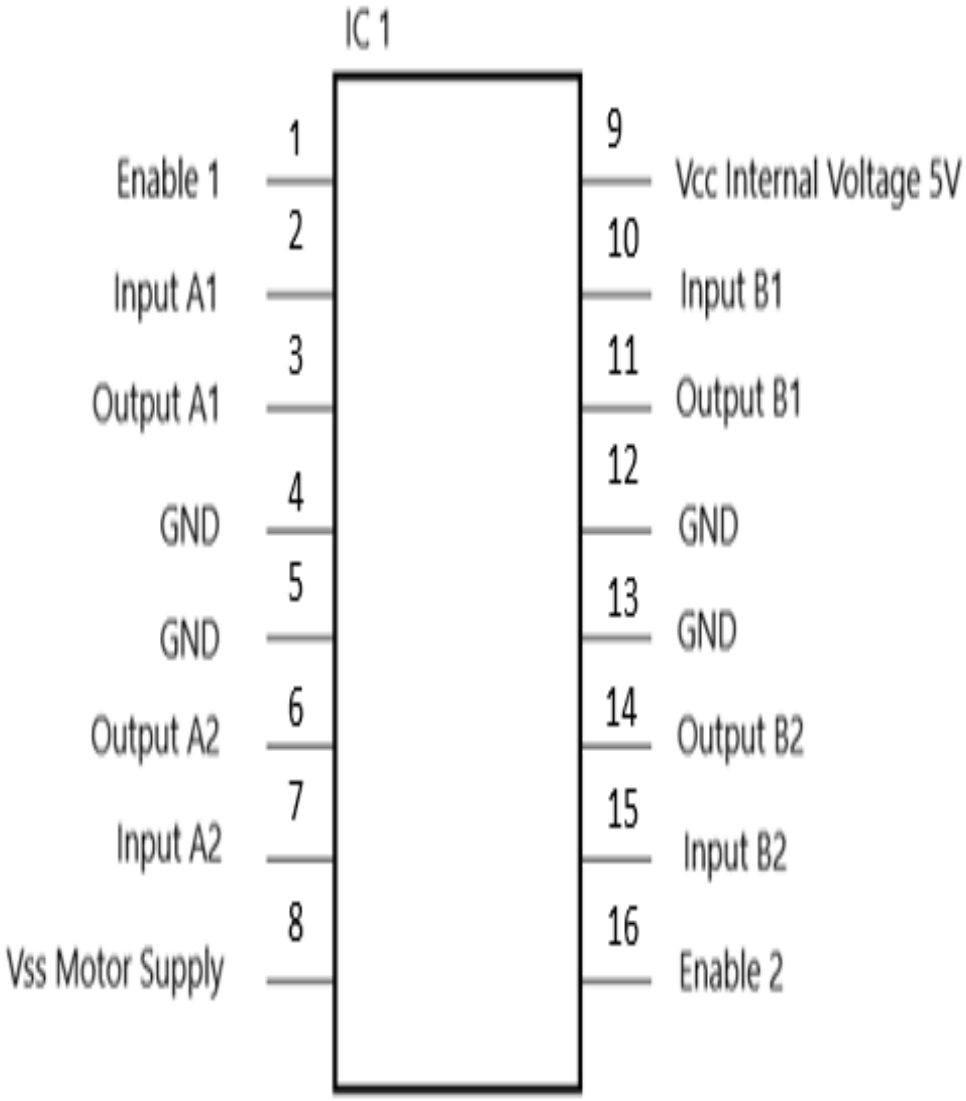
Photoelectric smoke detector is also called as optical smoke detector, contains a source of infrared, visible, or ultraviolet light (commonly a radiant light bulb or light-emitting diode), a

focal point, and a photoelectric recipient (regularly a photo diode). In spot-type detectors these parts are organized inside a chamber where air, which may contain smoke from a close by fire, streams. In huge open zones, for example, atria and assembly rooms, optical pillar or anticipated shaft smoke detectors are utilized rather than a chamber inside the unit: a divider mounted unit discharges a light emission or ultraviolet light which is either gotten and handled by a different gadget, or reflected back to the collector by a reflector. In certain kinds, especially optical pillar types, the light produced by the light source goes through the air being tried and comes to the photo sensor. The light intensity will be diminished because of dissipating from particulates of smoke, air-borne dust, or different substances; the circuitry distinguishes the light force and creates the alarm in the event that it is underneath a predetermined edge, potentially because of smoke. In different kinds, regularly chamber types, the light isn't aimed at the sensor, which isn't lit up without particles. On the off chance that the air in the chamber contains particles (smoke or residue), the light is dissipated and some of it arrives at the sensor, setting off the alarm.

4. L293D MOTOR DRIVER

L293D is an ordinary Motor driver or Motor Driver IC which permits DC motor to drive on either direction. L293D is a 16-pin IC which can control a lot of two DC motors at the same time in any direction. It implies that you can control two DC motor with a solitary L293D IC. It can drive both small as well as big motors.It works on the principle of H-bridge. H-bridge is a circuit which enables the voltage to be flown in either direction. As we are aware of the fact that voltage need to change its direction for having the option to turn the motor in clockwise or anticlockwise direction, hence H-bridge IC are perfect for driving a DC motor.

In a solitary L293D chip there are two H-Bridge circuit inside the IC which can turn two dc motor autonomously. Due its size it is especially utilized in mechanical application for controlling DC motors.


IC 1
1
Enable 1
2
Input A1
3
Output A1
4
GND
5
GND
6
Output A2
7
Input A2
8
Vss Motor Supply
9
Vcc Internal Voltage 5V
10
Input B1
11
Output B1
12
GND
13
GND
14
Output B2
15
Input B2
16
Enable 2

L293D PIN DIAGRAM:

There are two Enable pins on L293D i.e., pin 1 and pin 9, for having the option to drive the motor, the pin 1 and 9 should be high. For driving the motor with left H-bridge you have to enable pin 1 to high.

For right H-Bridge we have to make the pin 9 to high. In the event, that any of the either pin 1 or pin 9 goes low, then the motor in the comparing segment will suspend working. It resembles a switch.There are 4 input pins in the L293D motor driver i.e., pin 2, pin 7 on the left and pin 15, pin 10 on the right. Left input pins will control the rotation of motor associated crosswise over left side and right input for motor on the right hand side. The motors are rotated based on the inputs given to the input pins as LOGIC 0 or LOGIC 1. We just have to provide LOGIC 0 or LOGIC 1 to the input pins.

L293D LOGIC TABLE:

- Pin 2 = Logic 0 & Pin 7 = Logic 1 || Anticlockwise Direction
- Pin 2 = Logic 1 & Pin 7 = Logic 0 || Clockwise Direction
- Pin 2 = Logic 1 & Pin 7 = Logic 1 || Idle (No Rotation)
- Pin 2 = Logic 0 & Pin 7 = Logic 0 || Idle (No Rotation)

5. DC MOTOR

A DC motor is a type of rotational electrical machines that changes over direct current electrical energy into mechanical energy. The most well-known sorts depend on the powers delivered by magnetic fields. About a wide range of DC motors have some inner instrument, either electro-mechanical or electronic, to occasionally alter the course of current stream in part of the motor.

DC motors were the principal type of motor broadly utilized, as they could be powered from existing direct-current lighting power appropriation frameworks. A DC motor's speed can be controlled over a wide range, utilizing either a variable stock voltage or by changing the quality of current in its field windings. Little DC motors are utilized in devices, toys, and apparatuses. The universal motor can work on direct current yet is a lightweight brushed motor utilized for compact power instruments and apparatuses. Bigger DC motors are currently utilized in impetus of electric vehicles, lift and raises, and in drives for steel moving factories. The approach of power hardware has made supplanting of DC motors with AC motors conceivable in numerous applications.

The armature and the field windings are connected in series in the series DC motor with a common DC power source. This type of motors have very high starting torque and are commonly used for starting high inertia loads such as: trains, elevators or hoists. A series DC motor should never start at no load. As there is no mechanical load on the series motor, the current is low and so the armature should rotate faster to produce sufficient counter EMF to balance the supply voltage. Series motor which are called as universal motors can be used on the alternating current. Hence the armature voltage and the field direction are reversed at the same time, torque continues to produce in the same direction.

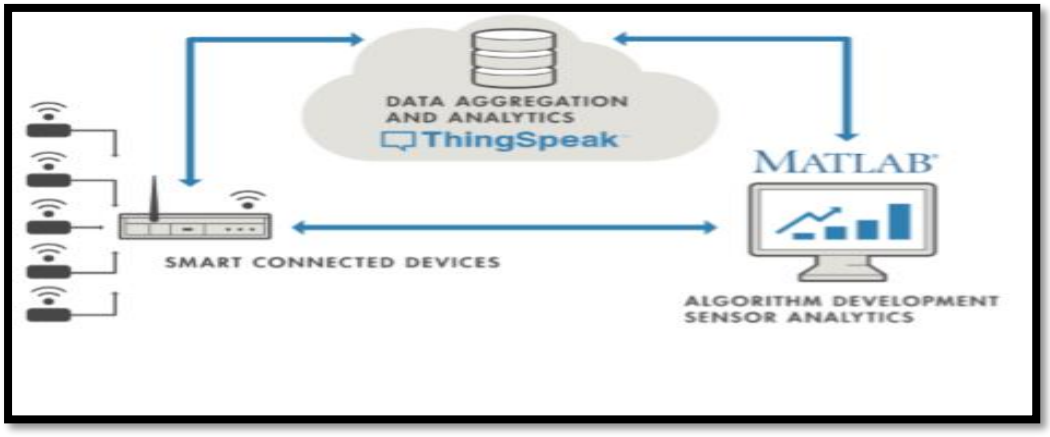
6. THINGSPEAK CLOUD

ThingSpeak is an internet of Thing platform that allows you to gather and store sensor information in the cloud and create IoT applications. The ThingSpeak IoT platform gives applications that let you breakdown and picture your information in MATLAB and afterward follow up the information.

ThingSpeak is an IoT investigation platform administrative that enables you to total, envision and break down live information streams in the cloud. ThingSpeak is regularly utilized for prototyping and evidence of idea Io frameworks that require investigation.

ThingSpeak aggregate, visualize and analyse the live data streaming on the cloud. Some of the key feature of ThingSpeak cloud includes:

- Configure devices easily to send information to ThingSpeak utilizing well known IoT protocols.
- Visualize sensor information continuously.
- Aggregate information on-demand from outsider sources.
- Utilize the power of MATLAB to understand IoT data.
- Run IoT analytics consequently depending on events.
- Prototype and assemble IoT frameworks without setting up servers or creating web programming.



7. BLUETOOTH MODULE

In communication, the Bluetooth wireless technology is the fastest growing and is very popular in the fields of wireless technology. These days, requests of cell phones and individual communication the bandwidth are simple and advantageous to utilize. The Bluetooth technology deals with the communication channel of the wireless part. The Bluetooth modules can transmit and receives the information wirelessly by utilizing two gadgets. The Bluetooth module can get and transmits the information from a host framework with the assistance of the host controller interface (HCI). The UART and USB are the most prevalent host controller interfaces. By utilizing the UART associations, the Bluetooth module can be incorporated and it gives the most ideal answers for the Bluetooth embedded systems.

HC 05 Bluetooth is a wireless communication protocol which is utilized in two devices as a sending and receiving the data. The Bluetooth is allowed to use in the wireless communication protocol as the scope of the Bluetooth is not exactly the different wireless communication protocols like Wifi and ZigBee. The Bluetooth works at the frequency of 2.41 GHz and furthermore utilized in numerous little scopes of utilizations.

Bluetooth module can be classified into three types:

Class 1: In this type of Bluetooth module the output ranges around 100mW and the distance between the two Bluetooth module devices is about 100m.

Class 2: In this type of Bluetooth module the output ranges around 2.5mW and the distance between two Bluetooth module devices is about 10m.

Class 3: In this type of Bluetooth module the output ranges around 1mW and the distance between two Bluetooth module devices is about 10cm.

8. GPS SMART ANTENNA

The Global Positioning System (GPS), is a satellite which is based on radio navigation system owned by the US government and worked by the United States Air Force. It is a global navigation satellite system (GNSS) that gives geo-location and time data to a GPS receiver anyplace on or close to the Earth where there is an unhindered viewable pathway to at least four GPS satellites. Obstacles, for example, mountains and structures obstruct the generally powerless GPS signals.

The GPS doesn't require the user to transmit any information, and it works autonomously of any telephonic or internet gathering, however these advancements can upgrade the value of the GPS positioning data. The GPS gives basic positioning abilities to military, common, and business clients around the globe. The United States government made the system, looks after it, and makes it uninhibitedly open to anybody with a GPS receiver.

GPS consists of three segments:

8.1 Space Segment:

The space segment is defines as the number of satellites in the constellation. It contains 29 satellites revolving around the earth at regular intervals at 12,000 miles in elevation or altitude. The capacity of the space segment is used to course/navigation signals and to store and re-transmit the course/navigation message sent by the control section. These transmissions are constrained by profoundly stable atomic clocks on the satellites. The GPS Space Segment is framed by a satellite heavenly body with enough satellites to guarantee that the clients will have, in any event, 4 synchronous satellites in see from any point at the Earth surface whenever.

8.2 Control Segment

The control segment involves an ace control station and five screen stations furnished with atomic clocks that are spread far and wide. The five screen stations screen the GPS satellite signals and afterward send that certified data to the ace control station where variations from the norm are reconsidered and sent back to the GPS satellites through ground receiving wires. Control segment is also known as monitor station.

8.3 User Segment

The user segment consists of GPS receiver, which gets the signals from the GPS satellites and decide the distance away it is from each satellite. For the most part this segment is utilized for the U.S military, rocket direction systems, non-military personnel applications for GPS in pretty much every field. The majority of the non-military personnel utilizes this from study to transportation to normal assets and from that point to horticulture reason and mapping as well.

The working/activity of Global positioning system depends on the 'trilateration' mathematical principle. The position is calculated from the distance measurements to satellites. Four satellites are utilized to decide the situation of the receiver on the earth. The objective area is affirmed by the fourth satellite. What's more, three satellites are utilized to follow the area place. A fourth satellite is utilized to affirm the objective area of every one of those space vehicles. Global positioning system comprises of satellite, control station and screen station and receiver. The GPS receiver takes the data from the satellite and uses the strategy for triangulation to decide a user's definite position.

Chapter 3

WORKING OF MODEL

On the left, we've the sensible devices (the “things” in IoT) that live at the sting of the network. These devices collect information and embrace things like wearable devices, wireless temperatures sensors, pulse rate monitors, and hydraulic pressure sensors, and machines on the manufactory floor.

In the middle, we've the cloud wherever information from several sources is aggregative and analysed in real time, usually by Associate in Nursing IoT analytics platform,designed for this purpose.

The right a spect of the diagram depicts the formula development related to the IoT application. Here Associate in Nursing engineer or information someone tries to achieve insight into the collected information by playing historical analysis on the info. In this case, the info is force from the IoT platform into a desktop package surroundings to modify the engineer or someone to epitome algorithms that will eventually execute within the cloud or on the sensible device itself.

An IoT system includes of these parts. ThingSpeak fits within the cloud a part of the diagram and provides a platform to quickly collect and analyse information from net connected sensors.

Chapter 4

CODING SECTION

```
#define SECRET_SSID "EEE"
#define SECRET_PASS "EEE@1234"
#define SECRET_CH_ID 814162
#define SECRET_WRITE_APIKEY "UJ6NIE7YUD4T7LXK"
#include "ThingSpeak.h"
#include "DHT.h"
#include <ESP8266WiFi.h>
charssid[] = SECRET_SSID;               // your network SSID (name)
char pass[] = SECRET_PASS;              // your network password
intkeyIndex = 0;
WiFiClient  client;
unsigned long myChannelNumber = SECRET_CH_ID;
const char * myWriteAPIKey = SECRET_WRITE_APIKEY;
int M1 = D5;
int M2 = D6;
int M3 = D7;
int M4 = D8;
float smoke=0;
int y=0;

// defining the pins
```

```
DHT dht;
float humidity=0;
float temperature=0;
void setup() {
pinMode(M1, OUTPUT);
pinMode(M2, OUTPUT);
pinMode(M3, OUTPUT);
pinMode(M4, OUTPUT);
pinMode(D1, INPUT);
dht.setup(D4);
Serial.begin(9600); //Define baud rate for serial communication //
WiFi.mode(WIFI_STA);
ThingSpeak.begin(client);  // Initialize ThingSpeak
}
void loop() {
smoke=analogRead(A0);
Serial.println(smoke);
delay(1000);
Dht();
delay(1000);
upload(1,2,3,humidity,temperature,smoke);
if (Serial.available())  //If data is available on serial port//
{
chardata_received;
data_received = Serial.read();  //Data received from bluetooth//
```

```
if (data_received == 'A')
{
digitalWrite(M1, HIGH);
digitalWrite(M2, HIGH);
digitalWrite(M3, LOW);
digitalWrite(M4, LOW);
Serial.println("Forward");
}
else if (data_received == 'B')
{
digitalWrite(M1, LOW);
digitalWrite(M2, LOW);
digitalWrite(M3, HIGH);
digitalWrite(M4, HIGH);
Serial.println("Backward");
}
else if (data_received == 'C')
{
digitalWrite(M1, HIGH);
digitalWrite(M2, LOW);
digitalWrite(M3, HIGH);
digitalWrite(M4, LOW);
Serial.println("left");
}
else if (data_received == 'D')
```

```
{
digitalWrite(M1, LOW);
digitalWrite(M2, HIGH);
digitalWrite(M3, LOW);
digitalWrite(M4, HIGH);
Serial.println("right");
}
else if (data_received == 'E')
{
digitalWrite(M1, LOW);
digitalWrite(M2, LOW);
digitalWrite(M3, LOW);
digitalWrite(M4, LOW);
Serial.println("Stop");
}
}
}
voidDht()
{
delay(dht.getMinimumSamplingPeriod());
humidity = dht.getHumidity();
temperature = dht.getTemperature();
Serial.print(dht.getStatusString());

//Serial.print("\t");
```

```
Serial.print("humidity:");
Serial.println(humidity, 1);
delay(1000);
Serial.print("tempreture:");
Serial.println(temperature, 1);
delay(1000);
}

void upload(int x,intz,int u, float sensor1,float sensor2,float sensor3) {
if(WiFi.status() != WL_CONNECTED){
Serial.print("Attempting to connect to SSID: ");
Serial.println(SECRET_SSID);
while(WiFi.status() != WL_CONNECTED){
WiFi.begin(ssid, pass);
Serial.print(".");
delay(5000);
}
Serial.println("\nConnected.");
}

// set the fields with the values
ThingSpeak.setField(1, humidity);
ThingSpeak.setField(2, temperature);
ThingSpeak.setField(3, smoke);
```

```
// write to the ThingSpeak channel
inty = ThingSpeak.writeFields(myChannelNumber,
myWriteAPIKey);
if(y == 200){
Serial.println("Channel update successful.");
}
else{
Serial.println("Problem updating channel. HTTP error code " +
String(x));
}
delay(5000); // Wait 20 seconds to update the channel again
}
```

Chapter 5

RESULT

The sensing part of all the car black box is being measured by the use of appropriate sensors. The sensed data is being stored in the database by the use of ThingSpeak software and also a comparative analysis is done on the parameters based on the sensor data.

The images obtained from car black box in ThingSpeak:

The following image gives the information about the temperature

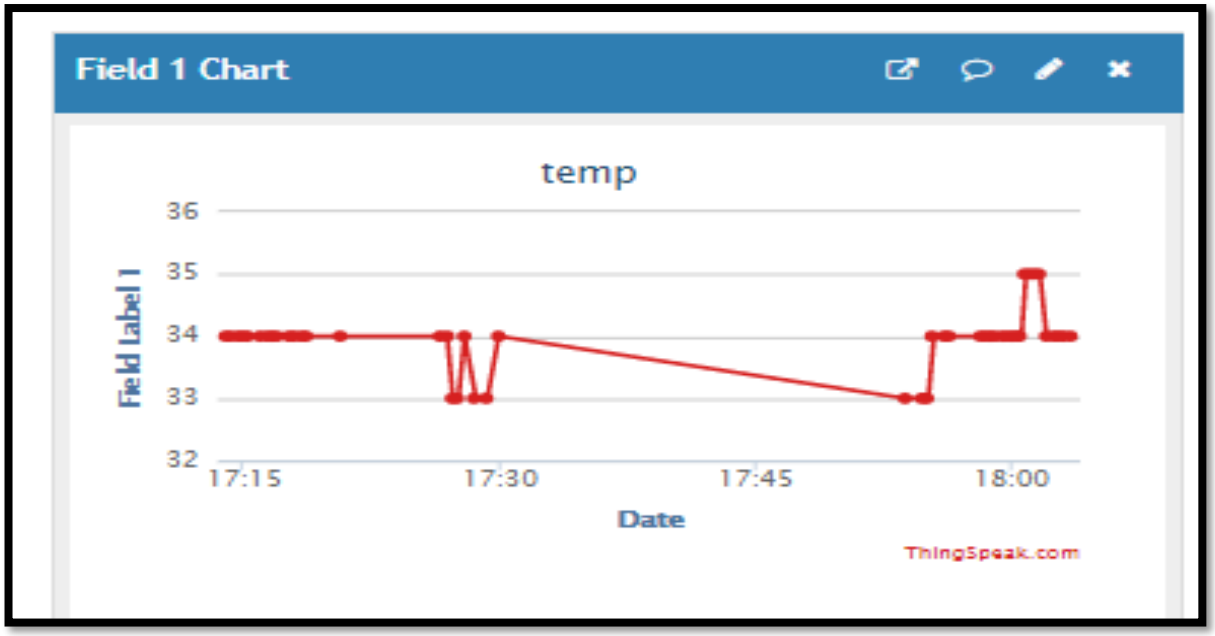


FIGURE 5.1: TEMPERATURE READING

The following image gives the information about the humidity

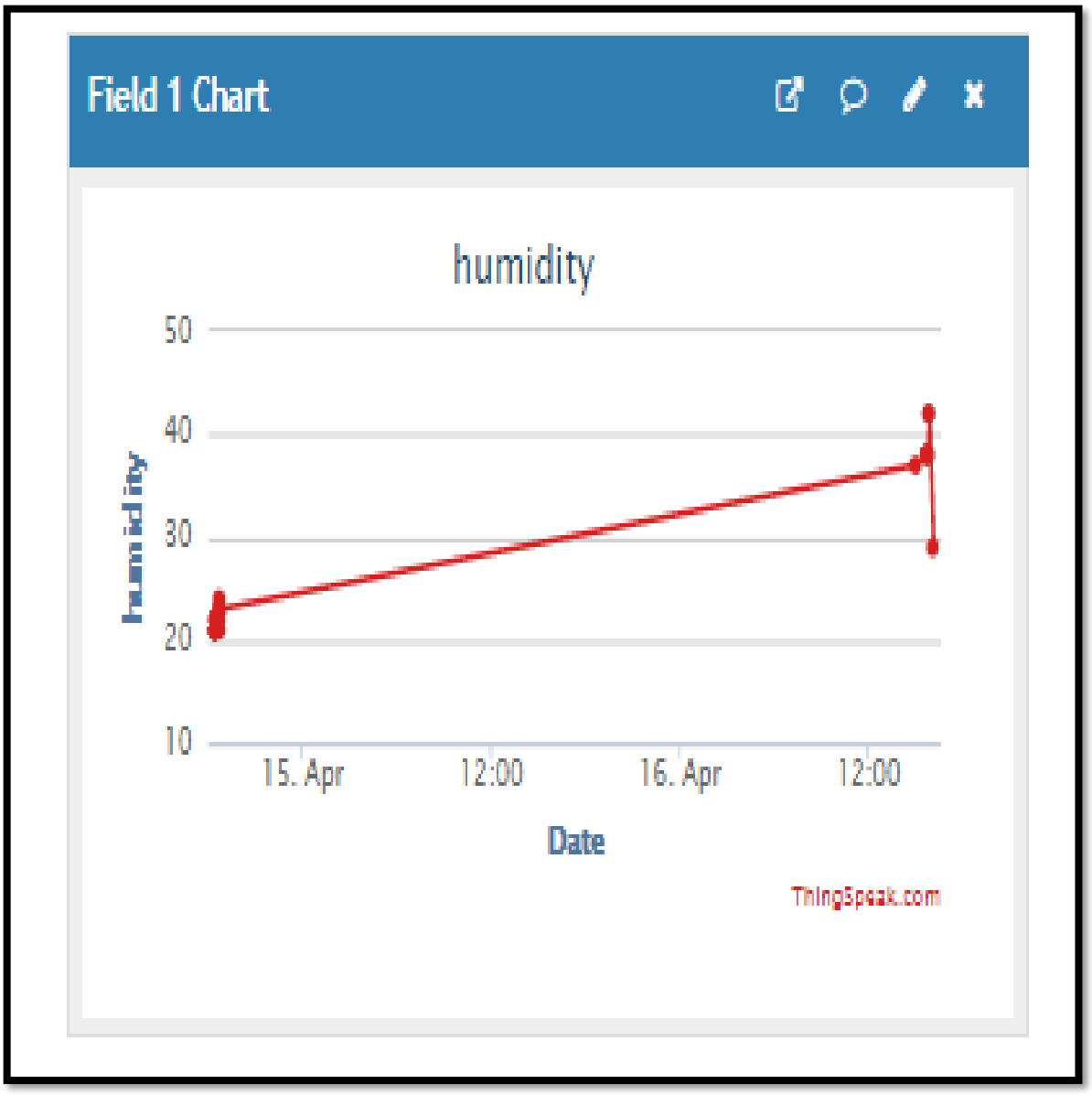


FIGURE 5.2: HUMIDITY READING

The following image gives the information about the smoke sensor

FIGURE 5.3: SMOKE SENSOR READING

FUTURE SCOPE

We can improve the present framework to check different parameters like fuel level, tyre pressure and working of headlight before beginning the vehicle. Numerous other basic parameters can be perused and put away in the memory .another helpful extra the present framework could be camera on front and posterior which continue recording live pictures and storing them in the memory. This video Data would be most valuable piece of information during accident examination.

CONCLUSION

The proposed system will serve as an important piece of information at the time of any accident. When any type of accident will occur due to any reason, the Cockpit Voice Recorder box system provides necessary data to generate the report of accident and about how it occurred. This project has also offered a user friendly program to analyse the data of the accident. This Cockpit Voice Recorder system can be implemented in any vehicle. As soon as the driver runs or start the vehicles the system will start collecting datas from all the sensors along with date and time. The data stored in the memory can be retrieved after the accident using ThingSpeak cloud.

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