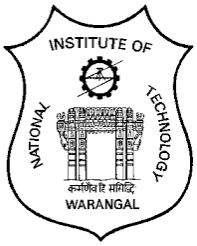

NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL
ELECTRONICS AND COMMUNICATION ENGINEERING

MICROCONTROLLERS

MINI PROJECT REPORT

Dhriti- *A Woman Safety Device*

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Acknowledgments

We take this opportunity to express our deep sense of gratitude and deep regards to our teachers Dr. Muralidhar Pullakandam, Dr. Kota Naga Srinivasarao Batta and Dr. Satish Maheswaram for their exemplary guidance,monitoring and constant encouragement throughout the course of this mini project.

Lastly, we would like to thank each and every person who directly or indirectly helped us in the completion of the project, especially our parents and peers who supported us throughout our project.

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Abstract

Due to a rise in the crime rate, women feel unsafe stepping out of their homes. With the help of technology, devices are now being built to improve the safety of women.

We propose a device - *Dhriti*, that will generate an emergency alarm and also send messages and emails asking for help to concerned people. Women carrying this device can send an alert message to a specified contact by pressing the SOS button.

In this project, NodeMCU will be interfaced with a GPS module and IFTTT (IF This, Then That) for getting location coordinates and sending alert SMS/Email. When we press the SOS button, the whole system will get active and send messages asking for help, along with the coordinates of the location calculated by the GPS. The controller will read the value and send the data to the predefined number via Email. This project can be powered using a power bank or batteries.

Problem statement

To alert and send the geo-location information of women who are in trouble to predefined contacts through messages/emails asking for help.

Objectives

- ➢ When the user isn't feeling safe and secure, they need to press the SOS button.
- ➢ Once the SOS button is pressed, the alarm rings and an SMS/Email is sent to the specified contact number.
- ➢ This SMS/Email will contain the exact location of the user in the form of coordinates with the alert message stating:

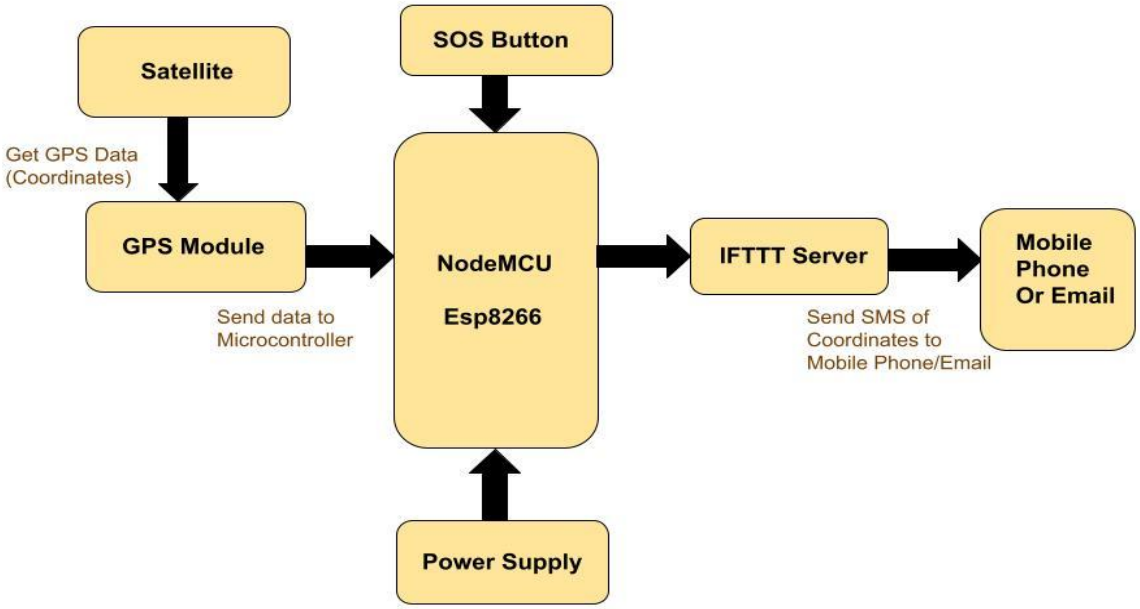
  "I need help! My Coordinates are: {Longitude}, {Latitude}."

Project Description

Women safety device

In this project we interface ESP8266 with the Neo 6M GPS module, which works towards ensuring the safety of women in our society.
The device gets activated as soon as the SOS button is pressed. Once this is done, an alert message/email containing the user's current location coordinates is sent to a concerned contact, thereby enabling the user to get help as soon as possible.

Block Diagram



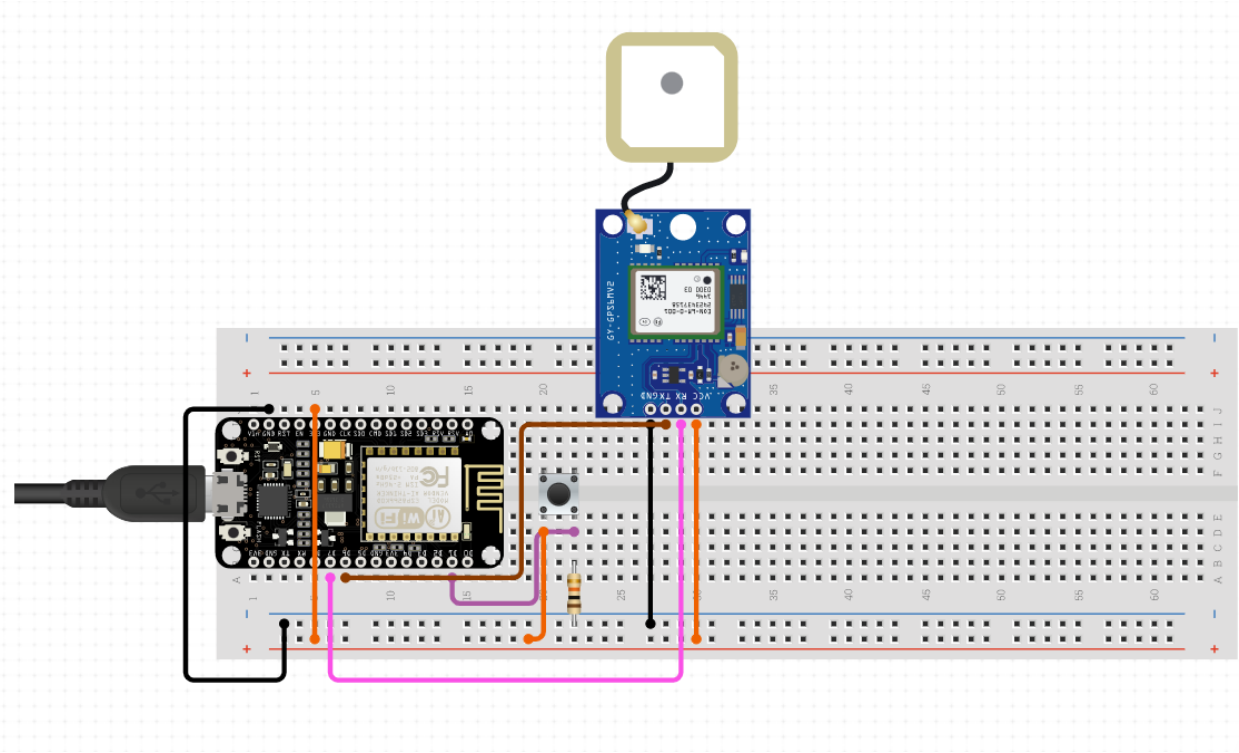
Above, we have a block diagram which gives a brief idea about the working of the device.The main blocks include GPS module, Nodemcu, IFTTT server, SOS.

The two main hardware components that we used to make the device are NodeMCU ESP8266 and Neo-6m GPS module.

The steps followed in the project:

- Check the status of the SOS button.
- Gather the details of the location of the device from the GPS module.
- Get Connected to given WIFI and form a connection with the IFTTT server.
- Send the GPS details along with an alert message to the person required.

The circuit diagram of the project:



The components used in the circuit are:

- *NodeMCU esp8266*
- *NEO-6M GPS module*
- *Resistor*
- *Power Source*
- *Push Button*
- *Led*
- *Piezo Buzzer*

1. NodeMCU ESP8266:

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing microcontroller to WiFi and is also capable of running self-contained applications. Developed by Shanghai-based Chinese manufacturer, Espressif, this module comes with a built in USB connector and a rich assortment of pin-outs.

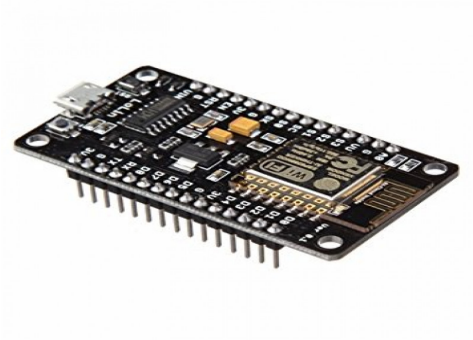


Fig: NodeMCU ESP8266

With a micro USB cable, you can connect a NodeMCU device to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Application of NodeMCU:

- Creating prototypes of IoT devices.
- Low power consumption projects.
- Projects which need multiple I/O interfaces with the WIFI.

2. NEO-6M GPS module:

The NEO-6M GPS module is one of the popular GPS receiver modules with a detachable ceramic antenna, which can provide strong satellite search capability. The device is capable of sensing locations and track up to 22 satellites and track the location anywhere in the world. It has an on board signal indicator, with which we can monitor network status of the module. It has a button cell which helps in saving the data when the main power is shut down accidentally.

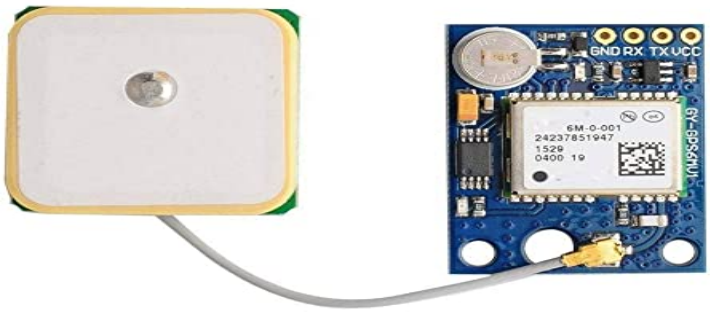


Fig: NEO-6M GPS MODULE

This module communicates with the satellites and gives the data in NMEA formats which we can decode into useful location Coordinates longitude and longitude, date and time. The core has a GPS receiver module, that is a NEO-6M GPS module chip from u-box. It tracks 22 satellites on 50 channels and has a sensitive level which is -161 dBm.

Application of NEO-6M GPS module:

- Location based application
- Navigation – moving from one position to another
- Maps • Time – we get precise timing of the world.
- Tracking people or moments of things.

3. Resistor:

Resistors are the electronic components who have a specific, constant electrical resistance. The resistor's resistance will limit the flow of the electrons in the circuit. It is a passive component that only consumes power but can't generate the power. They are commonly used with the active components like op-amps, microcontrollers, and other integrated circuits. Commonly they are used to limit current, divide voltages.

The resistance of the resistor is measured in ohms. The symbol of the resistance is given by a Greek letter omega: Ω.

Fig: Resistor

4. Power Source:

The primary function of a power supply is to convert electric current from a source to the correct voltage, current and frequency to power the load.
Any battery or power bank can be used to power the system, operating voltage of the system is 5V, we are using a power bank with output voltage of 5V.

Fig: Battery

5. Push button/SOS button:

A push button is a component which can be used as a switch to control an action in a machine or some type of process. It is made of plastic with metal connectors. We used it with a 10k resistor to act as a pulldown switch.

Fig: Push Button

6. LED:

A Light-emitting diode (LED) is a light source which is a semiconductor that emits light when current flows through it. It is a p-n junction diode that emits light when activated. When a suitable voltage is applied to the leads, electron holes within the device, releasing energy in the form of photons.

Fig: LED

7. PIEZO BUZZER:

A Peizo buzzer is a device that is used to generate beep sound (generally a warning or alert in embedded systems). It is a two leg device the longer leg is positive. If voltage is supplied it generates beep sound. Through analog write volume of beep can be controlled.

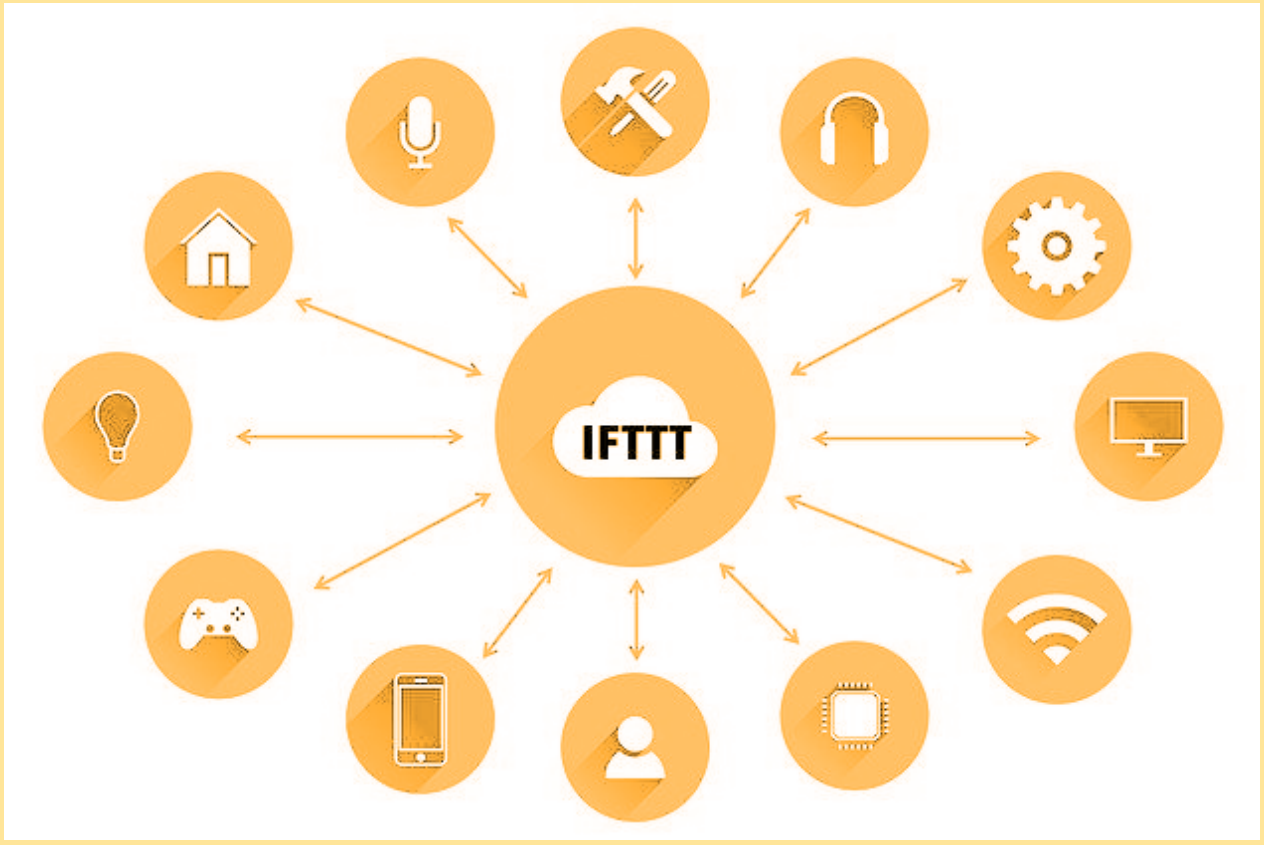
Fig: Piezo Buzzer

Software Specifications :-

1) Arduino Software (IDE) :
The Arduino Integrated Development Environment (IDE) is a cross-platform application that is written in functions of C and C++. It is used to write, compile and upload programs to the Arduino Boards and few other third party microcontrollers and modules which support the Arduino software Developers:
Arduino Software version used : Arduino 1.8.16

2) IFTTT (If This Then That):If This Then That is a private commercial company that runs services that allow a user to program a response to events in the world. IFTTT has partnerships with different service providers that supply event notifications to IFTTT and execute commands that implement the responses. It is a free web-based service to create chains of simple conditional statements, called applets.

An applet is triggered by changes that occur within other web services such as Gmail, Facebook, Instagram, or Pinterest. Here we used IFTTT to use Webhook and Android messages in chains.



Programming of NodeMCU

Program Code:

```
#include <SoftwareSerial.h>

#include <TinyGPS.h>

#include <ESP8266WiFi.h>

#include <WiFiClientSecure.h>




TinyGPS gps;

SoftwareSerial sgps(4,5);

WiFiClient client;




String MakerIFTTT_Key ;

String MakerIFTTT_Event;

char *append_str(char *here, String s) {  int i=0; while (*here++ = s[i]){i++;};return here-1;}

char *append_ul(char *here, unsigned long u) { char buf[20]; return append_str(here, ultoa(u, buf, 10));}
```

```
char post_rqst[256];char *p;char *content_length_here;char *json_start;int compi;
const char* ssid = "d_link803";
const char* password = "aswathy2001";
const char* host = "maker.ifttt.com";
const int httpsPort = 443;
char PIN[14];




void setup()
{
  Serial.begin(9600);
  pinMode(D7,INPUT);
  pinMode(LED_BUILTIN,OUTPUT); // declare push button as input
  pinMode(D4,OUTPUT);
  sgps.begin(9600);
  randomSeed( analogRead(A0) ); //randomize random seed value
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED)
```

```
  {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}




void loop()
{

  while (sgps.available())
  {
    digitalWrite(D4,LOW);
    int c = sgps.read();
    if (gps.encode(c))
    {
      float slat,slon;
      gps.f_get_position(&slat, &slon);
```

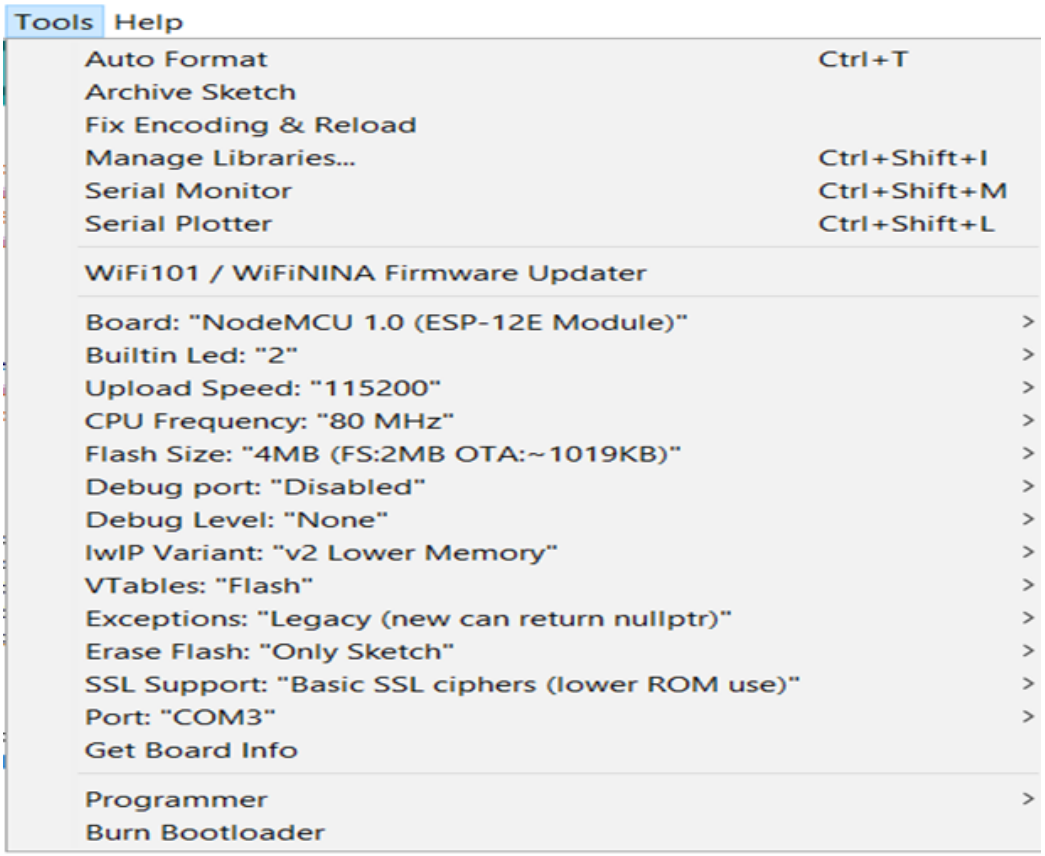
```
Serial.print("Latitude :");
Serial.println(slat, 6);
Serial.print("Longitude:");
Serial.println(slon, 6);
byte val=digitalRead(D7);

if (val == HIGH)
{
  if (client.connect("maker.ifttt.com",80))
  {
    digitalWrite(LED_BUILTIN,LOW);
    digitalWrite(D4,HIGH);
    MakerIFTTT_Key ="ml94gwFVEpC50XgB4BRV7zC-Gb3EtsDZESEkn3LQlGx";
    MakerIFTTT_Event ="Alert";
    p = post_rqst;
    p = append_str(p, "POST /trigger/");
    p = append_str(p, MakerIFTTT_Event);
    p = append_str(p, "/with/key/");
    p = append_str(p, MakerIFTTT_Key);
    p = append_str(p, " HTTP/1.1\r\n");
    p = append_str(p, "Host: maker.ifttt.com\r\n");
    p = append_str(p, "Content-Type: application/json\r\n");
    p = append_str(p, "Content-Length: ");
    content_length_here = p;
```

```
    p = append_str(p, "NN\r\n");
    p = append_str(p, "\r\n");
    json_start = p;
    p = append_str(p, "{\"value1\":\"");
    p = append_str(p, String(slat,6));
    p = append_str(p, "\",\"value2\":\"");
    p = append_str(p, String(slon,6));
    p = append_str(p, "\",\"value3\":\"");
    p = append_str(p, "");
    p = append_str(p, "\"}");

    compi= strlen(json_start);
    content_length_here[0] = '0' + (compi/10);
    content_length_here[1] = '0' + (compi%10);
    client.print(post_rqst);
    delay(3000);
  digitalWrite(D4,LOW);



  }
}
else
{
  digitalWrite(D4,LOW);
```

```
        digitalWrite(LED_BUILTIN,HIGH);
      }
    }
  }
}
```

After Completion of Code:

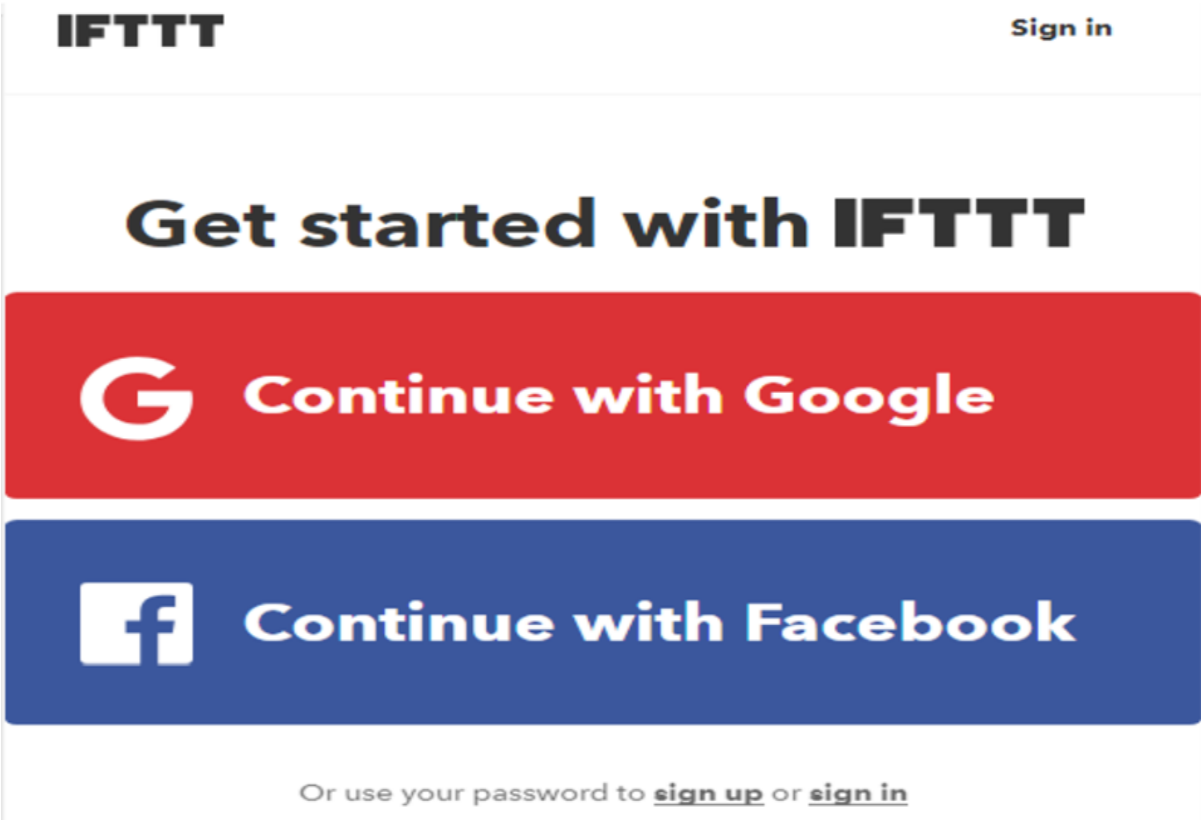
- Connect the NodeMCU to the PC with the USB port.
- Check which port number is assigned to the board.
- Open Board Manager from tools> esp8266 Modules platform.
- Select Generic ESP8266 module.
- Upload the code into the NodeMCU after compilation.



Creation of IFTTT applet in IFTTT website

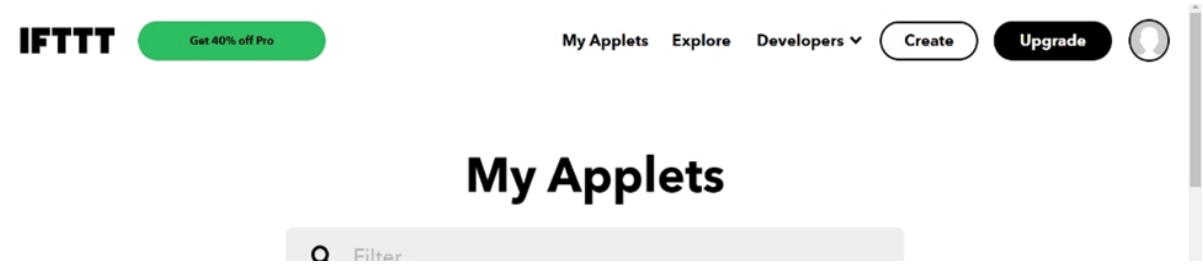
In our project, we have used IFTTT to use Webhooks and Email service in chains. So the GPS coordinates along with the alert message is sent to the concerned person using NodeMCU. Here, Webhook is triggered from NodeMCU to activate an event aiming at sending an email to a concerned person of the user's choice.

1. Creating an IFTTT account



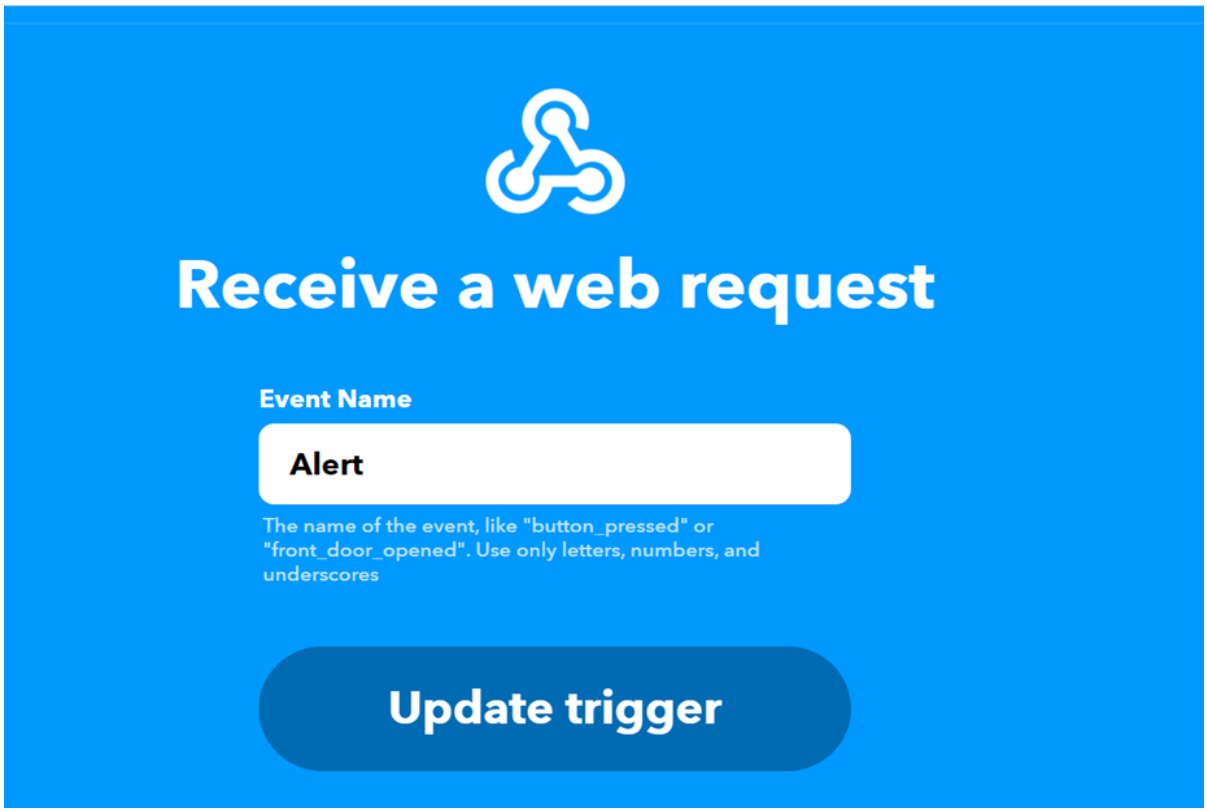
Sign in to IFTTT using IFTTT account.

After signing in, create an Applet.

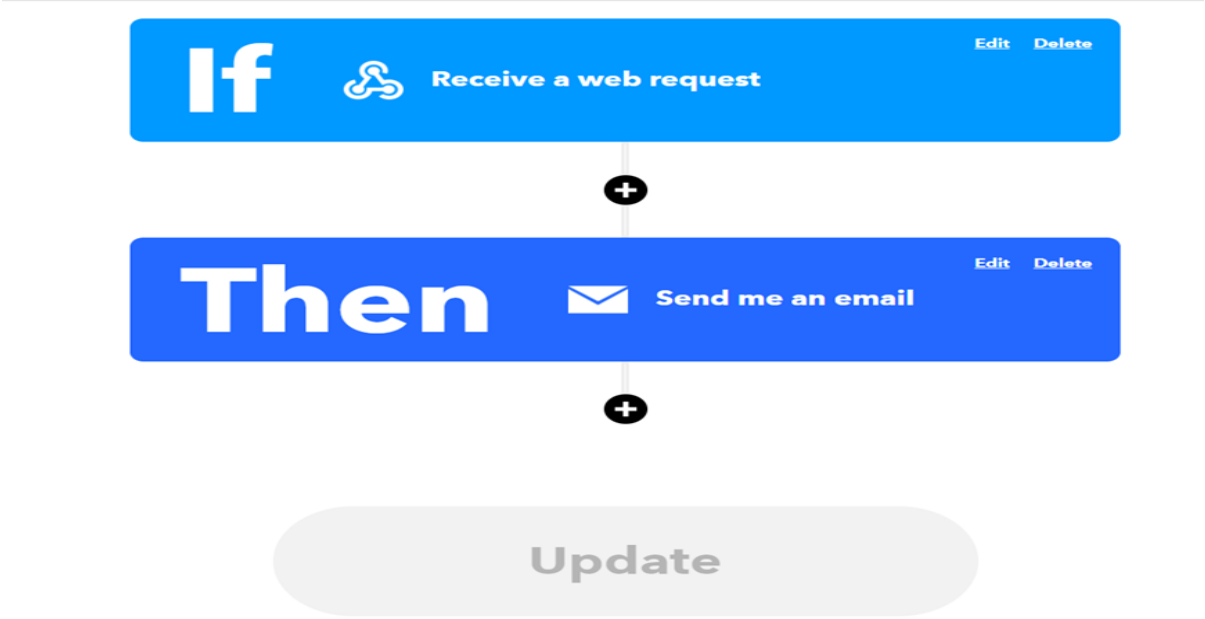


2. Create a trigger for “If This” event

3. Select Webhooks and add trigger with event name Alert

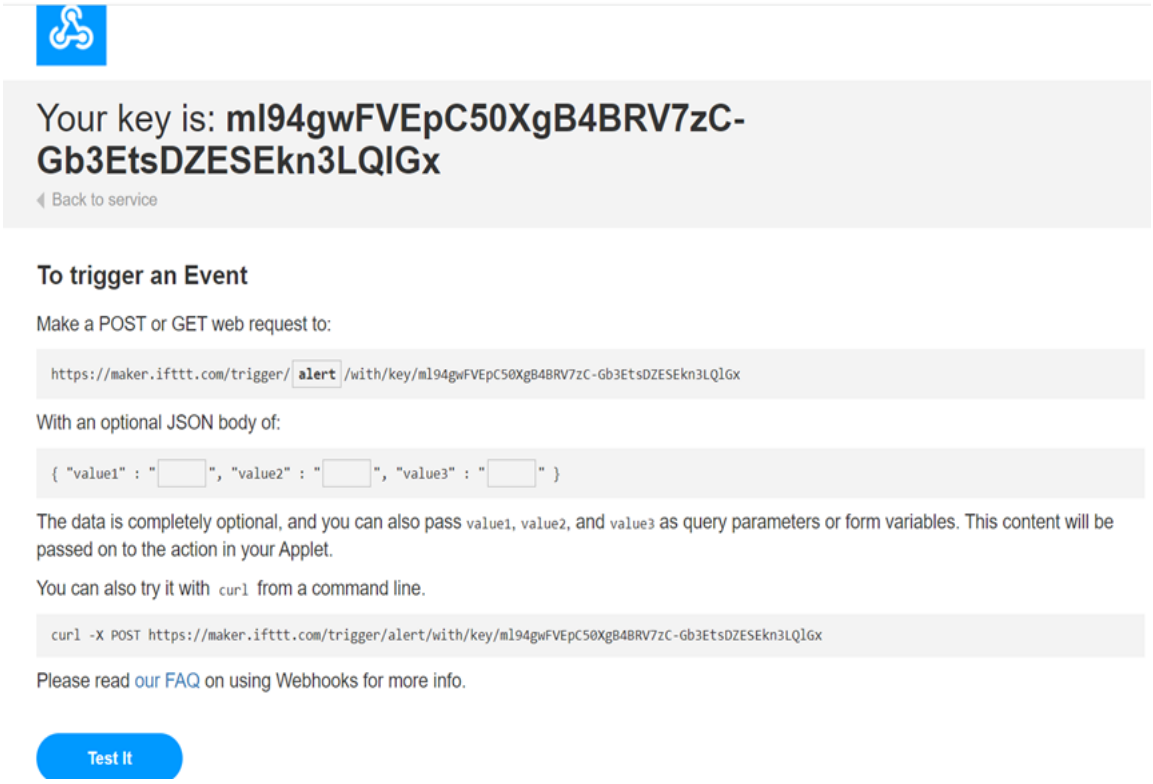


4. Then create a trigger for “Then” event, which is an Email in our case

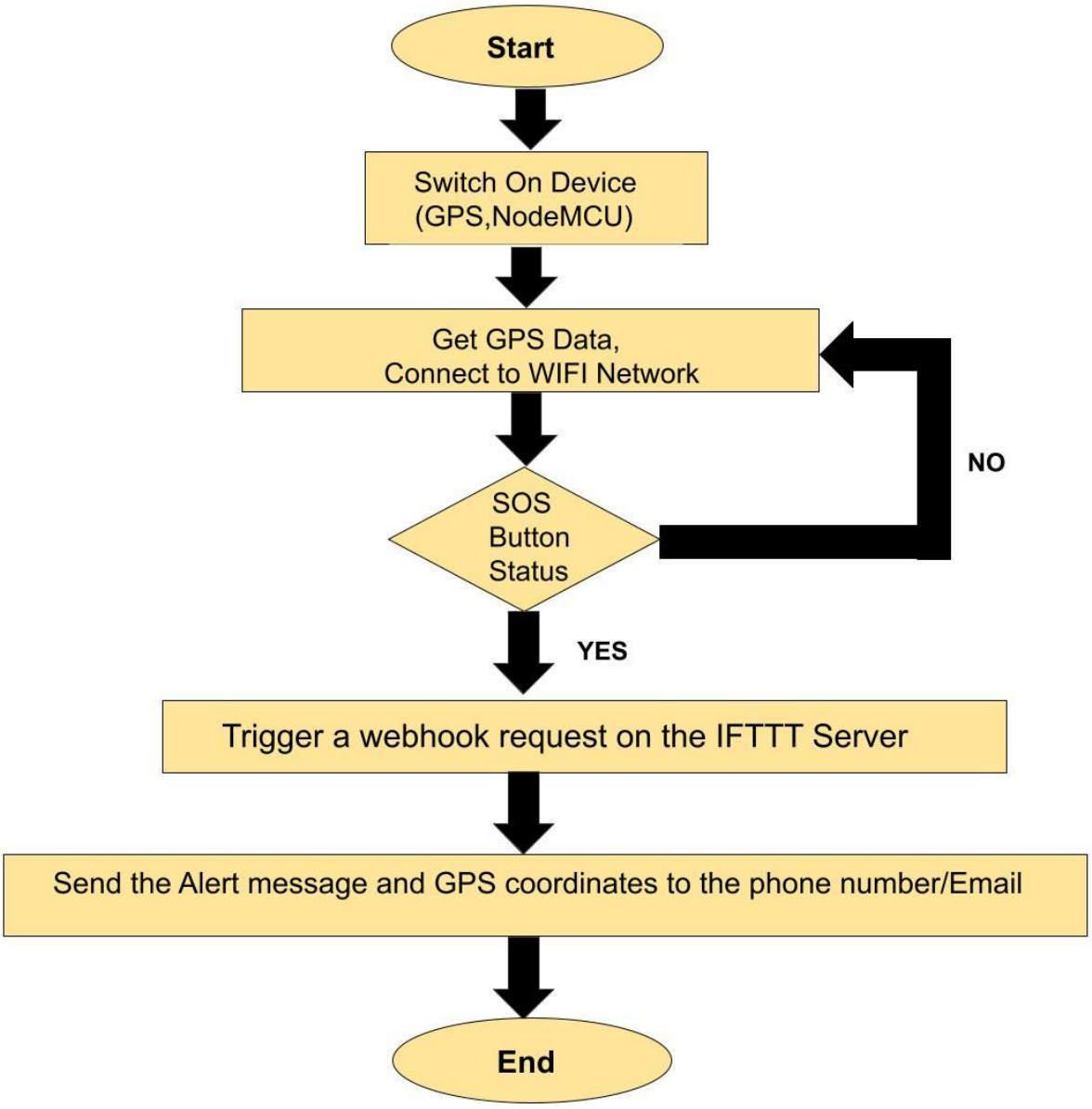


5. Set up the trigger event by filling in the details of the alert message and then complete the configuration on the IFTTT website.

6. Check the Webhooks documentation and make note of User KEY. Use this KEY in the program code



Flow Chart


Start
Switch On Device
(GPS,NodeMCU)
Get GPS Data,
Connect to WIFI Network
SOS
Button
Status
NO
YES
Trigger a webhook request on the IFTTT Server
Send the Alert message and GPS coordinates to the phone number/Email
End

Algorithm:

Step 1: Switch on the system GPS and NodeMCU by powering the device.

Step 2: Get the GPS Coordinates once Position Fix has been found and connect to the WIFI network.

Step 3: Check the status of the SOS button.

Step 4: If the SOS button is pressed then a Webhook request is triggered on the IFTTT server.

Step 5: The alert message along with the GPS Coordinates is sent to the concerned person's mail using the Email/Android SMS applet.

Explanation:

When the device is turned on, it connects to the given WIFI network. The GPS module will receive the GPS Coordinates and send it to NodeMCU. If the SOS button is pressed then the Webhook request is triggered on the IFTTT server and the GPS Coordinates along with the alert message are sent to the concerned person's mail as set by the user.

Working:

• When the device is turned on using a power source, NodeMCU will get connected to the given WIFI Network and the GPS module starts receiving data in the NMEA format once a Position Fix has been found.

• NodeMCU will decode the NMEA data into GPS Coordinates using certain libraries and display it on serial monitor.

• As soon as the SOS button is pressed, the builtin LED of NodeMCU is turned on to indicate that the system has been activated. NodeMCU will then start connecting to the IFTTT server and make a Webhook request, along with the GPS Coordinates.

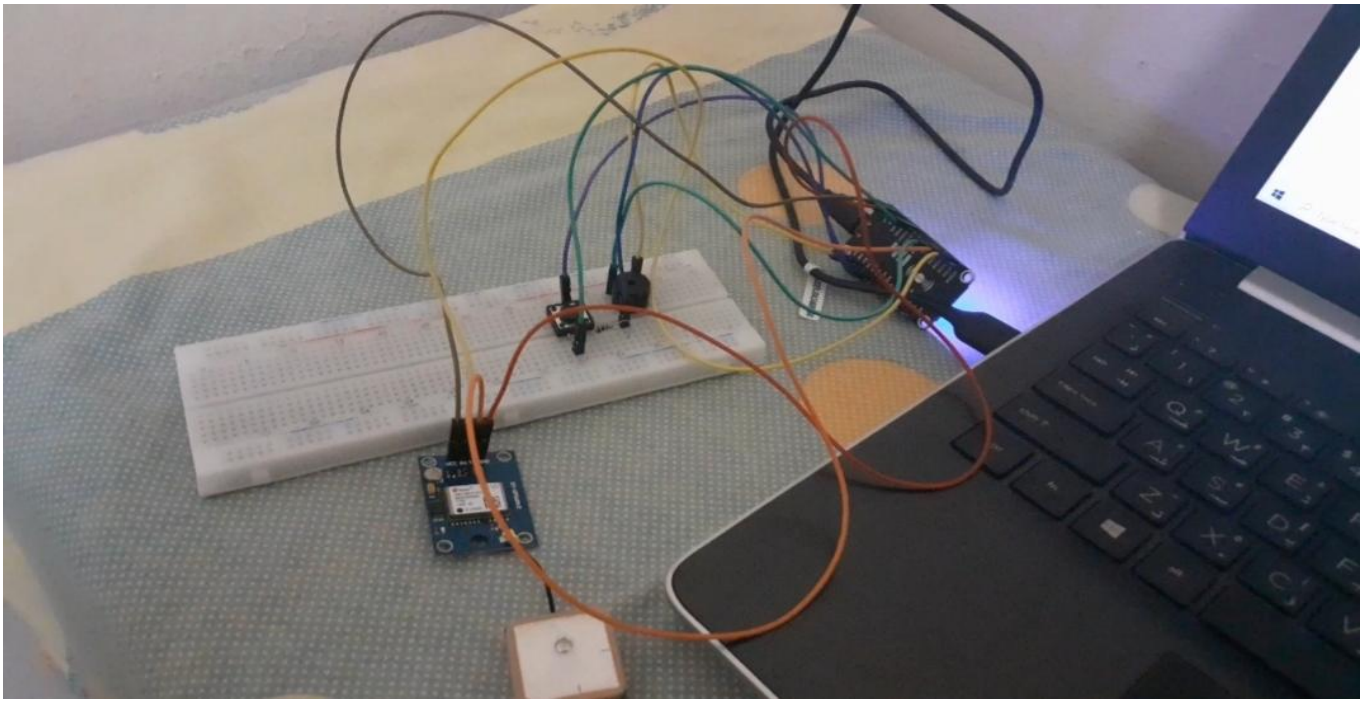
• As soon as the Webhook request is triggered from NodeMCU, the Email applet gets activated and an alert message is sent to the Email id configured by the user, containing the location coordinates of the user.

Result and Discussion

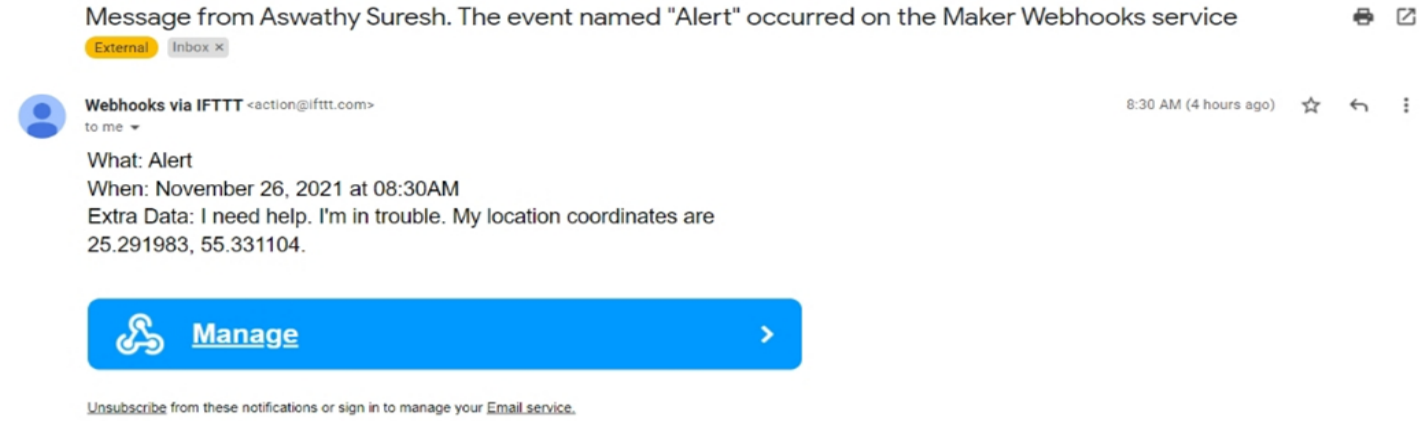
The main purpose of this project is to provide safety and security to people in case of dangerous situations. When the SOS button is pressed by a person, then their exact location is sent to any concerned contact of their choice in the form of location coordinates(Latitude and Longitude) with the Alert message stating:

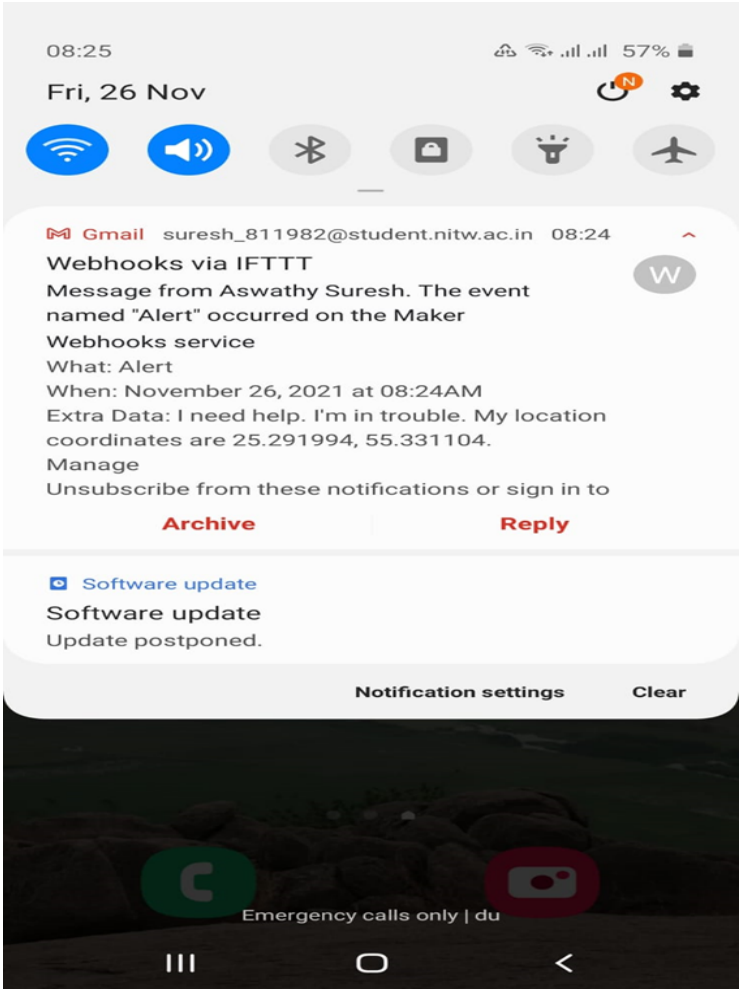
“I need help! My Coordinates are: {Longitude}, {Latitude}.”

Hardware Setup

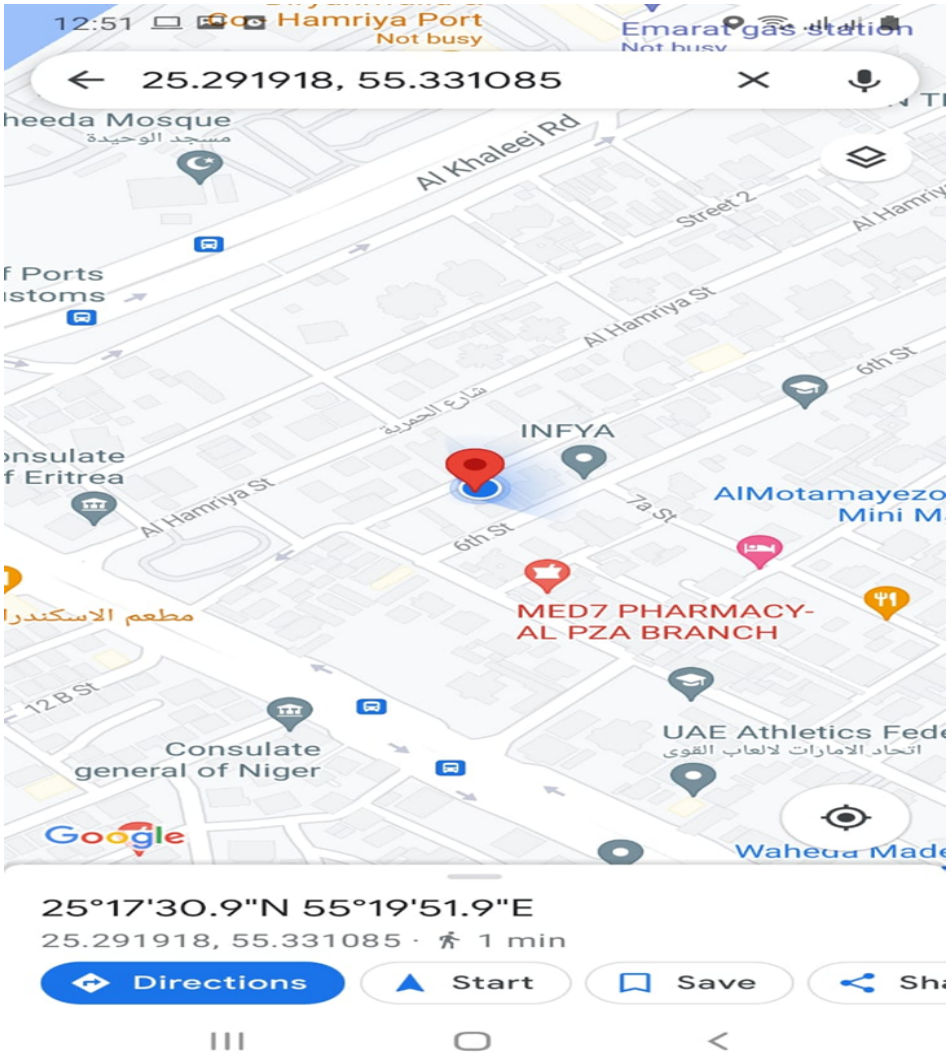


Screenshots of the output





Tracking location in google map using coordinates by GPS module



Advantages

- ➢ Can be used as legal evidence of crime with exact location information prosecution.
- ➢ It is affordable, not expensive.
- ➢ Comfortable and it is easy to use by just clicking the SOS button.
- ➢ The family member can locate women/any person in danger and hence take the necessary action to rescue the women from danger.
- ➢ It is portable and WiFi-Enabled.

Applications

- ➢ Can be used in vehicle tracking & safety systems.
- ➢ Can be used for the safety of women to easily track a woman's location with the help of coordinates sent.
- ➢ Can be used for the safety of women.
- ➢ Can be used for the safety of children.
- ➢ Can be used for the safety of elderly aged people.
- ➢ Can be used for the safety of physically challenged people.
- ➢ Can be used for Security applications.

Conclusion

The whole idea of the project is to help a needy woman by using her location with the help of a device made up of NodeMCU interfaced with GPS. The proposed system will help women to deal with the critical issues faced by them in their day-to-day life and therefore it will also help to reduce the crime rates against women. By sending the location it is easier to help a needy woman. All the applications and devices built using new technologies may be difficult to operate for women in rural areas. The system is easy to use and also affordable.

Hence this system can overcome the fear that scares every woman in the country about her safety and security. The internet of things has revolutionized the whole security system by simplifying things. It is helpful in providing a secure environment for the females. The entire project was quite cost effective and well within our budget. The total power consumption of the project is around 5V.

Future Scope

For the better functionality of the product new versions of the device can be introduced by adapting new technologies. The present system is working efficiently, but we can still increase the functionality of the device by using various other modules without affecting the present system. Functionalities like voice detection, camera can be added and some kind of tools for defense like shock generator can be implemented. Voice detectors can be added to give the voice command which can be fed priorly in NodeMCU to indicate emergency/danger. To send the alert message to the persons near to the emergency location. The device can be enhanced much more in the future by using highly compact modules.

References

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3. https://lifehacker.com/the-beginners-guide-to-ifttt-1819624556
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