NEW HORIZON
COLLEGE OF ENGINEERING
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"Emergency alert and tracking device for women safety"

A MINIPROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

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NEW HORIZON COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "Emergency alert and tracking device for women safety" carried out by **Tanmaya S H (1NH18EC112)** bonafide student of Electronics and Communication Department, New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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1.

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ABSTRACT

Emergency alert and tracking device for women safety

Due to increase in crime rate, women are feeling insecure to step out of the house. With the help of technology devices can be built to enhance the safety of the women. This device will generate an emergency alarm and will also send the message to concerned person. Women carrying this device can send the information to the police by pressing SOS button. In this project NodeMCU is interfaced with GPS module and IFTTT (If This Than That) for getting location co-ordinates and sending alert SMS. When the SOS button is pressed whole system gets active and send the message which is attached with latitude and longitude co-ordinates of the place which is calculated by the GPS, controller reads the value and sends the data to the predefined number via SMS using IFTTT applets like android SMS.GPS will get data from the satellites and obtains the geographical position of the device. NodeMCU decodes the NMEA format data to GPS coordinates using libraries, Operating voltage of the project is 5v, This project can be powered using power bank or batteries.

ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

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I sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide **Dr. K C R Nisha** to complete the project within stipulated time successfully.

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Tanmaya S H (1NH18EC112)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 01

INTRODUCTION

Emergency alert and tracking device for women safety

Though we are living in 21st century, people are facing lots of problems such as poverty, pollution, corruption, illiteracy and women safety. Due to increase in crime rate, women are feeling insecure to step out of the house. In many sectors working hours are till the late evening and there are night shifts too. Women working at this hour have to travel at late night, which bring an insecure feeling. With the help of technology devices can be built to enhance the safety of the women. This device will generate an emergency alarm and will also send the message to concerned person. Women carrying this device can send the information to the police by pressing SOS button which will send SMS with current location, using this information police will save the victim. In this project NodeMCU is interfaced with GPS module and IFTTT for getting location co-ordinates and sending alert SMS. When the SOS button is pressed whole system gets active and send the message which is attached with latitude and longitude co-ordinates of the place which is calculated by the GPS, NodeMCU reads the value and sends the data to the predefined number.

CHAPTER 02

LITERATURE SURVEY

Title of the paper	Author & Year of Publication	Outcome	Limitation
IoT based Smart System for Human Safety	Akash Wadhawane , Amir Attar, Priyanka Ghodke, Prasad Petkar, 2017	Describes how to build a smart device, which is having combination of multiple components, basically a wearable Smart device which continuously communicates through the internet with a Smart phone.	Does not describe the working part and circuit details.
Google Assistant controlled Home Automation	Manish Prakash Gupta, 2018	Provides details on how to use NodeMCU and connect to IFTTT servers for doing certain tasks.	Creation of IFTTT applets is not described in detail.
One touch alarm for Women's safety using Arduino	C. Priya, Ramya C, Befy D,Harini G,Shilpa S,Sivani KIruthiga B, 2019	Provides details about using GSM and GPS with Arduino uno along with touch sensor, tear gas mechanism and buzzer	touch senser may do false detection sometimes

Table 2.1: Literature Survey

CHAPTER 03

EXISTING SYSTEM AND PROBLEM STATEMENT

Existing Systems:

- VithU app: In this app when the power button of the Smartphone is pressed twice consecutively, it will begin sending out alert messages with a link to the location of the user every two minutes to the contacts fed into the app.
- Women security using GSM and GPS: In the project arduino nano(ATMEGA 328P) is interfaced with a GSM modem, GPS module, a LCD display and a push button, If the switch is pressed, the controller take the current location information from the GPS module and send those data to the predefined contact number using a GSM modem
- There are some projects which use FM transmitter and receiver with a SOS button to provide wireless transmission of location to arduino for processing which is again interfaced with GSM and GPS modules.

Problem Statement:

To Alert and Send the Geo Location of the woman, to predefined contacts in case of Emergency

Objectives:

- In this project when women feel insure at that time she can press and hold the SOS button.
- Then the GPS will send the current latitude and longitude co-ordinates of the area.
- The controller read this value and send those data to the pre-defined number saved in program.

CHAPTER 04

PROPOSED METHODOLOGY

- The main purpose of this project is to provide safety when women feel insure. The main two components are GPS module, and NodeMCU esp8266.
- GPS module is a device that receives data from the satellites and obtains the geographical position of the device.
- NodeMCU is a WIFI module that connects to the internet using the WIFI Network provided.
- Here the live coordinates received by the GPS receiver module is send to a mobile phone via SMS using the IFTTT applets like Webhook and Android SMS.
- The GPS Coordinates received from the GPS module is sent to the IFTTT server Webhook using NodeMCU and the IFTTT server will send the Alert message and GPS coordinates to the Mobile Number provided.
- By Press and holding the SOS button, the entire system gets activated and immediately a SMS is sent to the concerned person with GPS Coordinates.

CHAPTER 05

PROJECT DESCRIPTION

Emergency alert and tracking device for women safety

In this project we are using the concept of IoT (Internet of things) for implementing the safety of women in the society. The device will get activated as soon as SOS button is pressed and hold, the device will send her exact location co-ordinates, with an alert message to the concerned person for getting help as soon as possible.

We have built the device using mainly two hardware components that is, NodeMCU esp8266 and Neo-6m GPS module.

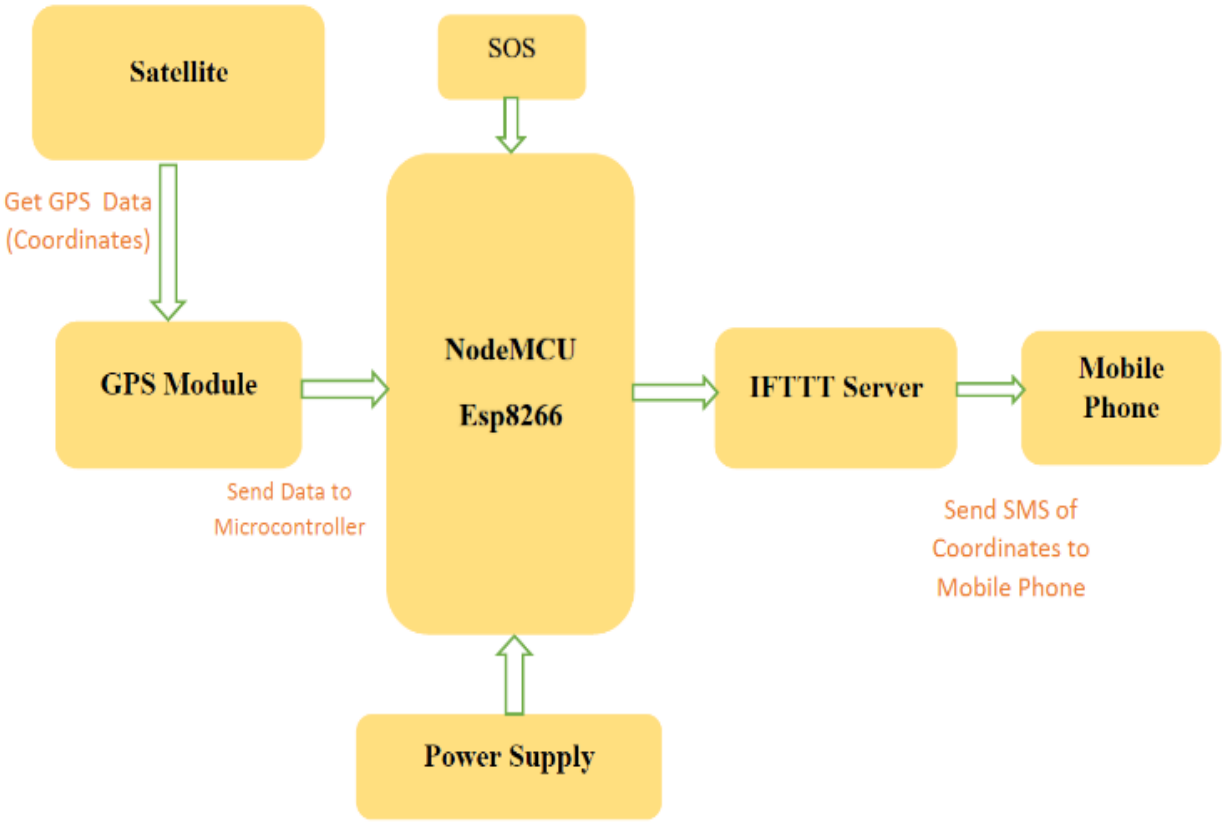

Fig 5.1: Block diagram

The above block diagram explains the working of the device in brief manner. The block diagram has mainly 4 important block that is Nodemcu, GPS module, SOS, IFTTT server.

The steps followed in the project are as follows:

- Check the status of SOS button.
- Collect the location details of the device from GPS module.
- Connect to given WIFI and establish a connection with IFTTT server.
- Send the GPS details with alert message to the concerned person.

The circuit diagram of the project is given below.

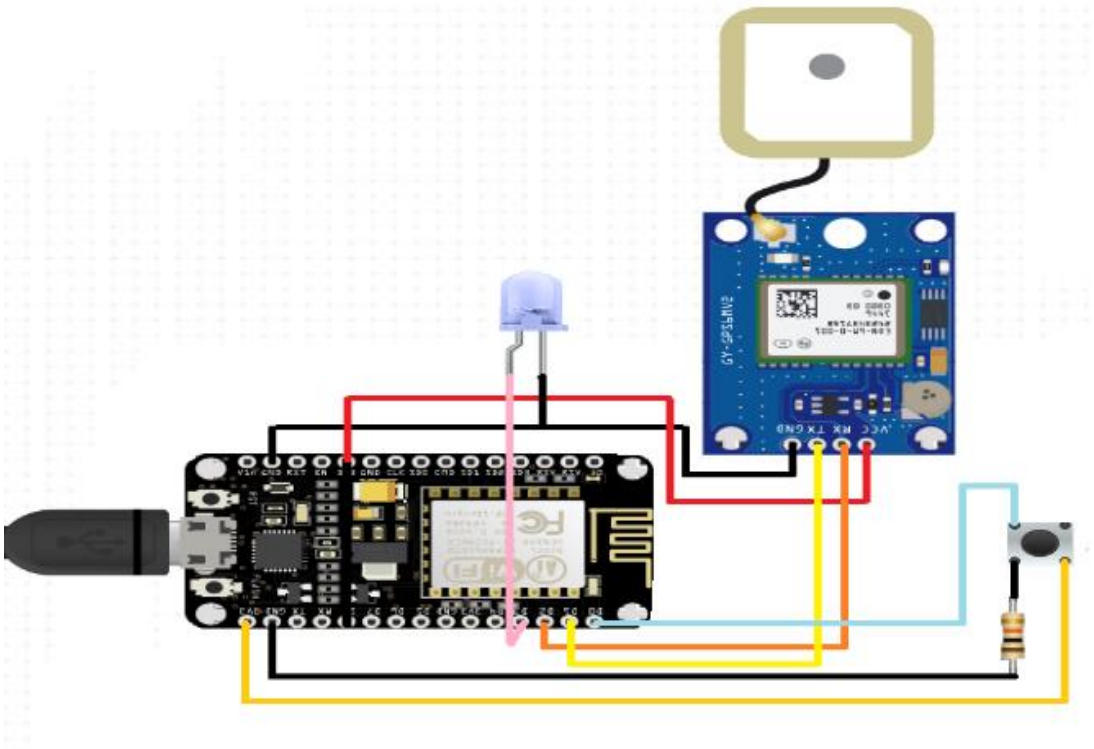

Fig 5.2: Circuit diagram

The components used in the circuit are,

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

5.1 NodeMCU esp8266:

NodeMCU is an open source IoT platform, based on Lua firmware which runs on ESP8266 WIFI SoC module from Espressif System and based on ESP-12 module hardware. It was developed to replace AT commands with Lau scripting to make it easier for the developers. The NodeMCU is a Low cost WIFI chip with full TCP/IP stack and complete microcontroller features to help the developers to use is in IoT applications.

Developed by Shanghai-based Chinese manufacturer, Espressif.

Fig 5.3: NodeMCU esp8266

Features of NodeMCU esp8266:

- Interactive.
- Low Cost.
- WIFI enabled.
- USB-TTL included.
- Smart.
- Programmable.
- Open-source.
- Plug N play.

Specifications of NodeMCU esp8266:

- **Type :** Single-board microcontroller
- **Developer :** ESP8266 Opensource Community
- **Operating system :** XTOS
- **CPU :** ESP8266
- **Digital I/O Pins (DIO) :** 16
- **Analog Input Pins (ADC) :** 1
- **Flash Memory :** 4 MB
- **SRAM :** 64 KB
- **Clock Speed :** 80 MHz
- **Power by :** USB
- **Power Voltage :** 3v, 5v
- **Code :** Arduino Cpp
- **IDE Used :** Arduino IDE

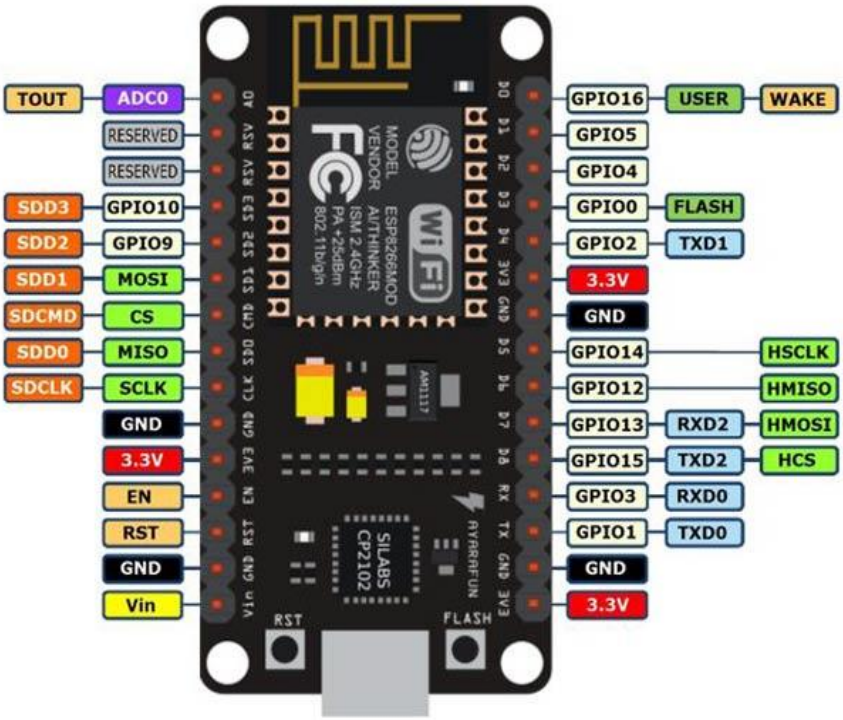

Fig 5.4: Pin Diagram of NodeMCU esp8266

Application of NodeMCU:

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

Advantages:

- Low cost
- Small size microcontroller
- Low energy consumption
- Built-in WIFI support
- Programmable using Arduino IDE.

Disadvantages:

- Need to learn Lau scripting.
- Pinout of NodeMCU is confusing compared to Arduino.

5.2 NEO-6M GPS module:

The NEO-6M GPS module is one of the popular GPS receiver module 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 a on board signal indicator, with which we can monitor network status of the module. It has a button cell which help in saving the data when the main power is shut down accidentally.

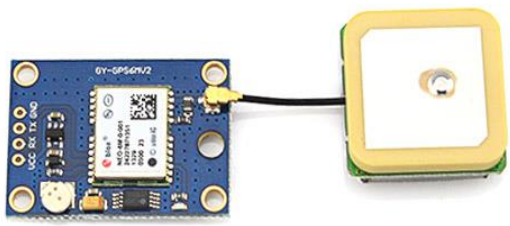

Fig 5.5: NEO-6M GPS module

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

NEMA format:

NEMA stands for National Marine Electronics Association. It was way before when GPS was not even invented. It was formed in 1957 by a group of electronic dealers to communicate with the manufacturers. Now the NEMA format is used by all the GPS manufacturers, it is much like ASCII in the computer digital world.

Features of NEO-6M GPS module:

- Interface : UART
- Operating voltage : 2.7v-3.6v DC voltage
- Baud rate : 4800-230400 bps (default 9600)
- Built-in EEPROM
- External antenna
- Operating Current : 67 mA

Pinout of NEO-6M GPS module:

- VCC : Input voltage pin which is used to power on the board.
- GND : it the ground pin to complete the circuit.
- TX, RX : used for UART communication with the microcontroller.

Fig 5.6: Pinout of NEO-6M GPS module

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 of people or moment of things.

Advantage of NEO-6M GPS module:

- Low cost
- In-built button cell
- Low energy consumption
- Has EEPROM
- Easy to program

Disadvantage of NEO-6M GPS module:

- Cold start of 40s
- Some time it has difficult in connecting to GPS.

5.3 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 5.7: Push button

5.4 LED:

A Light-emitting diode (LED) is a light source which is a semiconductor that emits light when current flows through it. Electron holes in the semiconductor recombines with electrons to release energy in the form of photons.

Fig 5.8: LED

5.5 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 is the only consume 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**.

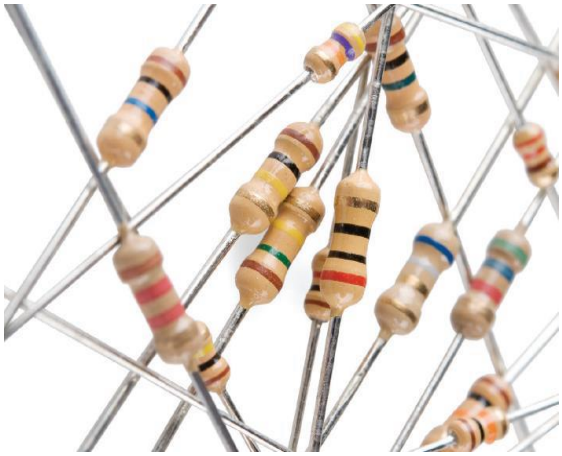

Fig 5.9: Resistor

5.6 Power Source:

- 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.

Software Specification:

The main two Software used to build the project are:

- Arduino Software IDE
- IFTTT

5.7 Arduino Software (IDE):

The Arduino IDE (Integrated Development Environment) is a Board development application that is written in function of C or C++

It is used to write, compile and upload programs to Arduino board and other third party microcontrollers which support the Arduino software.

Developers: Arduino Software

Software used: Arduino 1.8.13

Fig 5.10: Arduino Software IDE

Advantages of Arduino IDE:

- Open Source
- Portable
- User friendly programming language
- Can program third party microcontrollers as well.

5.8 IFTTT(If This Than That):

It is a free we-based service, where we can create chain of simple conditional statements, called Applets. A applets is triggered by changes which occur within other web-services such as Facebook, Gmail, Pinterest, etc.

We have used IFTTT to create an applet which has Webhook and Android Message in chain for building our project.

Fig 5.11: IFTTT (If This Than That)

Advantages of IFTTT:

- Simplifies automation
- Saves time
- Wide-ranging support
- Free of cost
- Ready-made applets

Disadvantages of IFTTT:

- Limited triggers and actions
- They wont work as expected
- No multi-level support

5.9 Programming of NodeMCU:

- Install the latest Arduino IDE at the Arduino website, install any version from 1.8 level or later.
- Open Arduino IDE and open preferences window.
- Post https://arduino.esp8266.com/stable/package_esp8266com_index.json into Additional Board Manager URLs field.

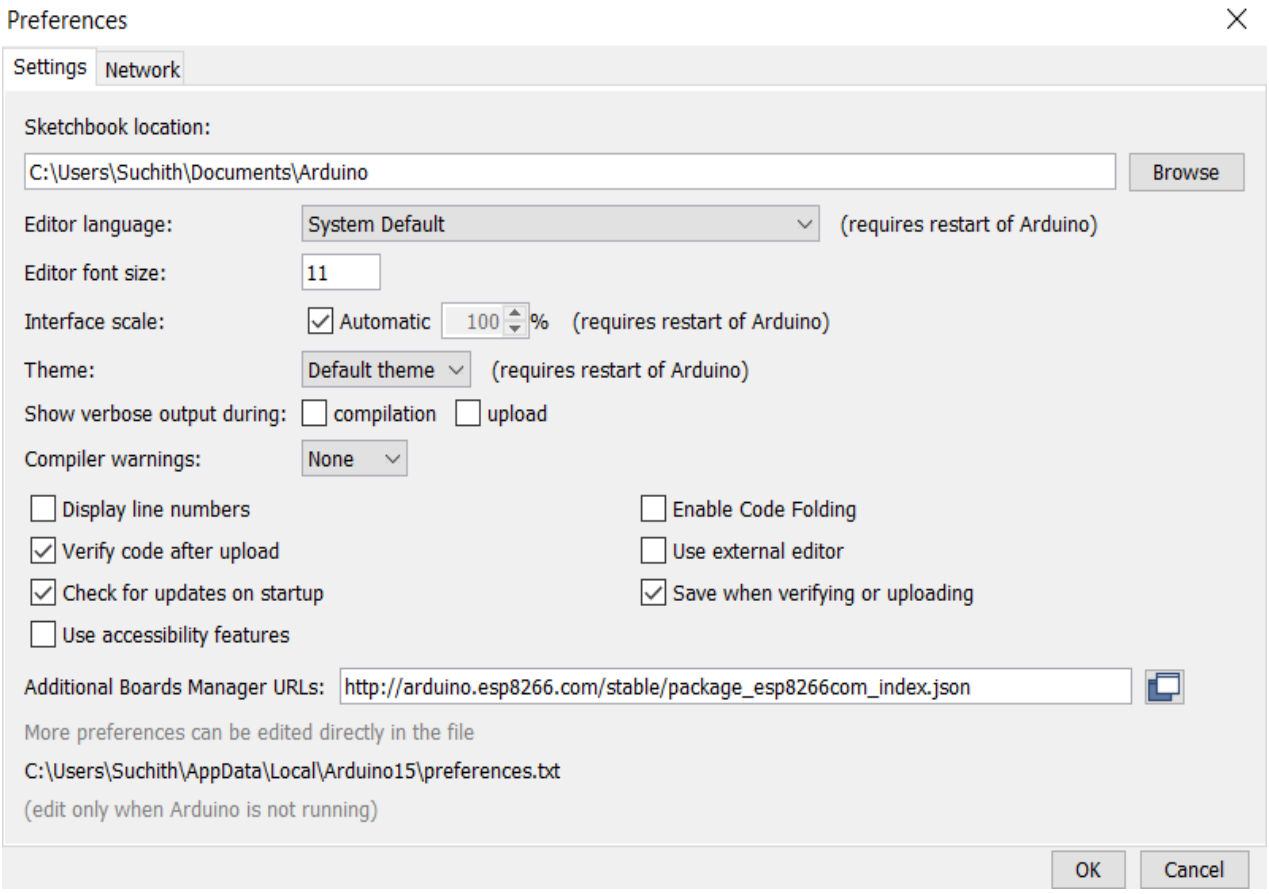

Fig 5.12: Addition of URLs

After Completion:

- Connect the NodeMCU to the PC with the USB port, install the drivers if needed.
- Check which port number is assigned to the board.
- Open Board Manager from tools> esp8266 Modules platform.
- Select Generic ESP8266 module.
- Upload using Serial, 80Mhz CPU frequency, Flash Size 4M, upload speed of 115200
- Upload the code into the NodeMCU after compilation.

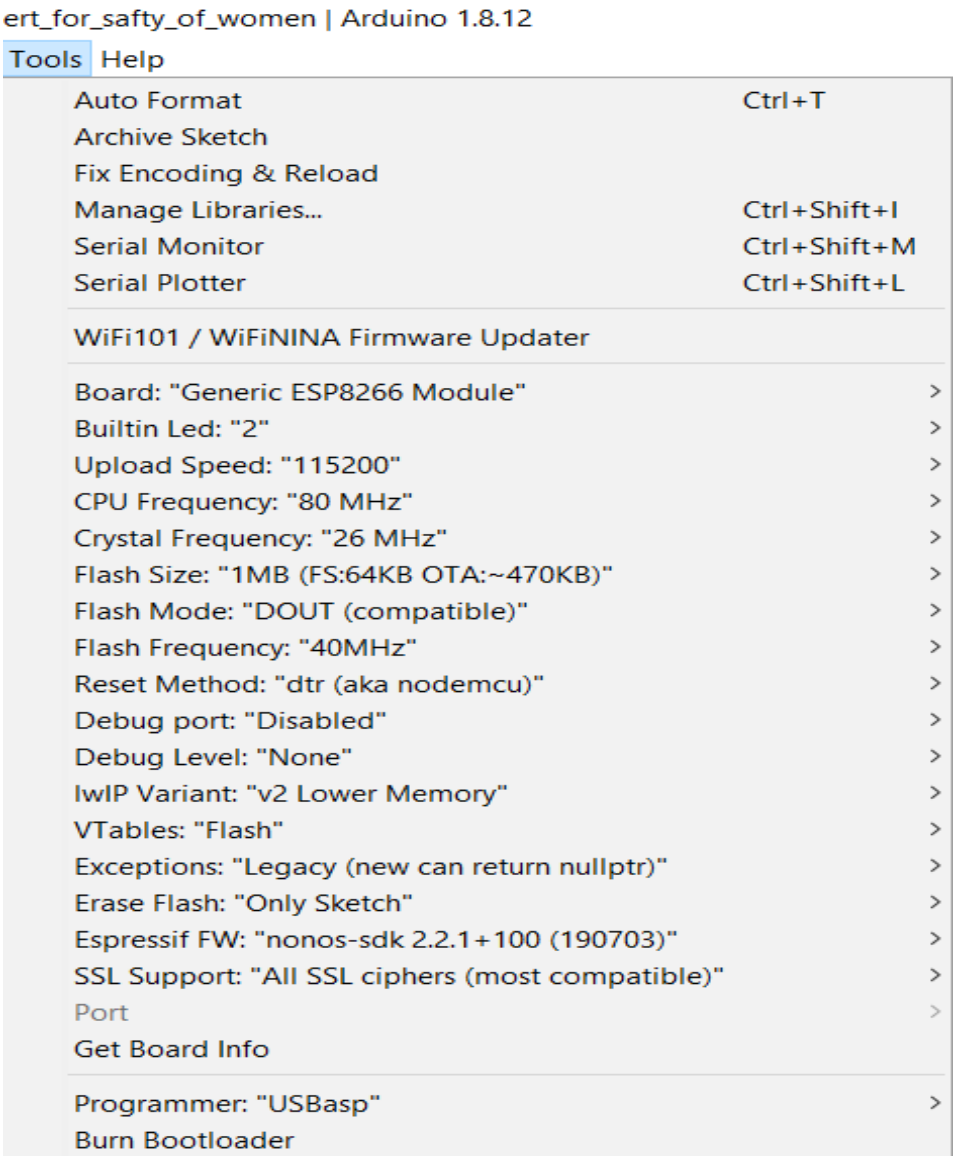

Fig 5.13: Selection of Board Specs

5.10 Creation of IFTTT applet in IFTTT website:

Here, IFTTT is used to use Webhook and Android SMS service in chain. So, the GPS coordinates are sent to concerned person using NodeMCU. Here Webhook is triggered from NodeMCU to activate Android SMS to send the SMS to the concerned person.

First step is creating account in IFTTT.

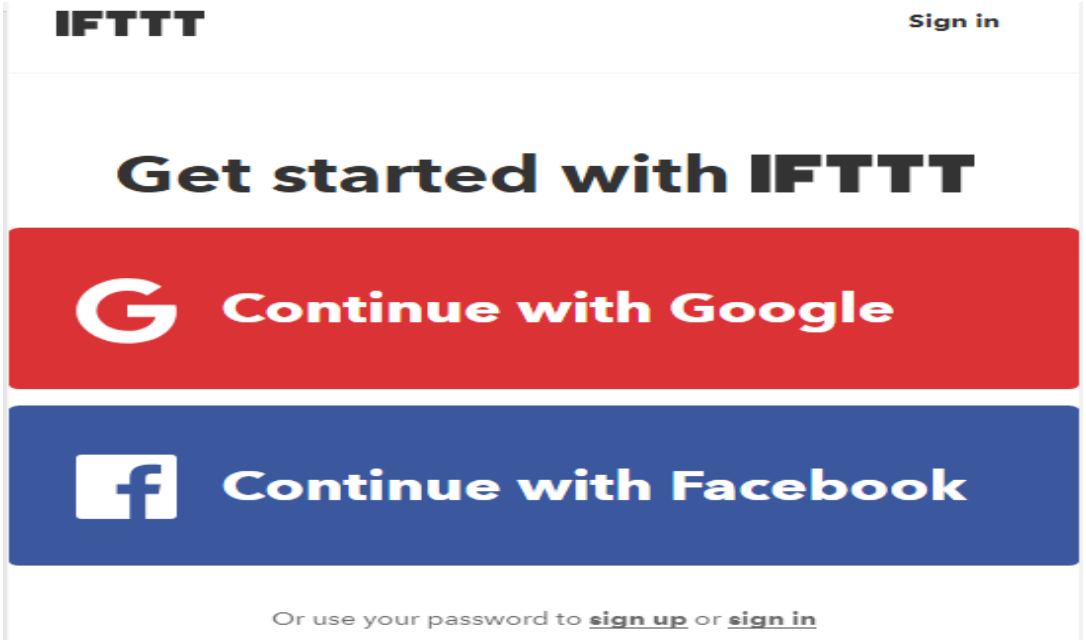

Fig 5.14: Creating account on IFTTT.

Sign in to IFTTT using IFTTT account.

After Sign in, click on My Applets and then select New Applet shown below.

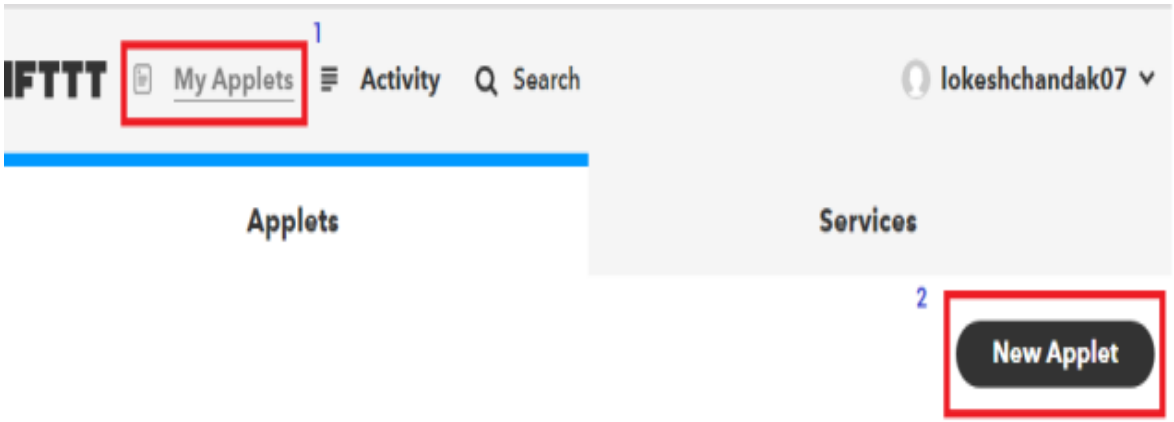

Fig 5.15: Applet creation in IFTTT website

Now click on **This** as shown below

Fig 5.16: Click on This and select Webhooks

Now Select Webhooks and Add trigger

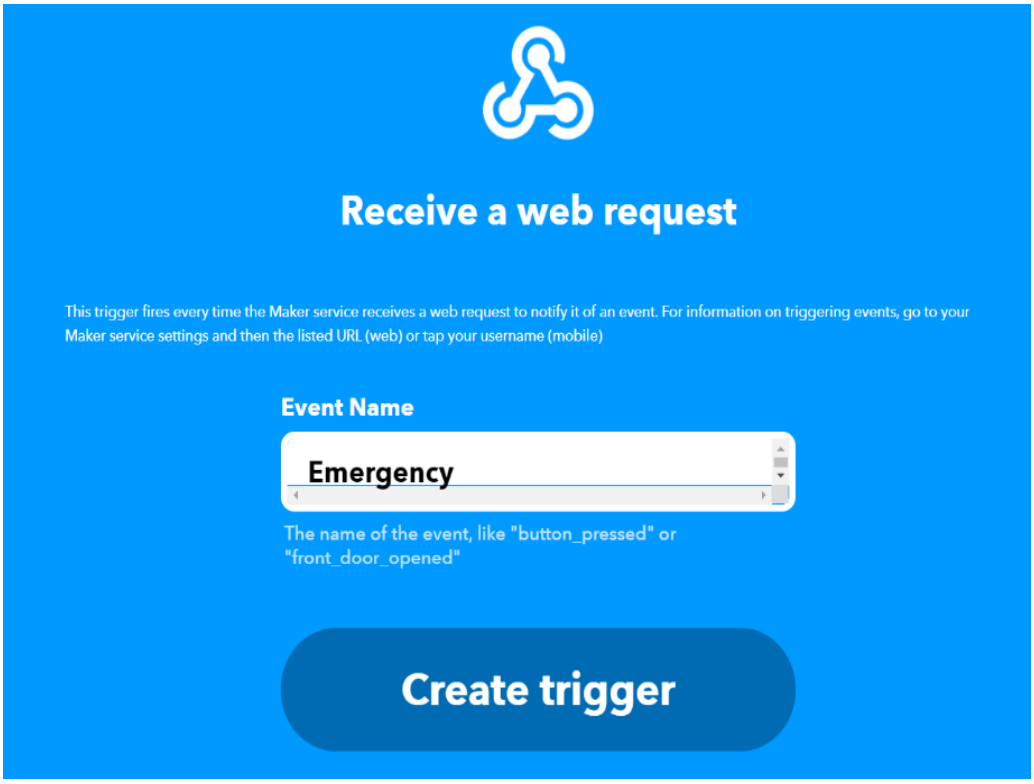

Fig 5.17: Creation of trigger

Now click on **That** and add the action which is here Android SMS

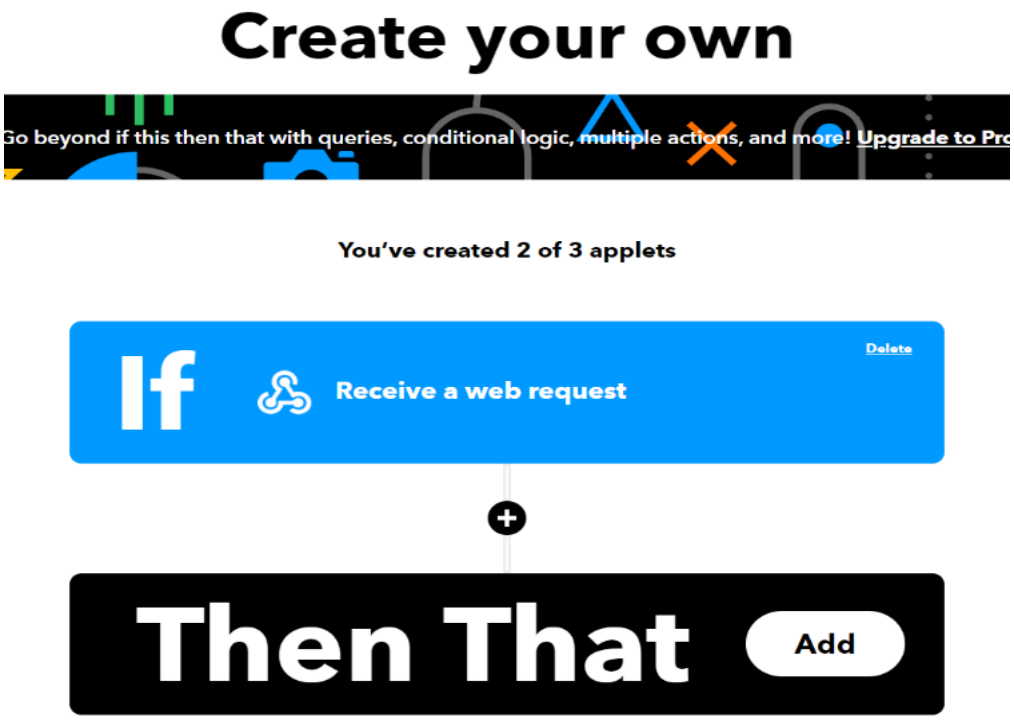

Fig 5.18: Creating THEN THAT statement

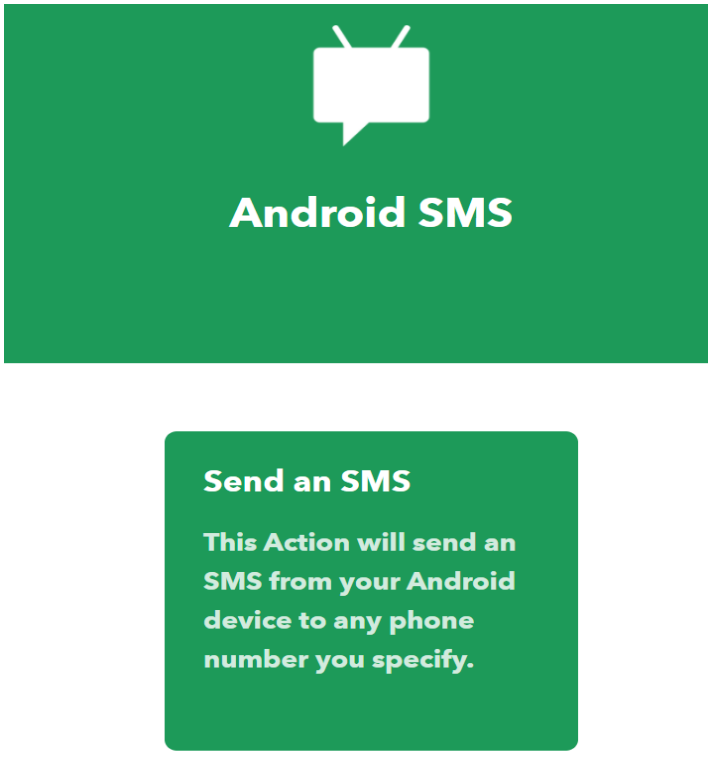

Fig 5.19: Select Send an SMS

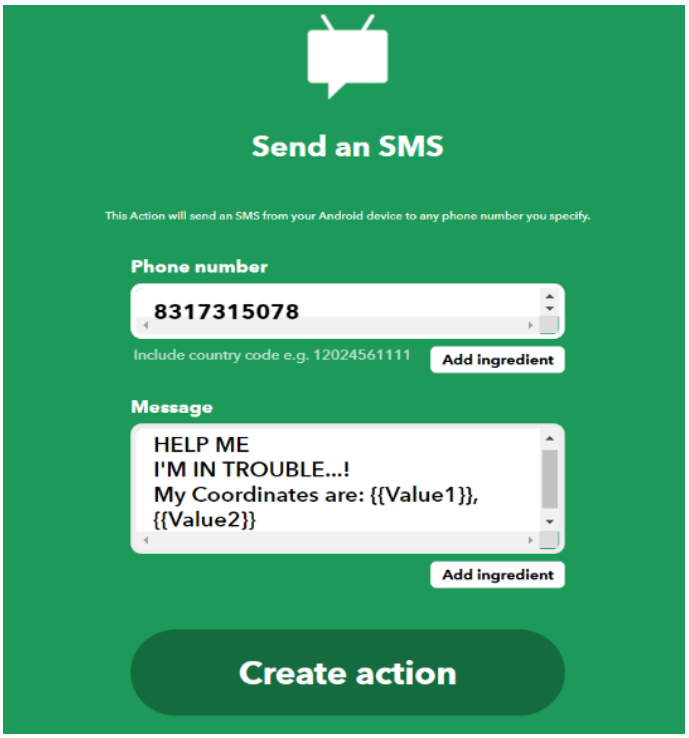

Fig 5.20: Click on create action

Fill the corresponding details of the alert message and create the action and complete the configuration in IFTTT website.

Now check for the Webhook documentation and make a note of user KEY

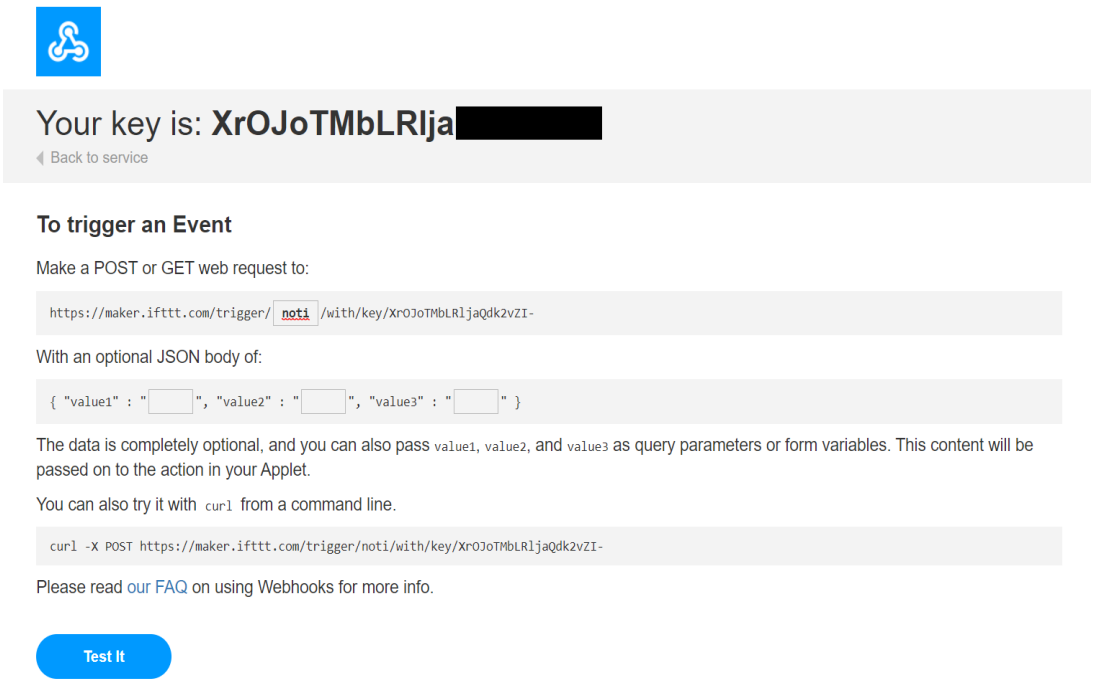

Fig 5.21: User KEY

5.11 Flowchart of the project:

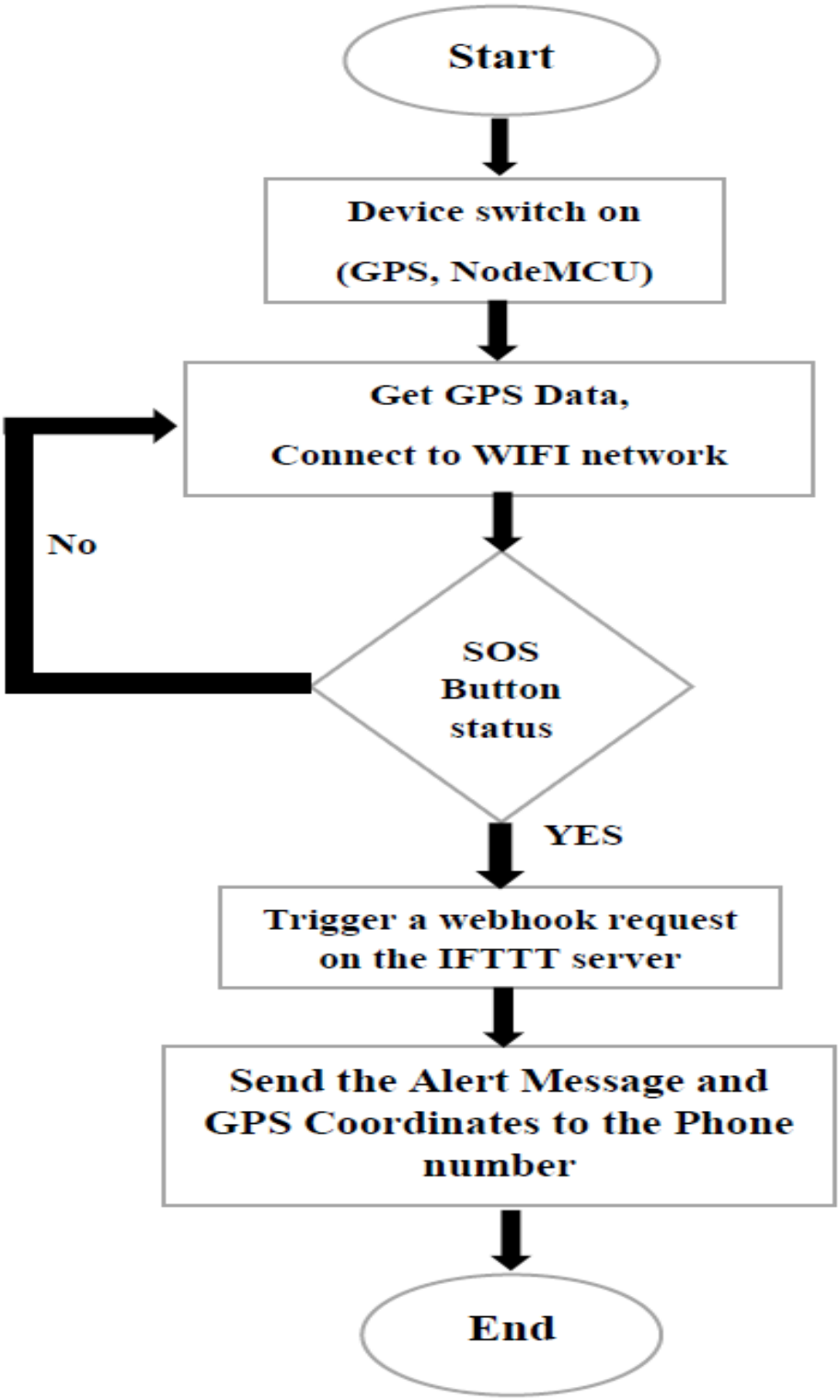

Fig 5.22: Flowchart of the project

Algorithm used in the project:

Step 1: Switch on the system GPS and NodeMCU.

Step 2: Get the GPS Coordinates and connect to the WIFI network.

Step 3: Check for the status of SOS button Status.

Step 4: If the SOS button is clicked than Webhook request is triggered on the IFTTT server.

Step 5: Send the alert message and GPS Coordinates to the concerned phone number.

Explanation:

When the device is turned on the device connects to the given WIFI network, the GPS module will receive the GPS Coordinates and send it to NodeMCU. Now check for the status of SOS button, if the button is pressed than the Webhook request is triggered on the IFTTT server and the GPS Coordinates are sent to concerned phone number.

5.12 Working:

- When the device is turned on using power source, NodeMCU will get connected to the given WIFI Network and GPS module starts receiving data in the NMEA format.
- NodeMCU will decode the NMEA data to GPS Coordinates using certain libraries and display it on serial monitor.
- As soon as SOS button is pressed and Hold , Led is turned on to indicate system got activated, NodeMCU will start connecting to IFTTT server and make a Webhook request, along with the GPS Coordinates.
- As soon as the Webhook request is triggered from NodeMCU, Android message applet gets activated and a message is sent to the mobile number configured in the Android message applet.
- It will also trigger an Emergency Notification alert on the Phone and message sent consists of the GPS Coordinates that was received from the GPS module.

CHAPTER 06

RESULT AND DISCUSSION

The project was successfully completed before the due date. The main purpose of this project is to provide safety and security to the women in danger situation. When the SOS button is pressed by women as soon as she feels insecure, then the exact location is sent to the specified contact number in the form of coordinates with the Alert message stating

“HELP ME

I’M IN TROUBLE…!

My Coordinates are: Longitude, Latitude”

The project is working as per our Objectives.

Hardware Setup of the Project:

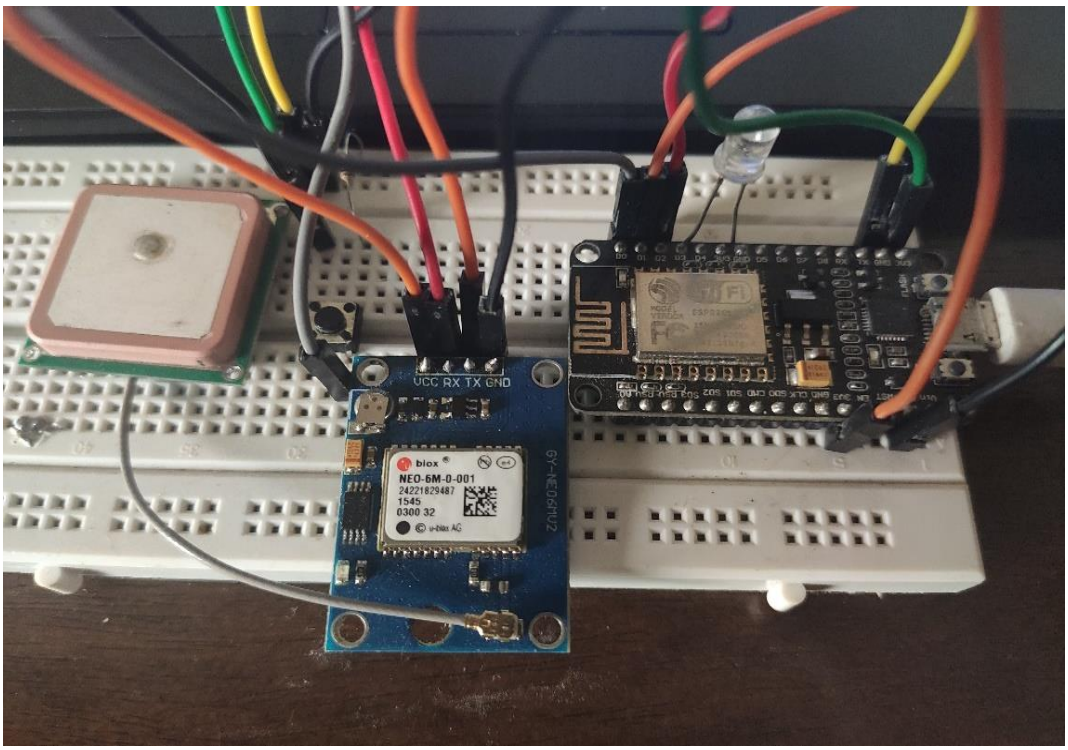

Fig 6.1: Hardware Setup of the project

The following are the screenshot of the outputs of the project:

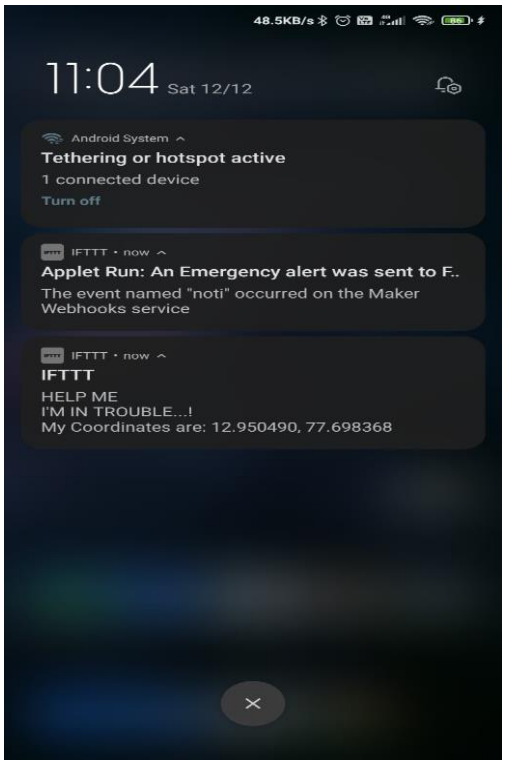

Fig 6.2: Notification sent by IFTTT server to IFTTT application in the phone

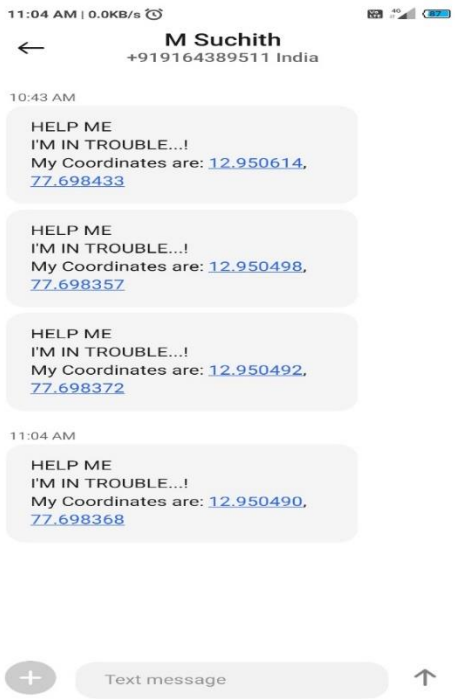

Fig 6.3: Alert message with GPS Coordinates sent to concerned person

Fig 6.4: User tracking location in map using the GPS Coordinates

CHAPTER 07

ADVANTAGES AND APPLICATIONS

Advantages of the project :

- Can be used as a legal evidence of crime with exact location information for prosecution.
- It is affordable not so expensive
- Comfortable and it is easy to use with just one press on 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 of the Project :

- Can be used in vehicle tracking & safety system.
- 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 in Security applications.

CHAPTER 08

CONCLUSION AND FUTURE SCOPE

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 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. This 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 secure environment for the females. The entire project was quite cost effective and well within our budget of ₹750. The total power consumption of the project is around 5V. We are very much satisfied with our results, but there is always room for improvement.

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, screaming alarm can be added and some kind of tools for defense like Stun gun (shock generator) can be implemented. Voice detector can be added to give the voice command which can be priorly feed 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.

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APPENDIX

Project Code:

Emergency alert and tracking device for women safety

```
#include <SoftwareSerial.h>

#include <TinyGPS.h>

#include <ESP8266WiFi.h>

#include <WiFiClientSecure.h>


TinyGPS gps;

SoftwareSerial sgps(5,4);

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 = "suchith";

const char* password = "suchithm";

const char* host = "maker.ifttt.com";

const int httpsPort = 443;

char PIN[14];
```

```
int led = 0;     // LED pin

int button = 16; // push button is connected

int temp = 0;    // temporary variable for reading the button pin status


void setup()

{

 Serial.begin(9600);

 pinMode(led, OUTPUT);   // declare LED as output

 pinMode(button, INPUT); // declare push button as input

 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())
 {
  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);
   temp = digitalRead(button);
   digitalWrite(led, LOW);
   if (temp == HIGH)
   {
    if (client.connect("maker.ifttt.com",80))
    {
     digitalWrite(led, HIGH);
```

```
MakerIFTTT_Key ="XrOJoTMbLRljaQdk2vZI-";

MakerIFTTT_Event ="noti";

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(5000);
        digitalWrite(led, LOW);
      }
    }
  }
 }
}
```