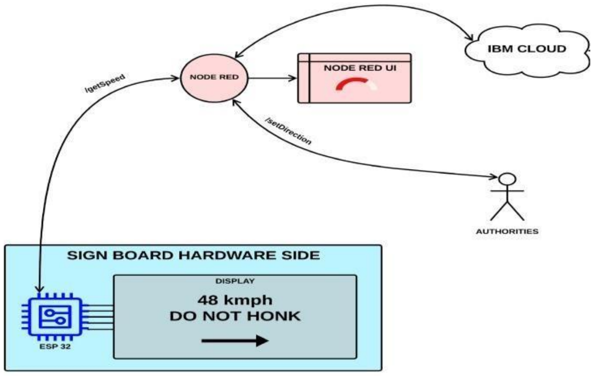
Date	16 November 2022
Team Id	PNT2022TMID09925
Project Name	Project - Signs with smart connectivity for Better road safety

Signs with smart connectivity for Better road safety

Sprint Goals :

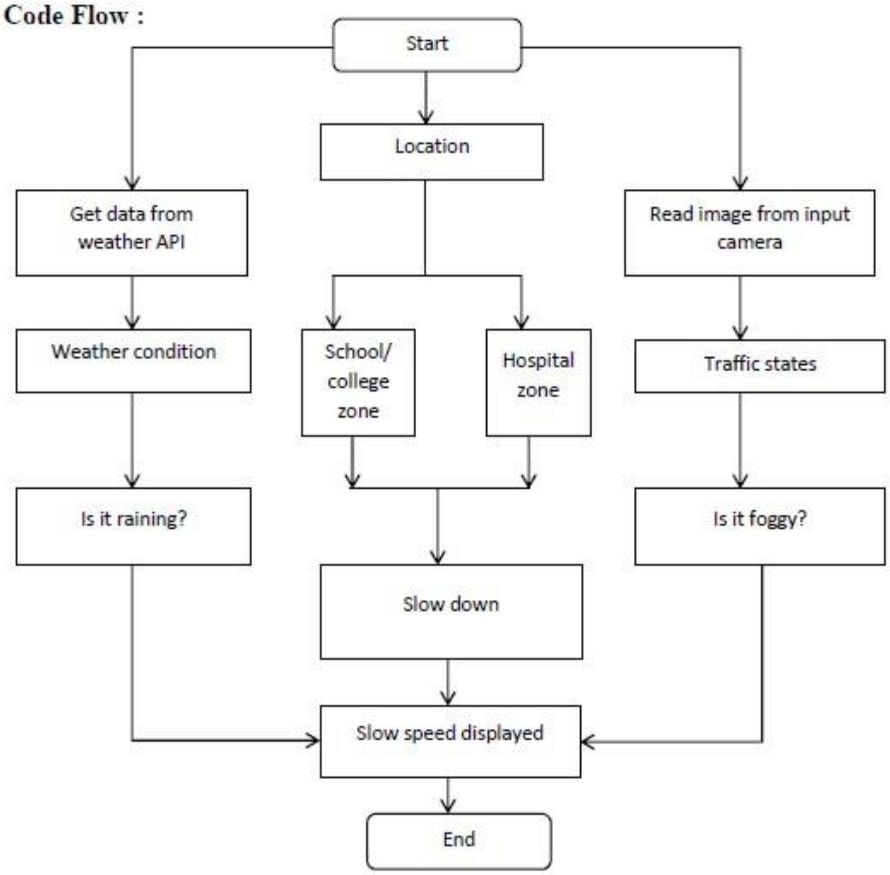
1. Hardware & Cloud integration

Process Flow :



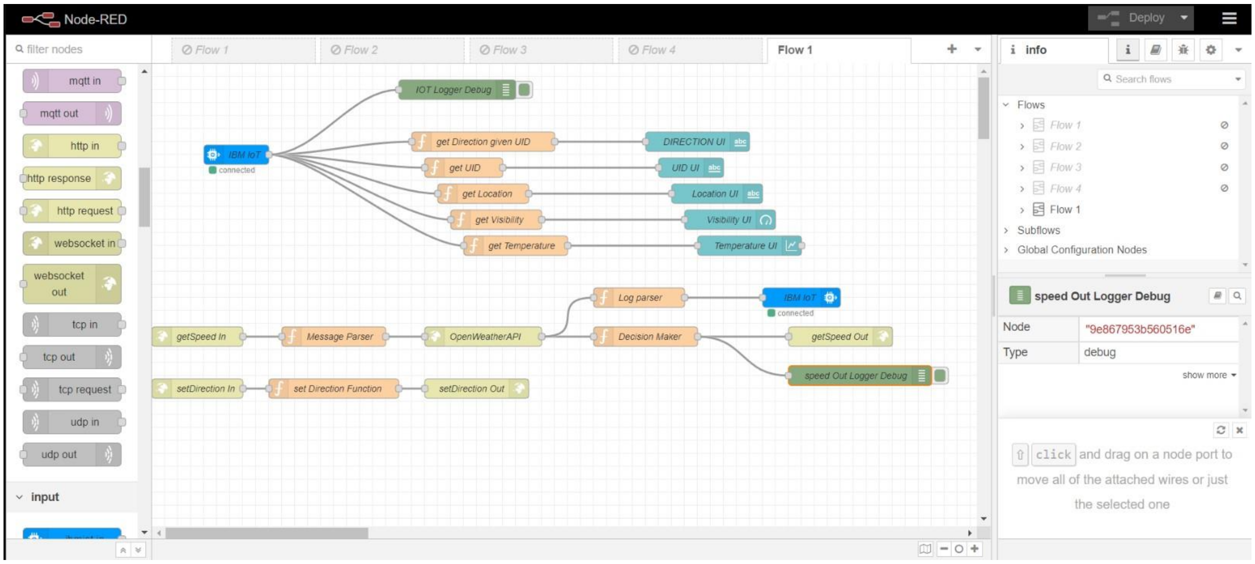
Code Flow :

Code Flow :



Node RED :

Node RED flow :



Node	"9e867953b560516e"
Type	debug

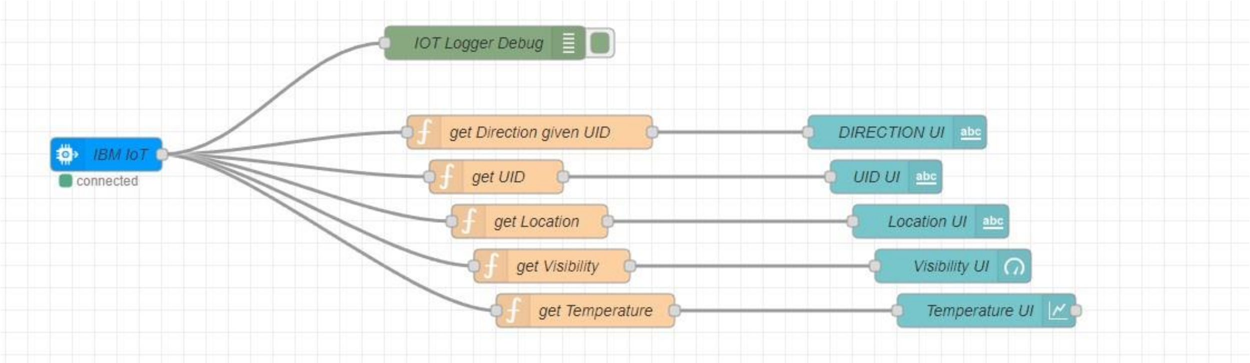
click and drag on a node port to move all of the attached wires or just the selected one

There are 3 flows in the above Node RED flow. They are

1.Node RED UI flow

2./getSpeed API flow 3. /setDirection API flow **1.**

Node RED UI flow :



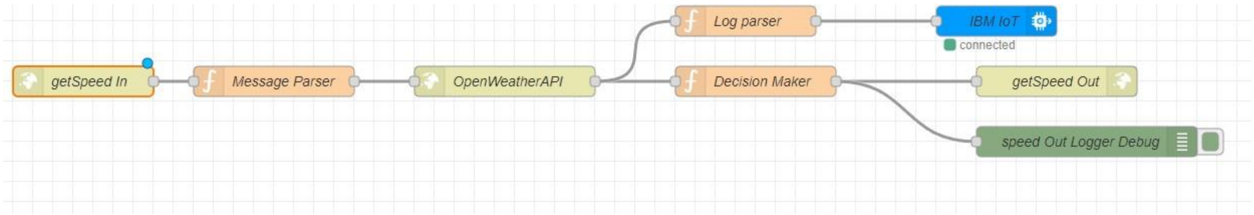
1. **"IBM IOT"** node connects the backend to Node RED UI
2. The function nodes such as **"get Direction given UID"**, **"get UID"**, **"get Location"**, **"get Visibility"** & **"get Temperature"** extract the respective data out and provides them to the UI nodes **"Direction UI"**, **"UID UI"**, **"Location UI"**, **"Visibility UI"** & **"Temperature UI"**.

```
// get Direction given UID
msg.payload = global.get(String(msg.payload.uid));
return msg;
```

```
// get UID
msg.payload = msg.payload.uid; return
msg;

// get Location
msg.payload = msg.payload.location; return
msg;

// get Visibility
msg.payload = msg.payload.visibility; return
msg;

// get Temperature
msg.payload = msg.payload.temperature; return
msg;
```

3. **"IOT Logger Debug"** node logs the data at debugger.

2./getSpeed API flow :



1. **"getSpeed In"** node is an http end point. It accepts parameters like microcontroller UID, location, school & hospital zones info.
2. **"Message Parser"** node parses the data and passes on only required information to the next node

```
global.set("data",msg.payload);


msg.payload.q = msg.payload.location;
msg.payload.appid = "9cd610e5fd400c74212074c7ace0d62c";
return msg;
```

3. **"OpenWeatherAPI"** node is a http request node which calls the OpenWeather API and send the data to the next node.
4. **"Log Parser"** node extracts specific parameters from the weather data and and sends it to the next node.

```
weatherObj = JSON.parse(JSON.stringify(msg.payload));
localityObj = global.get("data");
```

```
var suggestedSpeedPercentage = 100;

var preciseObject = {
    temperature : weatherObj.main.temp - 273.15,
location : localityObj.location,     visibility
: weatherObj.visibility/100,     uid :
localityObj.uid,
    direction : global.get("direction")
};
msg.payload = preciseObject;
 return
msg;
```

5. **"IBM IoT"** node here (IBM IoT OUT)connects the **"IBM IoT"** node (IBM IoT IN) metioned in the **Node RED UI flow** which enables UI updation and logging.

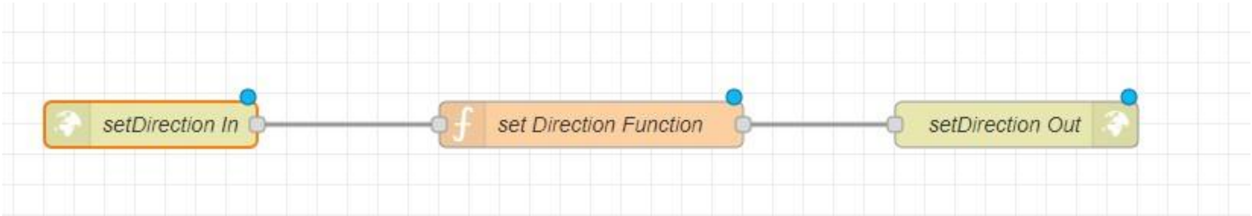
6. **"Decision Maker"** node processes the weather data and other information from the micro controller to form the string that is to be displayed at the Sign Board

```
weatherObj = JSON.parse(JSON.stringify(msg.payload));
localityObj = global.get("data");

var suggestedSpeedPercentage = 100;

var preciseObject = {
    temperature : weatherObj.main.temp - 273.15,
    weather : weatherObj.weather.map(x=>x.id).filter(code => code<700),
visibility : weatherObj.visibility/100
};
if(preciseObject.visibility<=40)
suggestedSpeedPercentage -=30
     switch(String(preciseObject.weather)[-1]) //
https://openweathermap.org/weatherconditions refer weather codes meaning here
{
    case "0" : suggestedSpeedPercentage -=10;break;
case "1" : suggestedSpeedPercentage -=20;break;     case
"2" : suggestedSpeedPercentage -=30;break;
}
msg.payload = preciseObject;

var doNotHonk = 0;
if(localityObj.hospitalZone=="1"||localityObj.schoolZone=="1")
doNotHonk = 1;

var returnObject = {
    suggestedSpeed : localityObj.usualSpeedLimit*(suggestedSpeedPercentage/100),
doNotHonk : doNotHonk
}
msg.payload = String(returnObject.suggestedSpeed) + " kmph \n\n" +
(returnObject.doNotHonk==1?"Do Not Honk":"") + "$" +
global.get(String(localityObj.uid));
 return
msg;
```

7. **"getSpeed Out"** node returns a http response for the request at node **"getSpeed In"**.

8. **"speed Out Logger Debug"** logs the data for debugging.

3. /setDirection API flow :



1. **"setDirection In"** node is an http end point. It accepts parameters like microcontroller UID & direction.

2. **"set Direction Function"** node sets the direction for the given UID.

```
global.set(String(msg.payload.uid),msg.payload.dir);
return msg;
```

3. **"setDirection Out"** node returns a http response for the request at node **"setDirection In"**.

Click on this link to change direction to Straight:

https://node-red-rvfut-2022-11-14.au-syd.mybluemix.net/setDirection?uid=2504&dir=s **Click on this link to change direction to Left:**

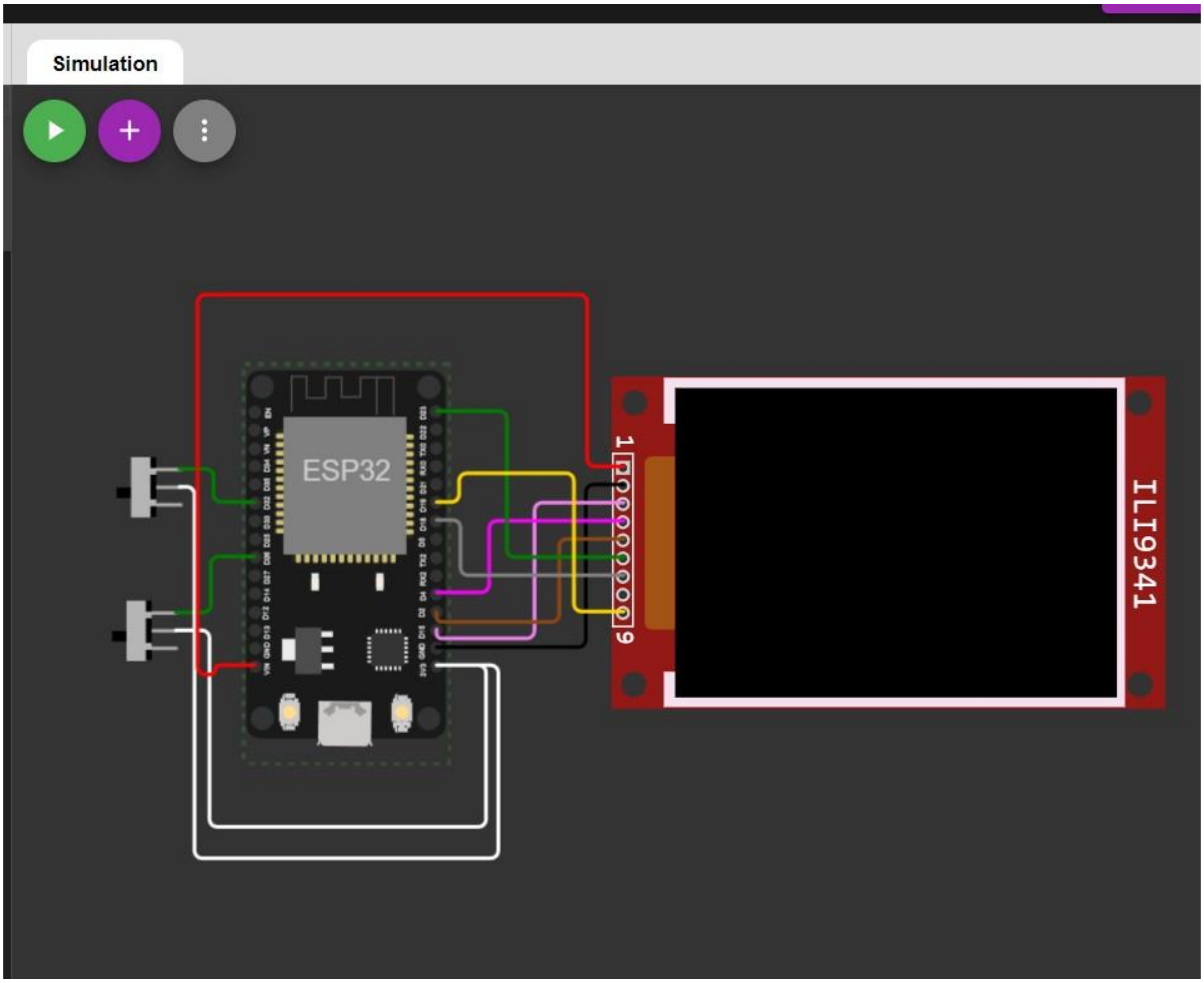
https://node-red-rvfut-2022-11-14.au-syd.mybluemix.net/setDirection?uid=2504&dir=l
Click on this link to change direction to Right: https://node-red-rvfut-2022-11-14.au-syd.mybluemix.net/setDirection?uid=2504&dir=r

Wokwi Circuit :

[Wokwi Code](#) [Wokwi Link](#)

https://wokwi.com/projects/348420917875966547

Circuit Diagram :



ESP 32 CODE :

```
#include <WiFi.h>

#include <HTTPClient.h>

#include <Adafruit_GFX.h>

#include <Adafruit_ILI9341.h>
```

```
#include <string.h>

const char* ssid = "Wokwi-GUEST"; const
char* password = "";

#define TFT_DC 2
#define TFT_CS 15
Adafruit_ILI9341 tft = Adafruit_ILI9341(TFT_CS, TFT_DC);

String myLocation = "Chennai,IN";
String usualSpeedLimit = "70"; // kmph

int schoolZone = 32; int
hospitalZone = 26;

int uid = 2504;

String getString(char x)
{
   String s(1, x);
return s;
}
```

```
String stringSplitter1(String fullString,char delimiter='$')
{
   String returnString = "";     for(int i =
0; i<fullString.length();i++) {          char c
= fullString[i];          if(delimiter==c)
break;          returnString+=String(c);
   }
   return(returnString);
}

String stringSplitter2(String fullString,char delimiter='$')
{
   String returnString = "";
bool flag = false;

   for(int i = 0; i<fullString.length();i++) {
char c = fullString[i];          if(flag)
returnString+=String(c);
if(delimiter==c)              flag = true;
   }
   return(returnString);
```

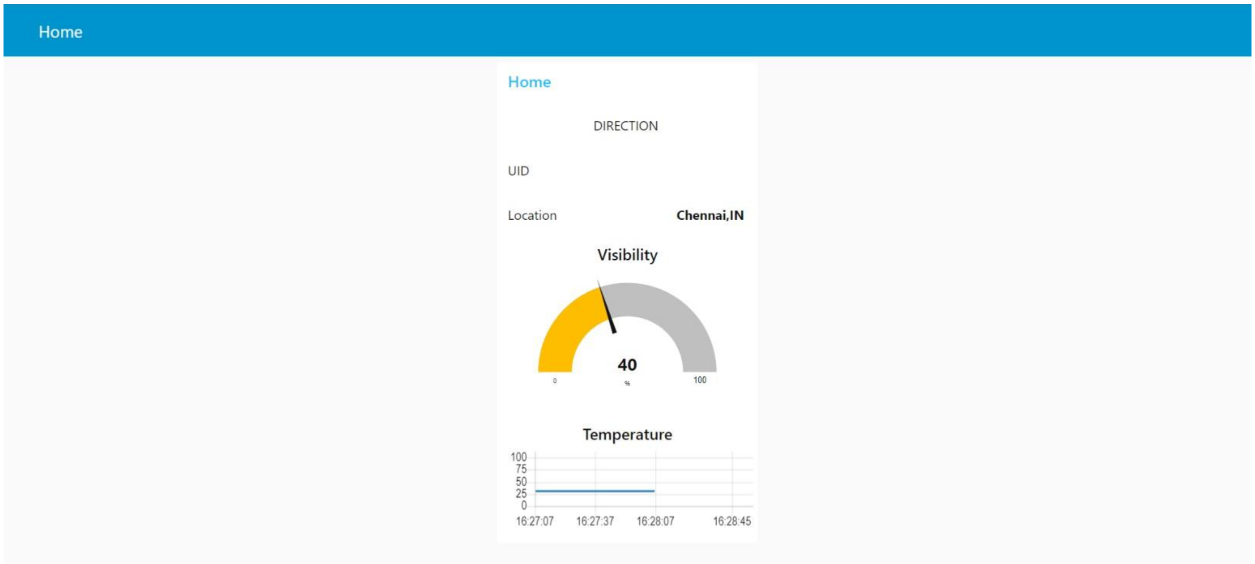
```
}

void rightArrow()
{
  int refX = 50;   int refY =
tft.getCursorY() + 40;

  tft.fillRect(refX,refY,100,20,ILI9341_RED);   tft.fillTriangle(refX+100,refY-
30,refX+100,refY+50,refX+40+100,refY+10,ILI9341_RED);
}

void leftArrow()
{
  int refX = 50;
  int refY = tft.getCursorY() + 40;

  tft.fillRect(refX+40,refY,100,20,ILI9341_RED);   tft.fillTriangle(refX+40,refY-
30,refX+40,refY+50,refX,refY+10,ILI9341_RED);
}

void upArrow()
{
  int refX = 125;   int refY =
tft.getCursorY() + 30;

  tft.fillTriangle(refX-40,refY+40,refX+40,refY+40,refX,refY,ILI9341_RED);   tft.fillRect(refX-
15,refY+40,30,20,ILI9341_RED);
}

String APICall() {
  HTTPClient http;

  String url = "https://node-red-nwmrt-2022-11-04.eu-gb.mybluemix.net/getSpeed?";
url += "location="+myLocation+"&";   url +=
"schoolZone="+(String)digitalRead(schoolZone)+(String)"&"; url +=
"hospitalZone="+(String)digitalRead(hospitalZone)+(String)"&";
  url += "usualSpeedLimit="+(String)usualSpeedLimit+(String)"&";
url += "uid="+(String)uid;   http.begin(url.c_str());   int
httpResponseCode = http.GET();

  if (httpResponseCode>0) {
String payload = http.getString();
http.end();     return(payload);
```

```
  }
else {
    Serial.print("Error code: ");
    Serial.println(httpResponseCode);
  }
  http.end();
}

void myPrint(String contents) {
tft.fillScreen(ILI9341_BLACK);
tft.setCursor(0, 20);   tft.setTextSize(4);
tft.setTextColor(ILI9341_RED);
//tft.println(contents);


  tft.println(stringSplitter1(contents));
String c2 = stringSplitter2(contents);
if(c2=="s") // represents Straight
  {
    upArrow();
  }
  if(c2=="l") // represents left
  {
    leftArrow();
  }
  if(c2=="r") // represents right
  {
    rightArrow();
  }
}

void setup() {
  WiFi.begin(ssid, password, 6);

   tft.begin();
   tft.setRotation(1);

  tft.setTextColor(ILI9341_WHITE);
tft.setTextSize(2);   tft.print("Connecting
to WiFi");

  while (WiFi.status() != WL_CONNECTED) {
delay(100);     tft.print(".");
  }
  tft.print("\nOK! IP=");
tft.println(WiFi.localIP());
}


void loop() {


  myPrint(APICall());


  delay(100);
}
```

Output :

Node RED Dashboard :

LINK TO NODE RED DASHBOARD



DIRECTION

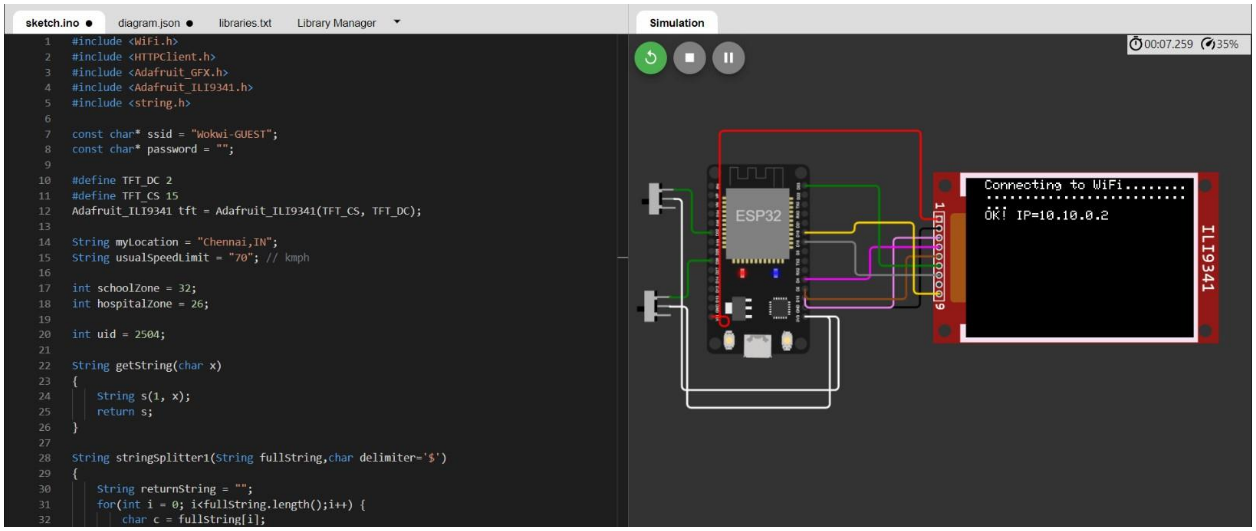
UID

Location Chennai,IN

Wokwi Output :

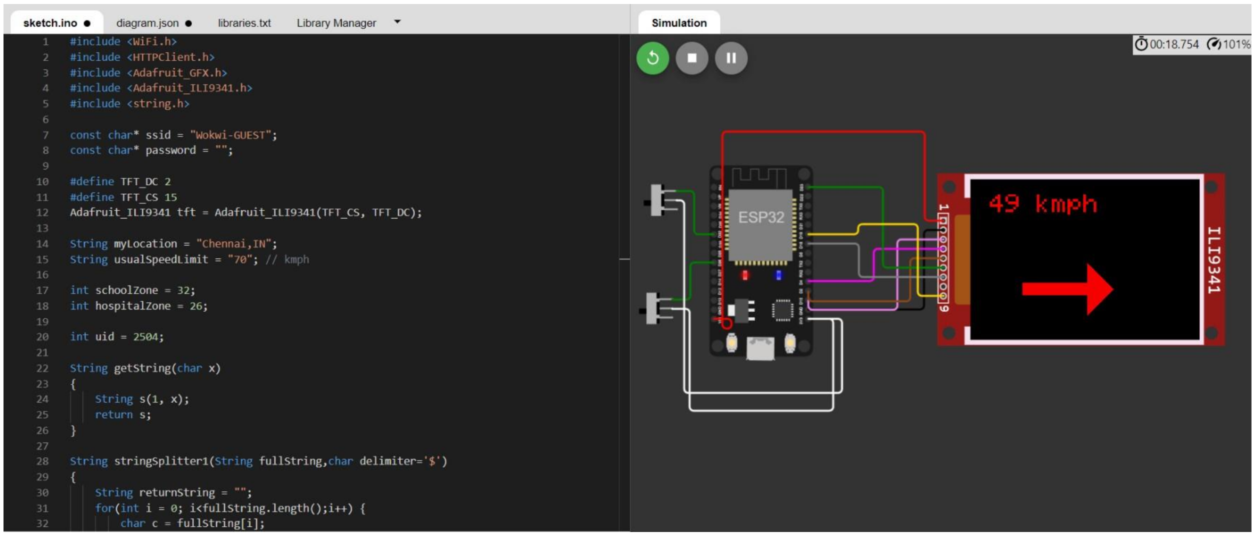
[LINK TO WOKWI PROJECT]

OUTPUT1



```
#include <WiFi.h>
#include <HTTPClient.h>
#include <Adafruit_GFX.h>
#include <Adafruit_ILI9341.h>
#include <string.h>

const char* ssid = "Wokwi-GUEST";
const char* password = "";

#define TFT_DC 2
#define TFT_CS 15
Adafruit_ILI9341 tft = Adafruit_ILI9341(TFT_CS, TFT_DC);

String myLocation = "Chennai,IN";
String usualSpeedLimit = "70"; // kmph

int schoolZone = 32;
int hospitalZone = 26;

int uid = 2504;

String getString(char x)
{
    String s(1, x);
    return s;
}

String stringSplitter1(String fullString,char delimiter='$')
{
    String returnString = "";
    for(int i = 0; i<fullString.length();i++) {
        char c = fullString[i];
```

```
Connecting to WiFi........
..........................
OK! IP=10.10.0.2
```



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#include <Adafruit_GFX.h>
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int schoolZone = 32;
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String getString(char x)
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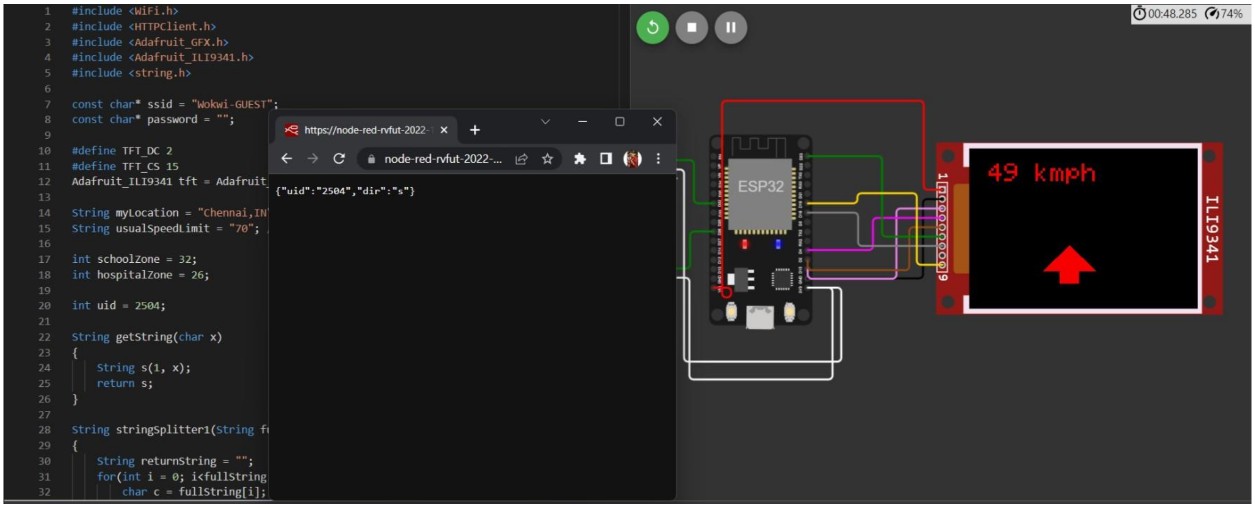
    String s(1, x);
    return s;
}

String stringSplitter1(String fullString,char delimiter='$')
{
    String returnString = "";
    for(int i = 0; i<fullString.length();i++) {
        char c = fullString[i];
```



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#include <WiFi.h>
#include <HTTPClient.h>
#include <Adafruit_GFX.h>
#include <Adafruit_ILI9341.h>
#include <string.h>

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const char* password = "";

#define TFT_DC 2
#define TFT_CS 15
Adafruit_ILI9341 tft = Adafruit_

String myLocation = "Chennai,IN
String usualSpeedLimit = "70";

int schoolZone = 32;
int hospitalZone = 26;

int uid = 2504;

String getString(char x)
{
    String s(1, x);
    return s;
}

String stringSplitter1(String f
{
    String returnString = "";
    for(int i = 0; i<fullString
        char c = fullString[i];
```
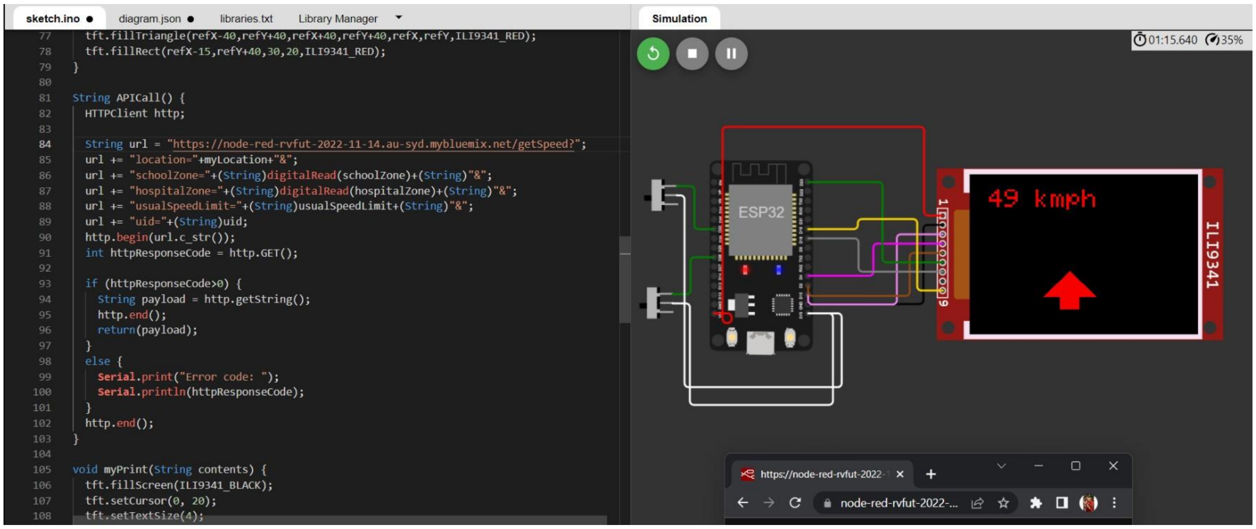

```
{"uid":"2504","dir":"s"}
```



```
  tft.fillTriangle(refX-40,refY+40,refX+40,refY+40,refX,refY,ILI9341_RED);
  tft.fillRect(refX-15,refY+40,30,20,ILI9341_RED);
}

String APICall() {
  HTTPClient http;

  String url = "https://node-red-rvfut-2022-11-14.au-syd.mybluemix.net/getSpeed?";
  url += "location="+myLocation+"&";
  url += "schoolZone="+(String)digitalRead(schoolZone)+(String)"&";
  url += "hospitalZone="+(String)digitalRead(hospitalZone)+(String)"&";
  url += "usualSpeedLimit="+(String)usualSpeedLimit+(String)"&";
  url += "uid="+(String)uid;
  http.begin(url.c_str());
  int httpResponseCode = http.GET();

  if (httpResponseCode>0) {
    String payload = http.getString();
    http.end();
    return(payload);
  }
  else {
    Serial.print("Error code: ");
    Serial.println(httpResponseCode);
  }
  http.end();
}

void myPrint(String contents) {
  tft.fillScreen(ILI9341_BLACK);
  tft.setCursor(0, 20);
  tft.setTextSize(4);
```