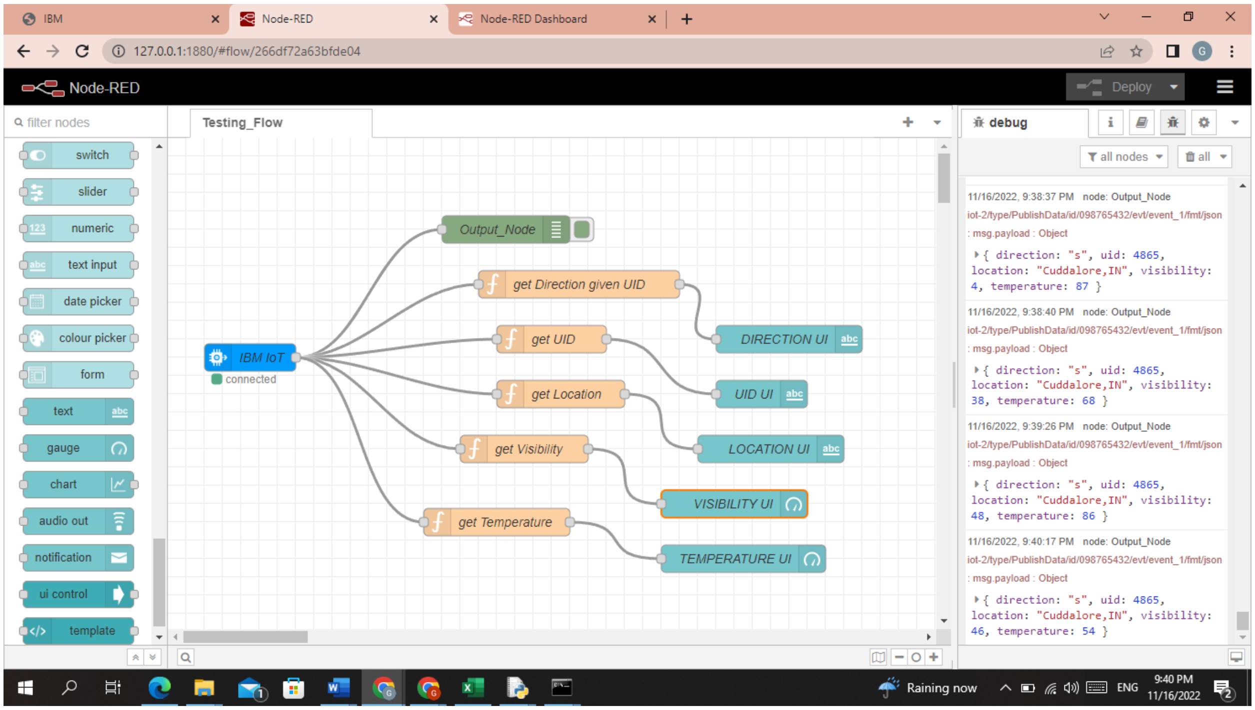
SPRINT 3

TEAM ID: PNT2022TMID38788

Node RED UI flow:



```
11/16/2022, 9:38:37 PM   node: Output_Node
iot-2/type/PublishData/id/098765432/evt/event_1/fmt/json
: msg.payload : Object
▸{ direction: "s", uid: 4865,
location: "Cuddalore,IN", visibility:
4, temperature: 87 }
11/16/2022, 9:38:40 PM   node: Output_Node
iot-2/type/PublishData/id/098765432/evt/event_1/fmt/json
: msg.payload : Object
▸{ direction: "s", uid: 4865,
location: "Cuddalore,IN", visibility:
38, temperature: 68 }
11/16/2022, 9:39:26 PM   node: Output_Node
iot-2/type/PublishData/id/098765432/evt/event_1/fmt/json
: msg.payload : Object
▸{ direction: "s", uid: 4865,
location: "Cuddalore,IN", visibility:
48, temperature: 86 }
11/16/2022, 9:40:17 PM   node: Output_Node
iot-2/type/PublishData/id/098765432/evt/event_1/fmt/json
: msg.payload : Object
▸{ direction: "s", uid: 4865,
location: "Cuddalore,IN", visibility:
46, temperature: 54 }
```

CODE:

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

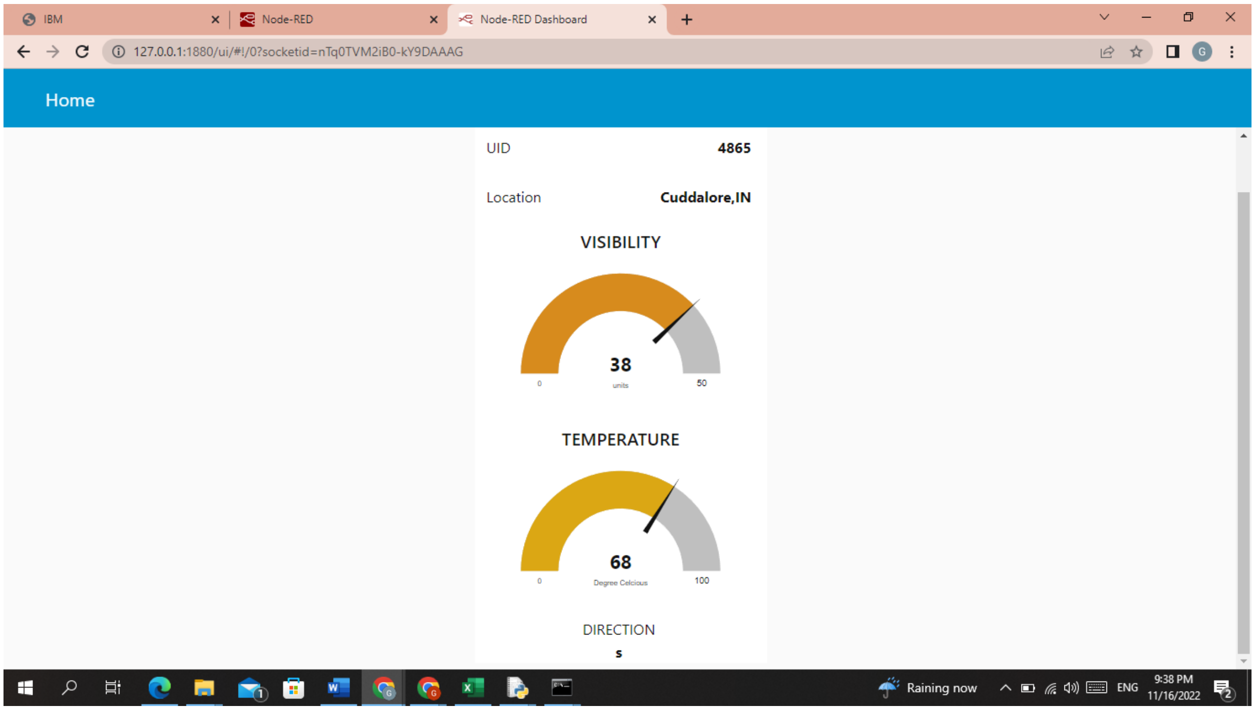
```
// get UID
msg.payload = msg.payload.uid;
return msg;
```

```
// 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;
```

OUTPUT:



UID 4865

Location Cuddalore,IN

VISIBILITY

38

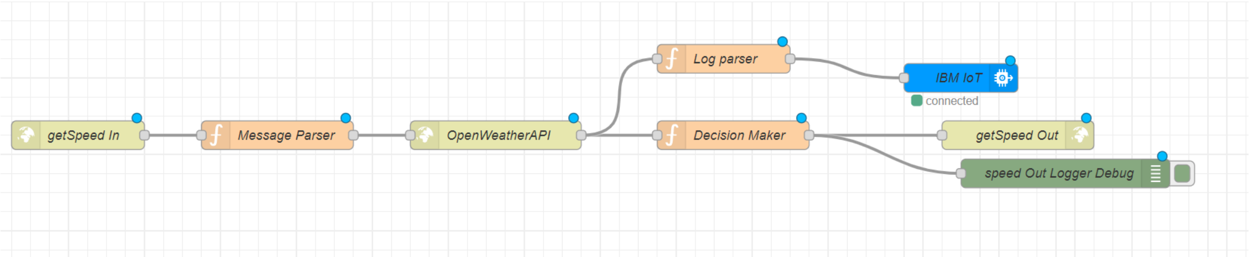
TEMPERATURE

68

DIRECTION

s

Get Speed API flow:



CODE:

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.

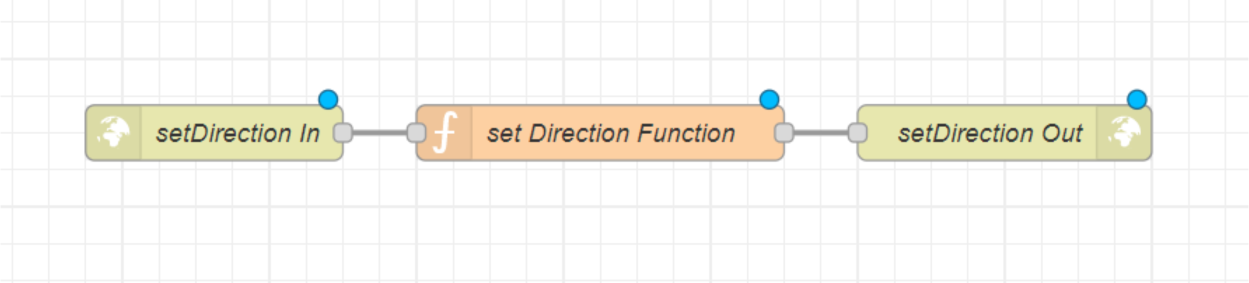
6. **"Decision Maker"** node processes the weather data and other information from the micro controller to form the string that is to be displayed at the Sign Board

```
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/weather-
conditions 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.

setDirection API flow:



CODE:

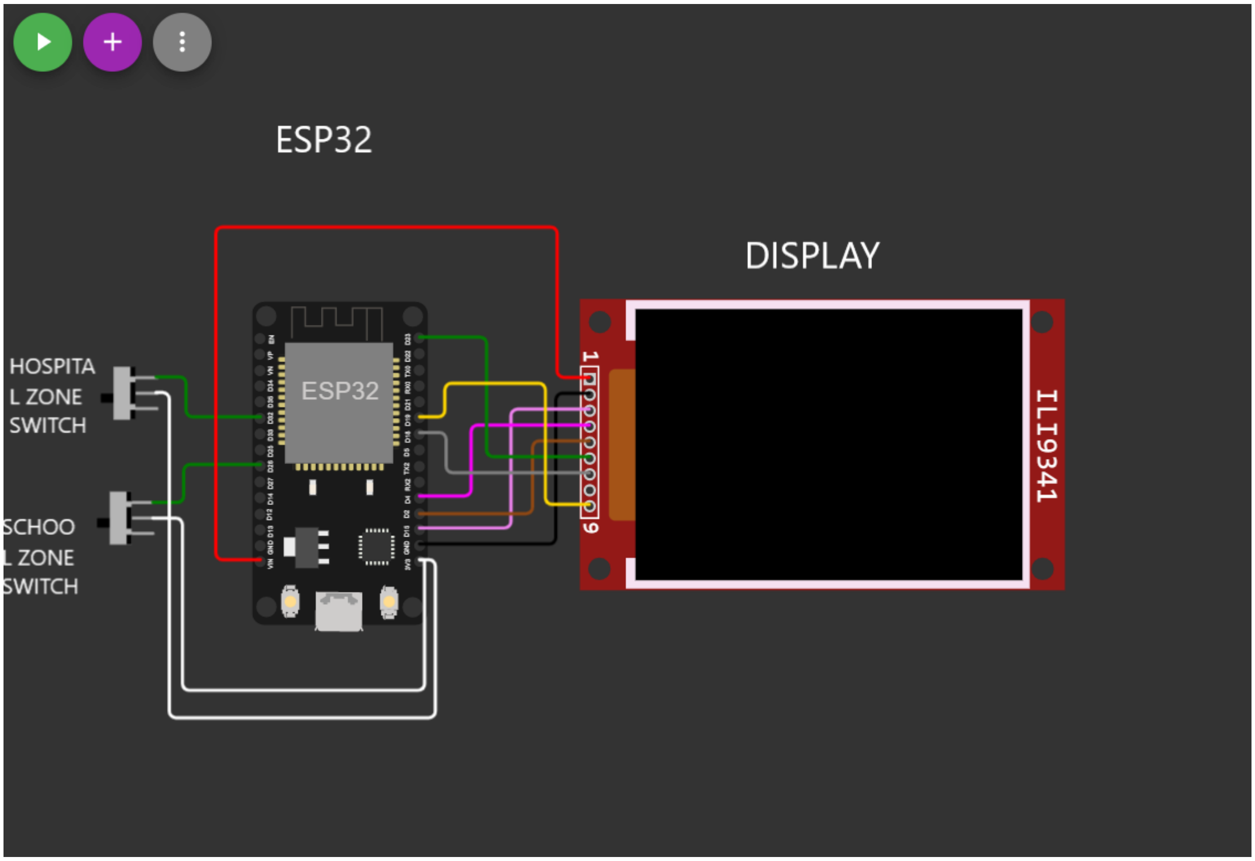
1. **"setDirection In"** node is an http end point. It accepts parameters like microcontroller UID & direction.

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"**.

ESP32 CIRCUIT DIAGRAM

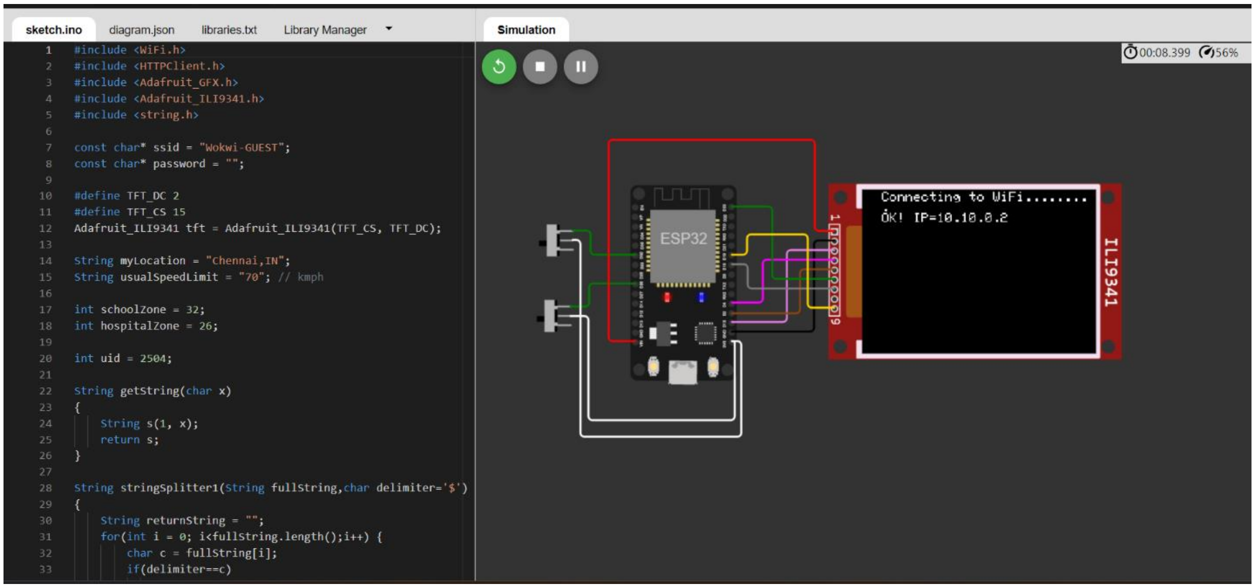


CODE:

```
#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();
}
```

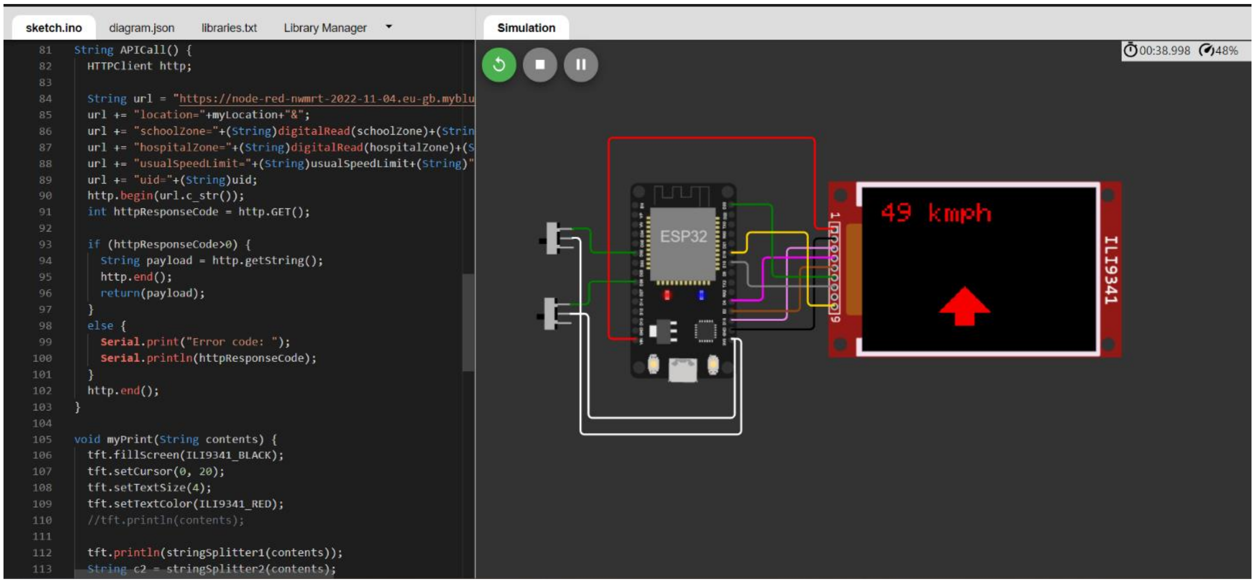
```
void myPrint(String contents) {
  tft.fillScreen(ILI9341_BLACK);
  tft.setCursor(0, 20);
  tft.setTextSize(4);
  tft.setTextColor(ILI9341_RED);
  //tft.println(contents);

  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:



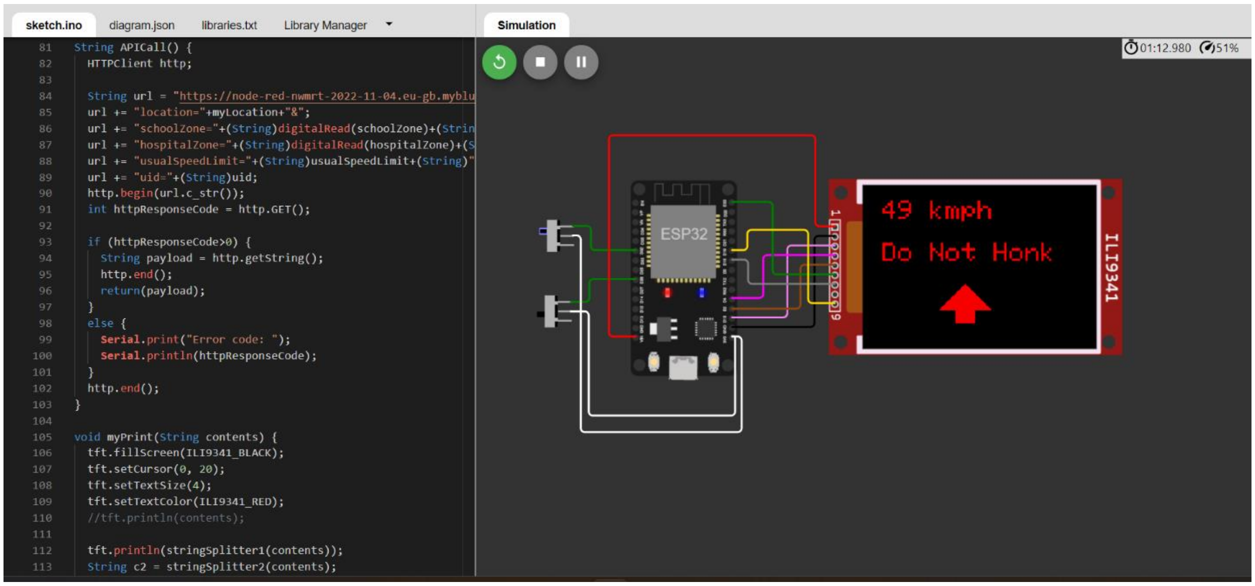
```
#include <WiFi.h>
#include <HTTPClient.h>
#include <Adafruit_GFX.h>
#include <Adafruit_ILI9341.h>
#include <string.h>

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)
```

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



```
String APICall() {
  HTTPClient http;

  String url = "https://node-red-nwmrt-2022-11-04.eu-gb.myblu
  url += "location="+myLocation+"&";
  url += "schoolZone="+(String)digitalRead(schoolZone)+(Strin
  url += "hospitalZone="+(String)digitalRead(hospitalZone)+(S
  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);
```

```
49 kmph
```



```
String APICall() {
  HTTPClient http;

  String url = "https://node-red-nwmrt-2022-11-04.eu-gb.myblu
  url += "location="+myLocation+"&";
  url += "schoolZone="+(String)digitalRead(schoolZone)+(Strin
  url += "hospitalZone="+(String)digitalRead(hospitalZone)+(S
  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);
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  tft.setTextSize(4);
  tft.setTextColor(ILI9341_RED);
  //tft.println(contents);

  tft.println(stringSplitter1(contents));
  String c2 = stringSplitter2(contents);
```
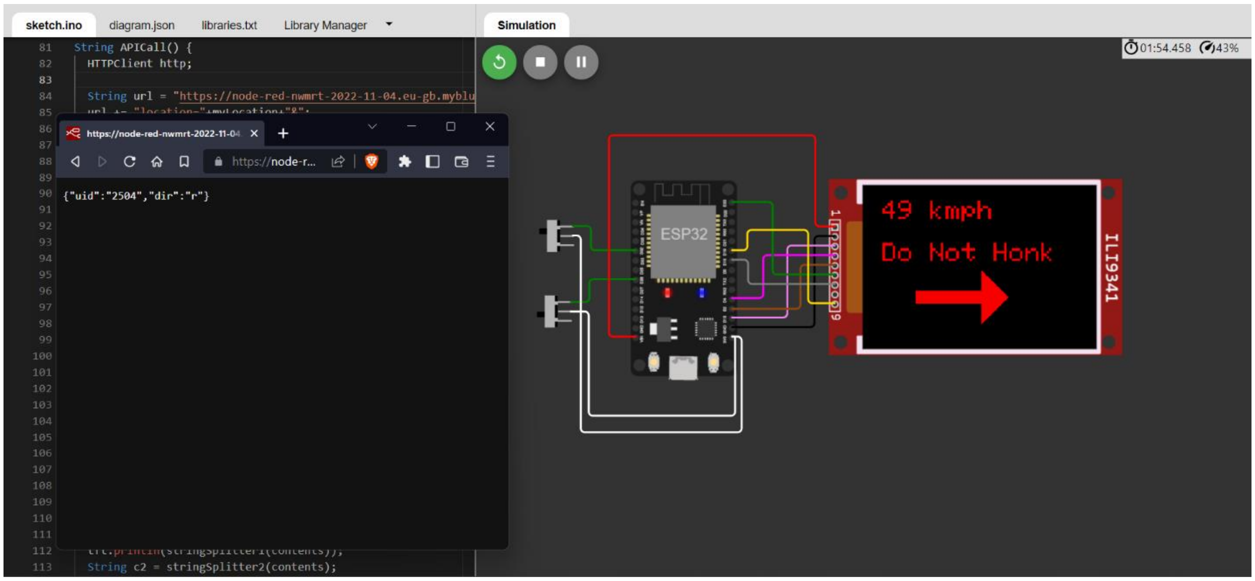
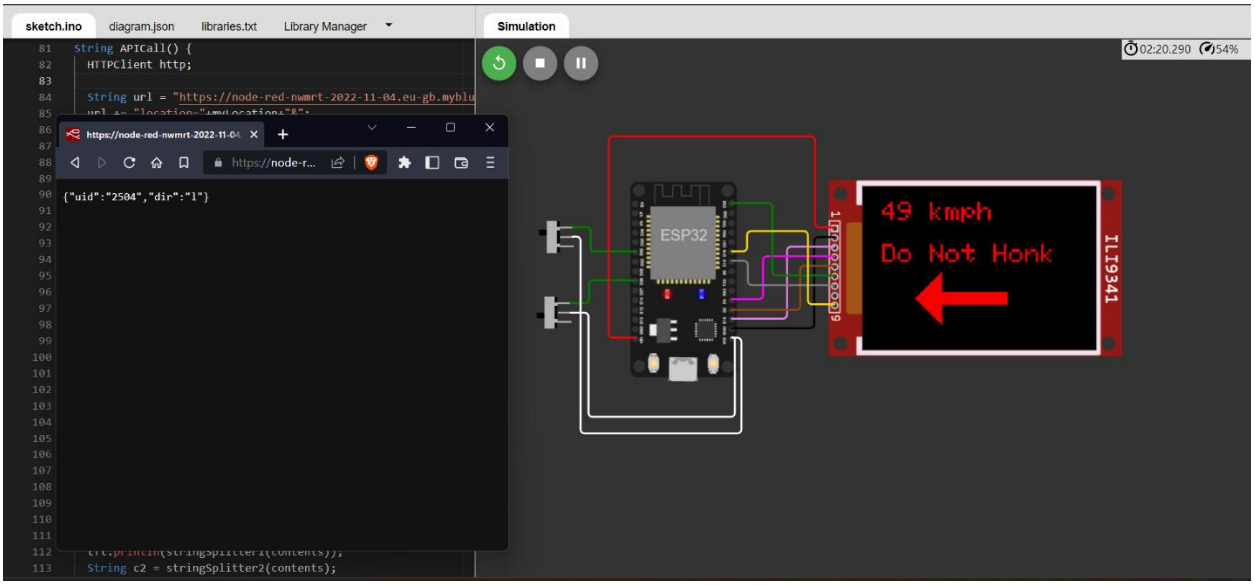



```
String APICall() {
  HTTPClient http;

  String url = "https://node-red-nwmrt-2022-11-04.eu-gb.myblu
  url += "location="+myLocation+"&";
```

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

```
  tft.println(stringSplitter1(contents));
  String c2 = stringSplitter2(contents);
```



```
String APICall() {
  HTTPClient http;

  String url = "https://node-red-nwmrt-2022-11-04.eu-gb.myblu
  url += "location="+myLocation+"&";
```

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

```
  tft.println(stringSplitter1(contents));
  String c2 = stringSplitter2(contents);
```