

SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

IBM PROJECT REPORT

TEAM ID: PNT2022TMID39434

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FINAL DELIVERABLES REPORT

DATE	20 TH NOVEMBER 2022
TEAM ID	PNT2022TMID39434
PROJECT NAME	SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

TEAM MEMBERS AND THEIR CONTRIBUTION:

NAME	ROLL NO	CONTRIBUTION
U.HARIPRIYA	510119106002	CREATED NODE RED AND IOT WATSON PLATFORM,ALSO CREATED SOURCE CODE FOR MIT APP.GATHERED IDEAS FOR CREATING PROJECT
B.RAGHUL	510119106009	PROJECT REPORT MAKING PROCESS AND WORKED IN IBM CLOUD DEPLOYMENT
M.KARUNANITHI	510119106701	CREATED SOURCE CODE FOR WOKWI WEATHER MAP SERVICES AND TO PUBLISH DATA IN CLOUD.DEVELOPED A PYTHON SCRIPT
S,SHAMKUMAR	510119106010	WORKED IN NODE RED FLOW AND PUBLISH LOCAL DATA TO CLOUD

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1. INTRODUCTION:

1.1.PROJECT OVERVIEW:

- To replace the static signboards, smart connected sign boards are used.
- These smart connected sign boards get the speed limitations from a web app using weather API and update automatically.
- Based on the weather changes the speed may increase or decrease.
- Based on the traffic and fatal situations the diversion signs are displayed.
- Guide(Schools), Warning and Service(Hospitals, Restaurant) signs are also displayed accordingly.
- Different modes of operations can be selected with the help of buttons.

1.2.PURPOSE:

In present Systems the road signs and the speed limits are Static. But the road signs can be changed in some cases. We can consider some cases when there are some road diversions due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalized. This project proposes a system which has digital sign boards on which the signs can be changed dynamically. If there is rainfall then the roads will be slippery and the speed limit would be decreased. There is a web app through which you can enter the data of the road diversions, accident prone areas and the information sign boards can be entered

through web app. This data is retrieved and displayed on the sign boards accordingly.

2. LITERATURE SURVEY:

2.1 EXISTING PROBLEM:

Conventional traffic system does not have proper monitoring system and often requires manual handling at traffic junction. This not only causes mental stress in passengers but also lot of fuel goes wasted due to delay at traffic junction. According to a study, one person dies every four minutes in road accidents in India, estimating the cost of such accidents at INR 3.8 lakh crores or 3% of the GDP. As a signatory to the Brasilia Declaration, India is committed to reducing the number of road accidents and fatalities by 50% by 2020.

Analysis of crash data has suggested a link between roadside advertising signs and safety. Researches suggest that crash risk increases by 30% in presence of digital roadside advertising. In addition, drivers showed eye fixation and increased drifting between lanes on the road.

2.2 . REFERENCES:

<https://vrriourope.com/en/smart-road-technology-digital-highways-of-the-future>
<https://www.trafficinftratech.com/technology-for-road-safety>
<https://www.researchgate.net/publication/221701886> Pedestrian Gap Acceptance for Mid-Block Street Crossing

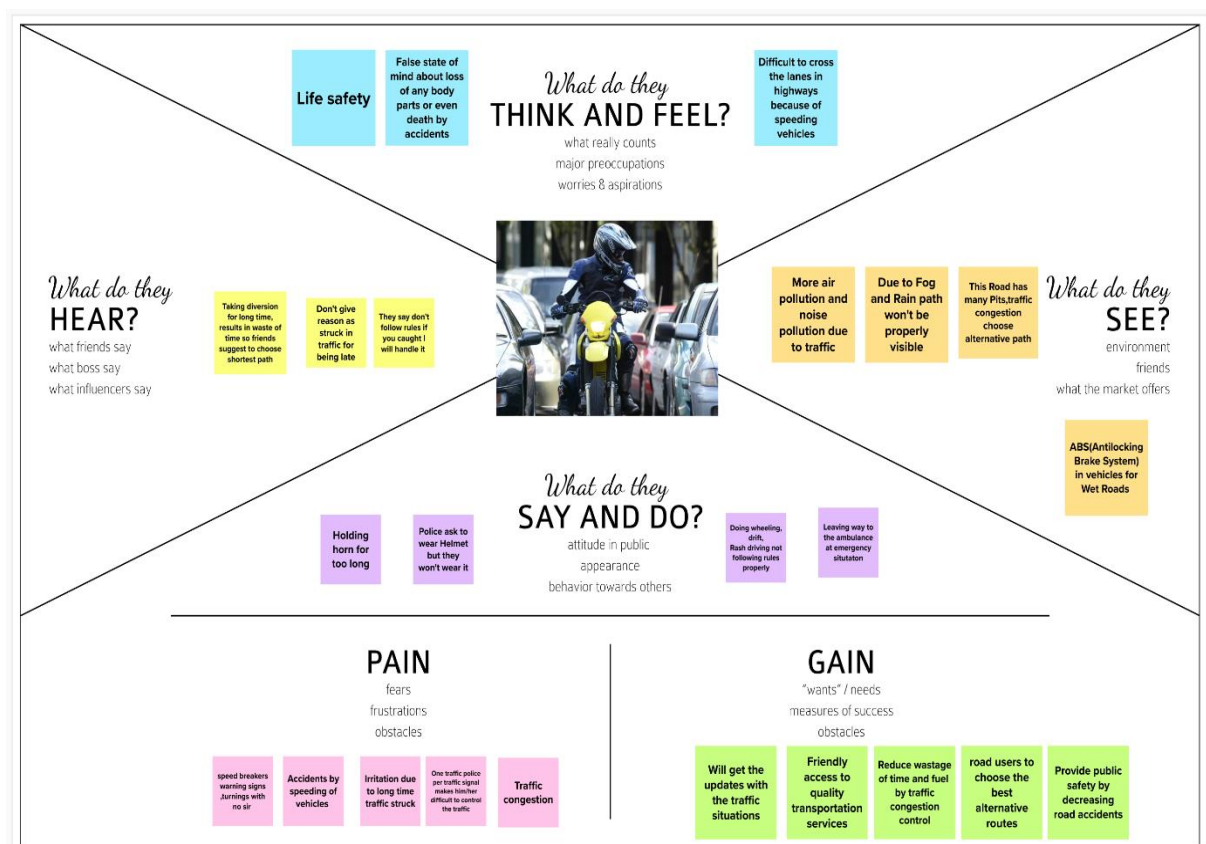
2.3.PROBLEM STATEMENT:

This project will replace the static boards to smart signed boards that will change the speed limits according to the weather climate and show

diversion message if there are accidents in the road and alert messages if there is hospital, school and any roadworks, also using the web application the user will get to know about road conditions.

3.IDEATION & PROPOSED SOLUTION:

3.1. Empathy Map Canvas:



3.2. Ideation and Brainstorming:

Haripriya U

SMART SYSTEMS CAN USE DIGITAL SENSOR TO ACQUIRE DATA PERTAINING TO LANECHANGES, ACCIDENTS, TRAFFIC JAMS AND WEATHER CONDITIONS, ACTIVATING WARNING SYSTEM IN TIME AND ENABLING ACTIVE LED DISPLAYS ON ROADS AND HIGHWAYS.

INTELLIGENT TRAFFIC LIGHT COMMUNICATES WITH SENSORS OF CONNECTED CARS AND RECEIVE INFORMATION ABOUT THEIR STATUS AND WHEN WILL THE TRAFFIC JAM CHANGES.IT ALSO IN CASE OF EMERGENCY CONNECTED CARS HAVE AUTOMATIC WARNING MECHANISM FOR EMERGENCY SERVICES.

EMERGENCY ROUTING BASED ON IOT BY CONTROL OF SIGNS AND TRAFFIC SYSTEM TO GIVE PRIORITY TO AMBULANCE, FIRE SERVICE, POLICE ETC.

SMART PEDESTRAIN CROSSING CONNECTIVITY WITH TRAFFIC SIGNS

Karunanithi

IN JUNCTIONS, CHANGING SIGNALS ACCORDING TO THE DENSITY OF THE VEHICLE IN THE LANE

GEOGRAPHY BASED SMART SPEED WARNING SYSTEM.

IF TRAFFIC OCCURS IN A ROAD, PREVIOUS TRAFFIC POST AUTOMATICALLY CHOOSE ALTERNATIVE PATH

IF PEOPLE FAIL TO OBEY SIGN BOARDS THEY DETECTED BY THE CAMERA AND FINED

Raghul

DISTRACTIONS IS THE MAJOR CAUSE FOR ROAD ACCIDENTS, SO MONITORING OF MOBILE PHONE USAGE AND REPORTING TO THE CONTROL ROOM

VIDEO DETECTION SYSTEMS TO RELAY THE INFORMATION COLLECTED TO CENTRAL SERVER IN CONTROL ROOM WHICH LEADS TO REAL-TIME INCIDENT MANAGEMENT.

FOLLOWING THE LANE DISCIPLINE (KEEPING TO THE LEFT), BY DETECTING THE DIRECTION OF THE VEHICLE IF IT IS IN WRONG DIRECTION THEN REPORT IS SENT

UPDATES INFORMATION REGARDING STATE OF ROADS SUCH AS POTHOLES, ICE, CLIMATIC CHANGES AND BLACK SPOTS

Shamkumar

DETECTING DRINK AND DRIVE BY THE STEADINESS OF THE VEHICLE MOVEMENT

PASSENGER LIMIT MONITORING SYSTEM

SMART CEMENT BASED ROADS HELPS TO MONITOR THE STRUCTURAL STATUS OF ROAD AND BRIDGES UNDER EMERGENCY CONDITONS ALERT US

DIGITAL SENSORS IN POLL GIVES DETAILS ABOUT SIGNS SUCH AS DIVERSIONS, CONSTRUCTION WORK, TRAFFIC AND BEST ROUTES.

Prabhatharan(Mentor)

IN JUNCTIONS, CHANGING SIGNALS ACCORDING TO THE DENSITY OF THE VEHICLE IN THE LANE

SMART PEDESTRAIN CROSSING CONNECTIVITY WITH TRAFFIC SIGNS

UPDATES INFORMATION REGARDING STATE OF ROADS SUCH AS POTHOLES, ICE, CLIMATIC CHANGES AND BLACK SPOTS

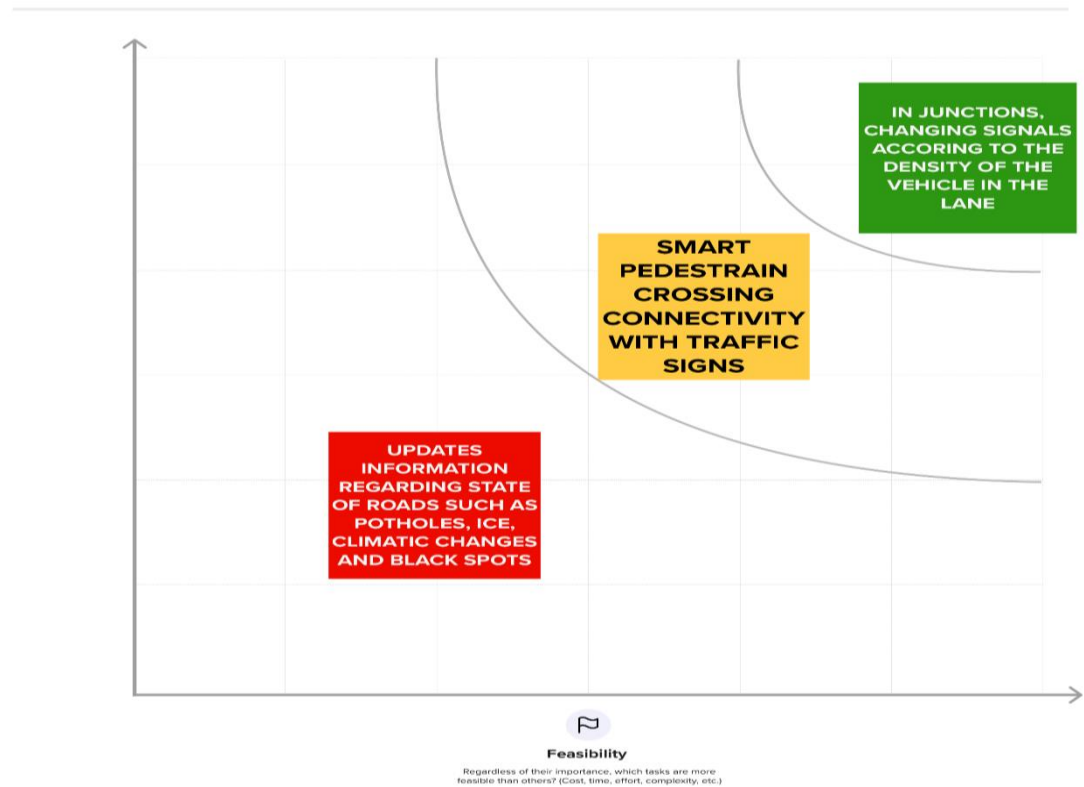
GROUP IDEAS

IN JUNCTIONS, CHANGING SIGNALS ACCORDING TO THE DENSITY OF THE VEHICLE IN THE LANE

SMART PEDESTRAIN CROSSING CONNECTIVITY WITH TRAFFIC SIGNS

UPDATES INFORMATION REGARDING STATE OF ROADS SUCH AS POTHOLES, ICE, CLIMATIC CHANGES AND BLACK SPOTS

Prioritize



3.3. Proposed solution:

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<p>Road traffic issues moreover has become the backbone for major injuries, deaths in recent times. The problem lies between negligence and the false approach towards the better analysis of traffic events. The liability of road accidents supposed to be varied due to various reasons such as drunken driver, natural cause (weather conditions), the lack of visibility pedestrian crossings, brake failure etc., It is at ease to find remedy it factors could be analysed and act it to take right measures. To avoid road mishaps, it is not enough to just improve road conditions but also need to control the traffic accidents and congestion, the cause-and-effect regulations with the smart sign connectivity in traffic signals.</p> <p>Proposed solution:</p> <p>To avoid the traffic congestions and reduce the</p>

		<p>accidents and to save the lives we propose the three major solutions such as follows:</p> <p>1)Density based traffic control systems with smart sign connectivity.</p> <p>2)Smart pedestrian crossing connectivity with traffic signs.</p> <p>3)Intelligent real time pothole detection and warning system for automobile application based on IOT.</p>
2.	Idea / Solution description	<p><u>Changing Traffic signals According to the density of the vehicle in the lanes</u></p> <p>To reduce the traffic congestion in a particular lane we introducing automatically changing traffic signals according to the density of the vehicle in the lane, for example: Consider a four lane Junction, where lane-A, B, C, D respectively. If lane A has 15 vehicles, B has 10 vehicles, C has 7 vehicles and D has 2 vehicles. Green signal should be prioritized to the higher density lane. Signal towards A should be change into green within 15 sec and last for 30 sec, signal towards B should be change into green within 25 sec and last for 20 sec, signal towards C should be change into green within 35 sec and last for 15sec and signal towards D should be change into green within 40 sec and last for 10sec. This helps to easily config the traffic signals.</p> <p><u>SMART PEDESTRIAN CROSSING CONNECTIVITY WITH TRAFFIC SIGNS:</u></p> <p>To reduce the number of traffic accidents that occur in many busy areas SMART Pedestrian crossings have been designed and by this way increase safety for pedestrians. This technical solution functions with a series of sensors which detect movement every time</p>

		<p>someone is crossing or about to cross. The light panels on the floor connected to these sensors immediately light up and help drivers see in an easier and quicker way that there is a pedestrian crossing. And also using the traffic signs automatically changing to red signal can make it even more clear and understandable to drivers that they must stop because someone is crossing the street. This solution mainly addresses the lack of visibility in pedestrian crossing situated in some busy zones of city. This solution is in the use of sensors to detect movement around pedestrian crossing. When movement is detected, this information is sent automatically to the smart sign connectivity in traffic light and ON the light and wait until the pedestrians cross the road. Near the both ends of pedestrian crossing a vertical light panel will glow until the pedestrians cross from one end to another end.</p> <p>3. The problem of this project is to potholes and climate change. So basic concept to solve this is that to detect the potholes and the change in climate and then convey the intermediate person to maintain the speed if the user is connected to internet and for the user who are not connected to the internet will receive the information by the digital board placed at a particular interval of distance. Step1: Detect the climate change through the open whether map Step 2: Indicate the user to maintain the speed level through the MQTT protocol where the particular channel needed to be subscribed by all the user (connected to internet users) and even through the digital board of the high wavelength font colour for long distance view placed at equal intervals of distance (not connected to internet users).</p>
3.	Novelty / Uniqueness	<p>1. By this Idea the camera analyses the number of vehicles in the lane and decrease the red signal time and Increase the Green signal time. This majorly useful in developed cities where frequently more traffics are occurring.</p> <p>2. In current existing solutions for smart pedestrian crossings, it uses light panels</p>

		<p>and sensors for detection of pedestrians crossing the road Whereas in our idea, we use the sensors which detect the pedestrian crossing and also it will update info the connected devices and smart sign boards. It will also change the traffic signals accordingly.</p> <p>3. The existing system just deals with the climate changes and inform the user. In our project we detect the climate change and convey about the safety measures to be followed users.</p>
4.	Social Impact / Customer Satisfaction	<p>1. The benefits of this idea is to clear the traffic as soon as possible. By this it first tries to clear the lane which has a greater number of vehicles. So there no more waiting time in the traffics.</p> <p>2. The main benefits of implementing this solution are an improved and higher traffic safety, therefore a decrease in the number of accidents. This system of pedestrian crossing affects very POSITIVELY. Since it increases the visibility and reduce the accidents. In Spain, there are many cities already using this system, it can be adopted in major cities. Automated pedestrian detection provides more timely pedestrian indications and ensure that visually impaired pedestrians also have enough time to safely cross the road.</p> <p>3. With the implementation of our project customers can travel peacefully at all type of climatic changes because of the earlier intimation.</p>
5.	Business Model (Revenue Model)	<p>1. It doesn't require more cost because in most of the junction already contains camera in the top of the signal towers, we just analyse the number of vehicles in the lane by a Python code and change the signals accordingly with the help of IOT.</p> <p>2. This type of technical solution could be applied in any town or urban cities as it does not require a very high amount of money to be installed or to be maintained. It is believed that it will be adopted by the government in the upcoming years. The intelligent cost for this Intelligent Transport System (ITS) cost 1.20 lakh/set (INR) approximately. Operating costs are approximately 3.25 lakh per year. Adding</p>

		smart sign with the existing pedestrian signal can range from (5-8 lakh) INR per crosswalk.
6.	Scalability of the Solution	<p>1. Most of the people are struggling in the traffic signal by waiting for a long in the same lane. They can be cleared by this idea.</p> <p>2. A pedestrian crossing in road is an essential infrastructure in the part of transportation which help to serve in the security and saving life of million people and possessions and helps flow in order of traffic in roads. This IOT based smart pedestrian crossing system has high scalability and integrity which helps in reducing unpredictability in determining the behaviour of the pedestrians while crossing the road. It will have high range of accuracy nearly 80% and it is cost effective of the current system. It is expected with this technical solution issues and hazards associated during road crossing will be eliminated.</p> <p>3.This project highly feasible one as it's very easy to implement with low cost environment.</p>

4.REQUIREMENT ANALYSIS:

4.1.Functional requirements:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Pedestrian Aspects	The field element shall collect pedestrian sensor data and respond to pedestrian crossing via display (pedestrian sign indication) and control traffic signs accordingly.

FR-2	Density based vehicle aspects -Transit Signal priority	The field element collect information about emergency vehicle in which green time is extended or red time is truncated in traffic signs and expedite movement of authorized emergency vehicles. The transit signal priority shall include rules to negotiate competing calls for priority.
FR-3	Monitoring Aspects	The field element shall monitor operation of the traffic signal controllers and report to the centre any instance in which the indicator response does not match that expected from the detectors and sensors.
FR-4	Interface aspects	The field element shall include traffic sensor that receive control information to other field element devices (such as traffic controllers at adjacent intersections and dynamic message signs).
FR-5	Simultaneous working aspects:	Our project focus on both the pedestrian and vehicular users to reach their place safely and on time respectively. This parallel mechanism helps to save time and processing of data

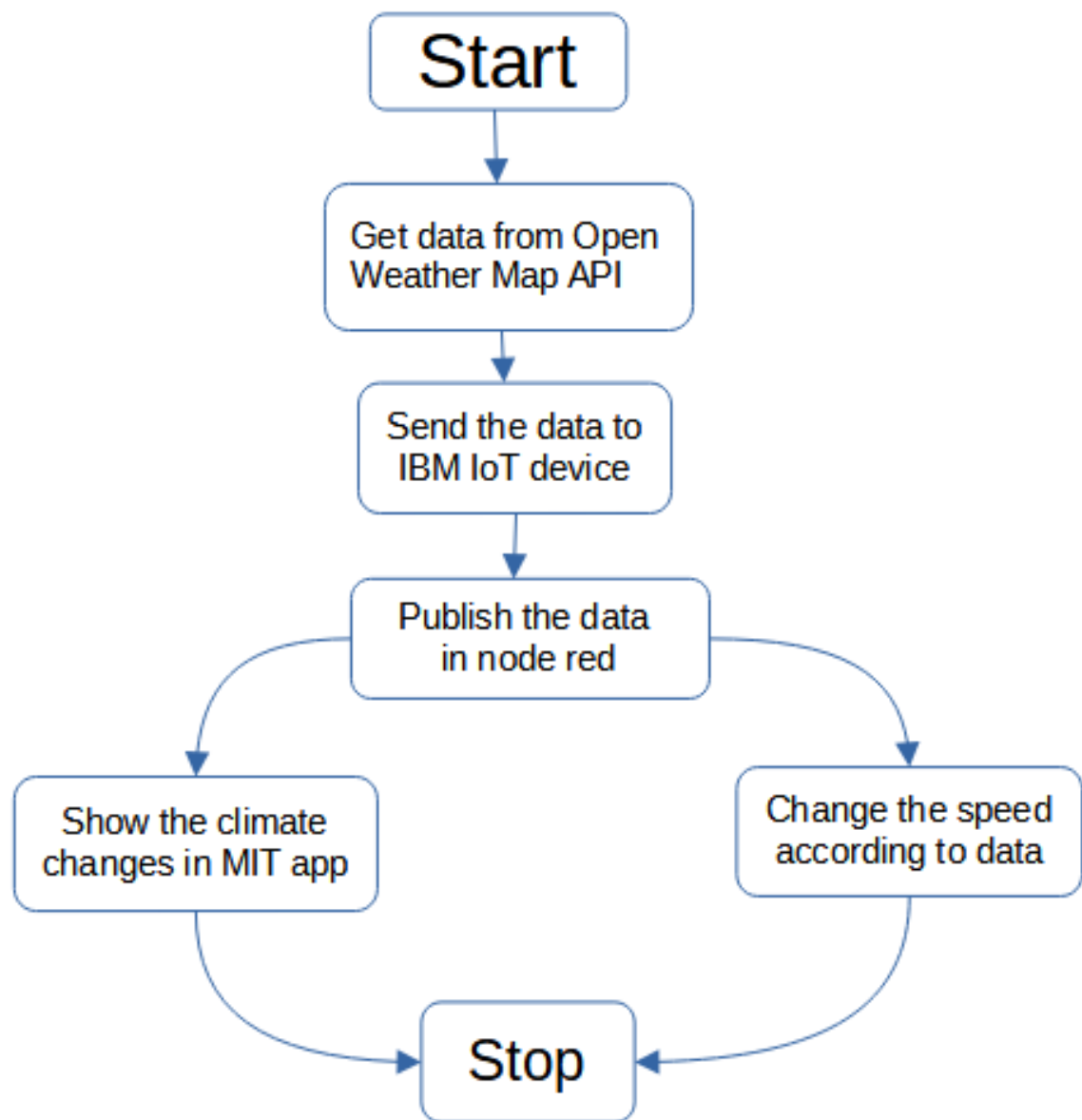
4.2. Non Functional requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It's used for the people who cross the road slowly, and for density change its useful for who rushing to the exams or meeting's. It is used in order to increase the safety of pedestrians that can find themselves at the same time with vehicles on road, the automobiles and roads are fitted which controls traffic congestion

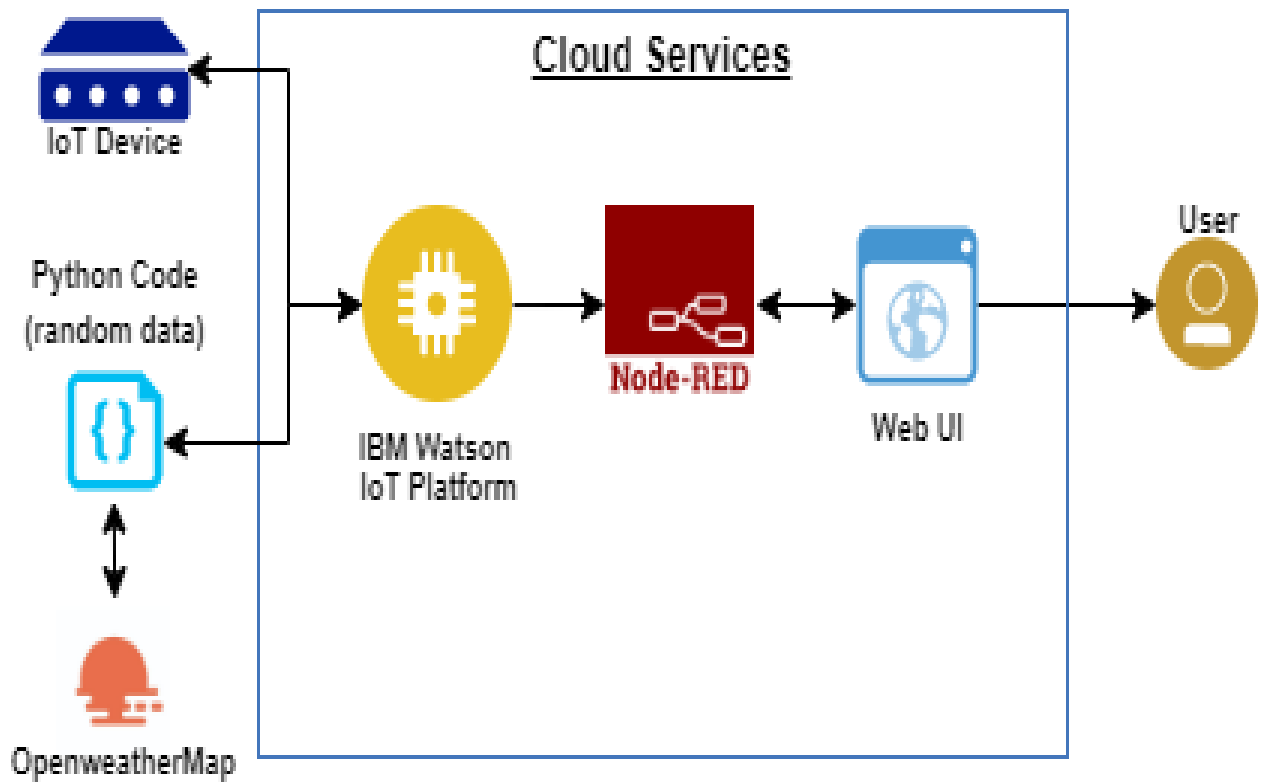
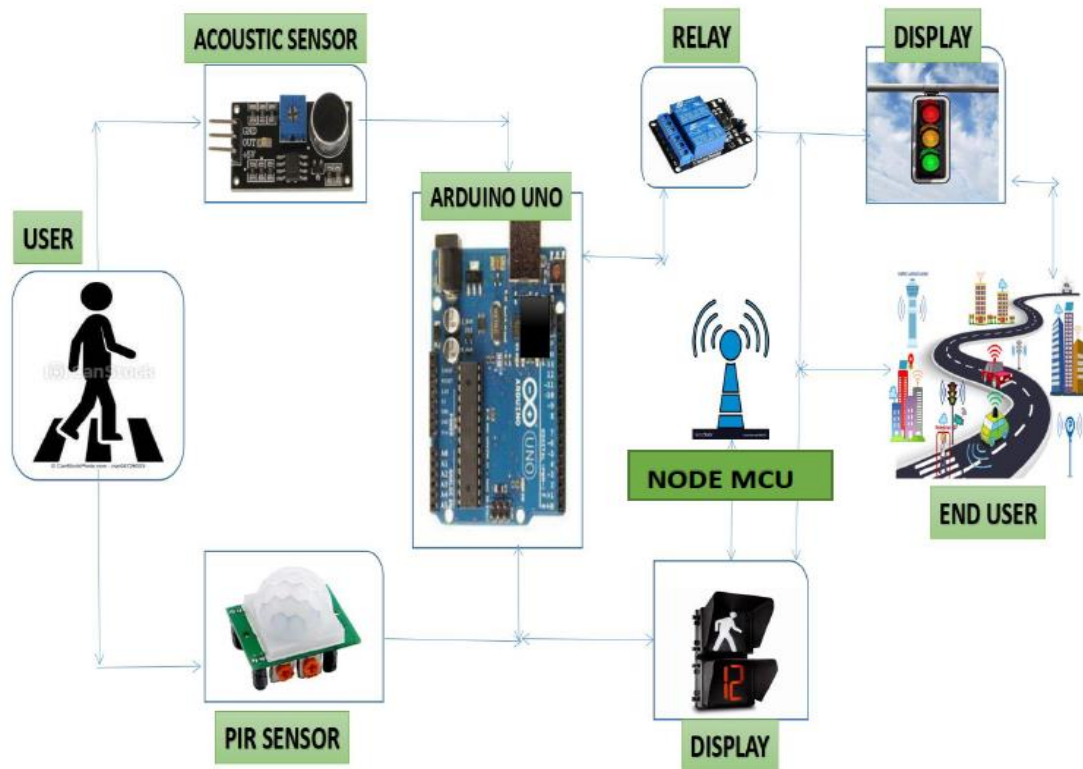
NFR-2	Security	<p>The storing data are not important for any kind of illegal activity.</p> <p>In this project, security aspects are not much issues. Only the data of vehicles counts and people count detected thus the security won't be an issue. The security on their database includes firewalls to prevent unauthorized access.</p>
NFR-3	Reliability	<p>It significantly improves the efficiency and safety of pedestrian traffic from making the right decision in multimode transport. And it also reduces the traffic congestions and accidents.</p>
NFR-4	Performance	<p>It provides Quality of service by reducing the latency in the traffic sign boards. Thus, the processors are faster</p>
NFR-5	Availability	<p>It's available for 24x7 hours and in any climate conditions.</p>
NFR-6	Scalability	<p>This data are not stored for long time so the disk space can be free it helps to handle large data with a fast execution.</p>

5.PROJECT DESIGN:

5.1.Data flow diagram:



5.2.Solution & Technical architecture:



5.3.USER STORIES:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Pedestrian)	Pedestrian aspects	USN-1	The user trying to cross the road, and once he stands in pedestrian lane, it detects with pir sensor and if the density of vehicles is low the pedestrian signs go steady green and vehicles to be stopped for sometimes and the pedestrian sign starts flashing green for 10 seconds and by that time all have to cross and vehicles can move forward, by this monitoring and sign connectivity, we can avoid non adherence of traffic rules and no congestion in cities.	The board can receive the detection of people presence in the lane and sent it to the sign board	High	Sprint-1
Emergency vehicle driver	Emergency rider aspects	USN-2	As a emergency responder, i need to know the accurate state of road, routes and schedule and to know the best possible or prioritized route to the incident and to hospitals.	I can able to know the best route to the hospital to fulfill my duty.	High	Sprint-1
Customer	Reporting and safety information aspects	USN-3	Who is operating the vehicle and that i can trust them, and if it is run by a human or by AI	I can sense the level of higher safety	Low	Sprint-2
Driver	Distractions and frustrations	USN-4	Drivers get distracted due to the long wait period in the red signal but the opposite lane is empty. This makes the person to feel frustrated. So, in our project we look after the vehicular density on each lane and based on that data we going to control the timings of the signal on each lane hence traffic control can be monitored efficiently.	I can travel in peaceful manner and reach the destination on time.	Medium	Sprint-1
Student and working persons	Reach on time	USN-5	Due to heavy congestion they cannot reach on time. In our project we maintained efficient traffic signaling system which reduces the heavy traffic.	I can reach the destination earlier	High	Sprint-1

6.PROJECT PLANNING AND SCHEDULING:

6.1.Sprint planning and estimation:

Sprint	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	US-1	Create IBM cloud services.	6	High	Karunanithi M Shamkumar S
Sprint-1	US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices.	5	Medium	Haripriya U Raghul B
Sprint-1	US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Karunanithi M Shamkumar S
Sprint-2	US-1	Configure open weather map services.	7	High	Raghul B Haripriya U
Sprint-2	US-2	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	7	Medium	Raghul B Shamkumar S
Sprint-2	US-3	Create Node-red services.	5	High	Karunanithi M Haripriya U
Sprint-3	US-1	Develop a python script to publish random sensor data such as temperature, humidity,rain to the IBM IoT platform	7	Medium	Karunanithi M Raghul B
Sprint-3	US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	High	Haripriya U Shamkumar S
Sprint 3	US-3	Publish Data to The IBM Cloud	8		Karunanithi M Haripriya U
Sprint-4	US-1	Create Web UI in Node- Red	10	High	Karunanithi M Haripriya U Raghul B Shamkumar S
Sprint-4	US-2	Configure the Node-RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB	10	High	Karunanithi M Haripriya U Raghul B Shamkumar S

6.2.Sprint delivery and schedule:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3. Reports from jira:

1)Issues created for sprints:

The screenshot displays the Jira Software interface for a project named 'Signs with Smart Connectivity for Better Road Safety'. The 'Backlog' view is active, showing two sprints:

- SWSCFBRS Sprint 2** (31 Oct – 5 Nov, 3 issues):
 - SWSCFBRS-34: Configure open weather map services. Status: DONE (7 points).
 - SWSCFBRS-36: Create Node-red services. Status: DONE (5 points).
 - SWSCFBRS-35: Configure the connection security and create API keys. Status: DONE (7 points).
- SWSCFBRS Sprint 3** (7 Nov – 12 Nov, 3 issues):
 - SWSCFBRS-37: Develop a python script to publish random sensor data such as temperature, humidity,rain to the IBM IoT platform. Status: DONE (7 points).
 - SWSCFBRS-38: After developing python code, commands are received just print the statements which represent the control of the devices. Status: DONE (5 points).
 - SWSCFBRS-39: Publish Data to The IBM Cloud. Status: DONE (8 points).

The interface includes a sidebar with navigation options like Roadmap, Backlog, Board, Reports, Code, and Project settings. A 'Quickstart' button is visible at the bottom right.

The screenshot shows the Jira Software interface for a project named "Signs with Smart Connectivity for Better Road Safety". The view is the "Backlog". The left sidebar shows the project navigation menu with options like Roadmap, Backlog, Board, Reports, Code, Project pages, Add shortcut, and Project settings. The main content area displays two sprints:

- SWSCFBRS Sprint 3** (7 Nov – 12 Nov, 3 issues):
 - SWSCFBRS-37: Develop a python script to publish random sensor data such as temperature, humidity,rain to the IBM IoT platform (Status: DONE, Assignee: KK)
 - SWSCFBRS-38: After developing python code, commands are received just print the statements which represent the control of the devices (Status: DONE, Assignee: RB)
 - SWSCFBRS-39: Publish Data to The IBM Cloud (Status: DONE, Assignee: S)
- SWSCFBRS Sprint 4** (12 Nov – 19 Nov, 2 issues):
 - SWSCFBRS-41: Use Cloudant DB nodes to store the received sensor data (Status: DONE, Assignee: KK)
 - SWSCFBRS-40: Create Web UI in Node- Red (Status: DONE, Assignee: HU)

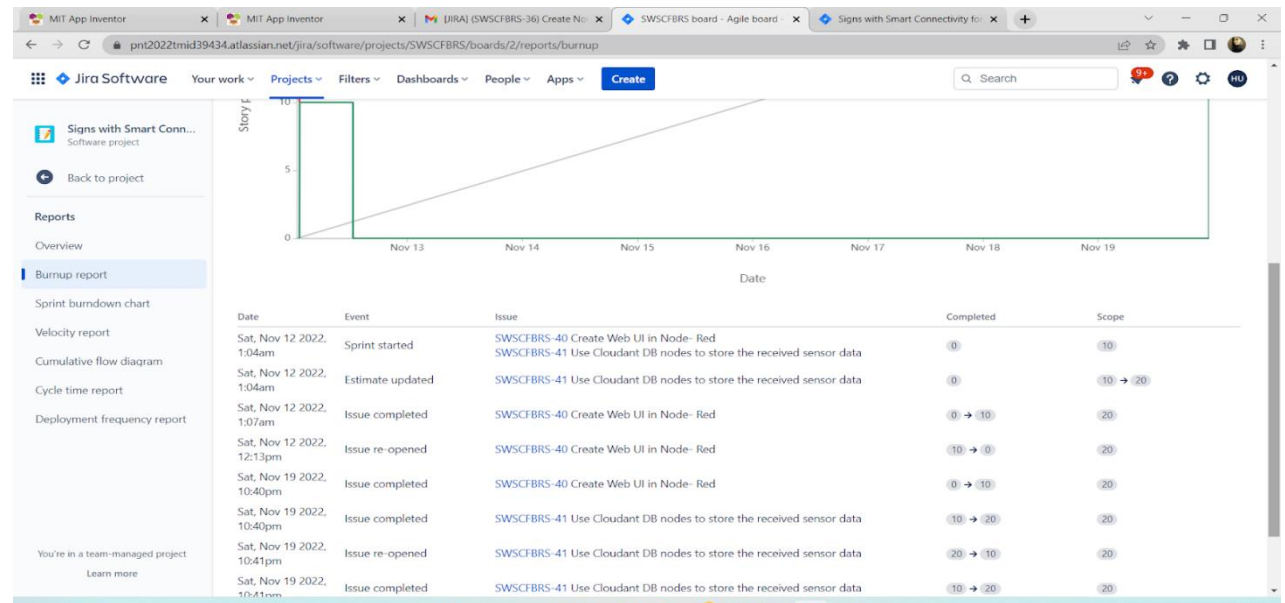
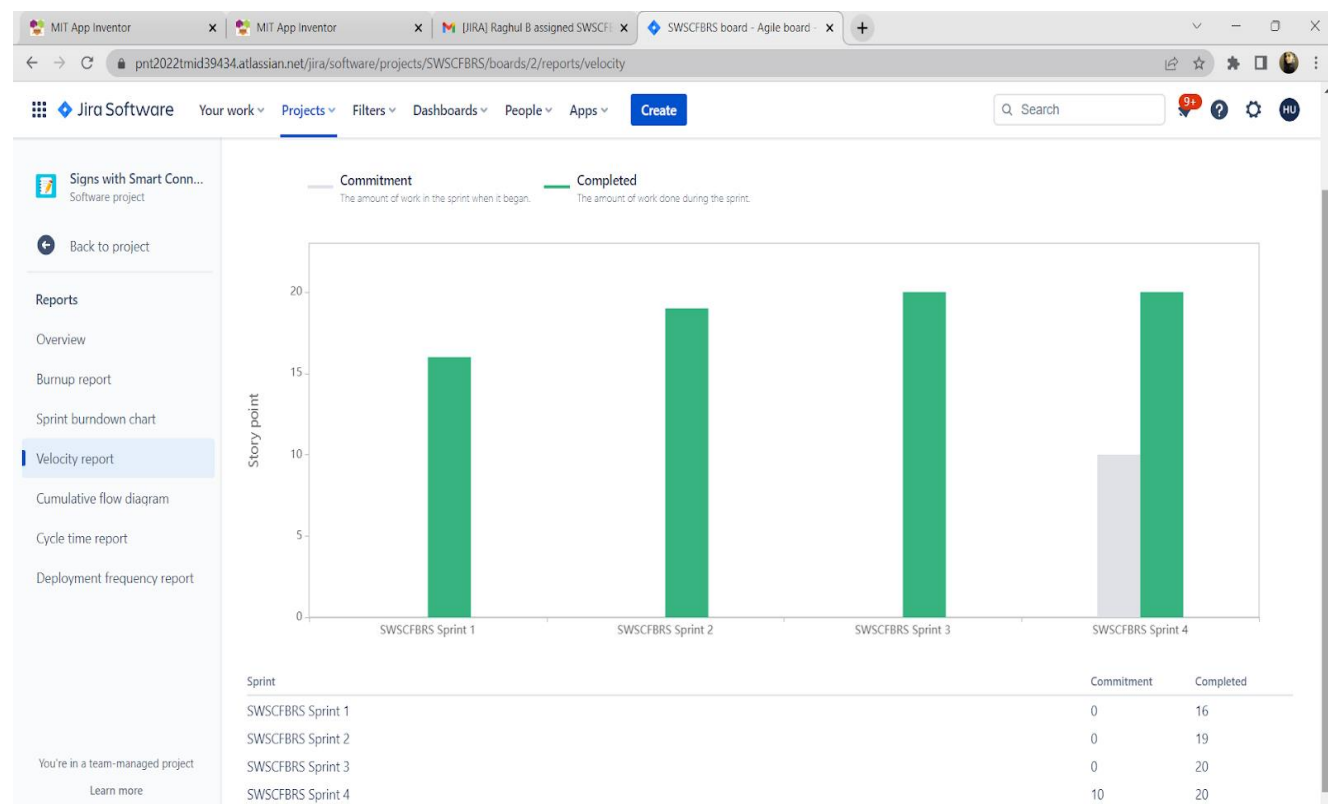
At the bottom right, there is a "Quickstart" button.

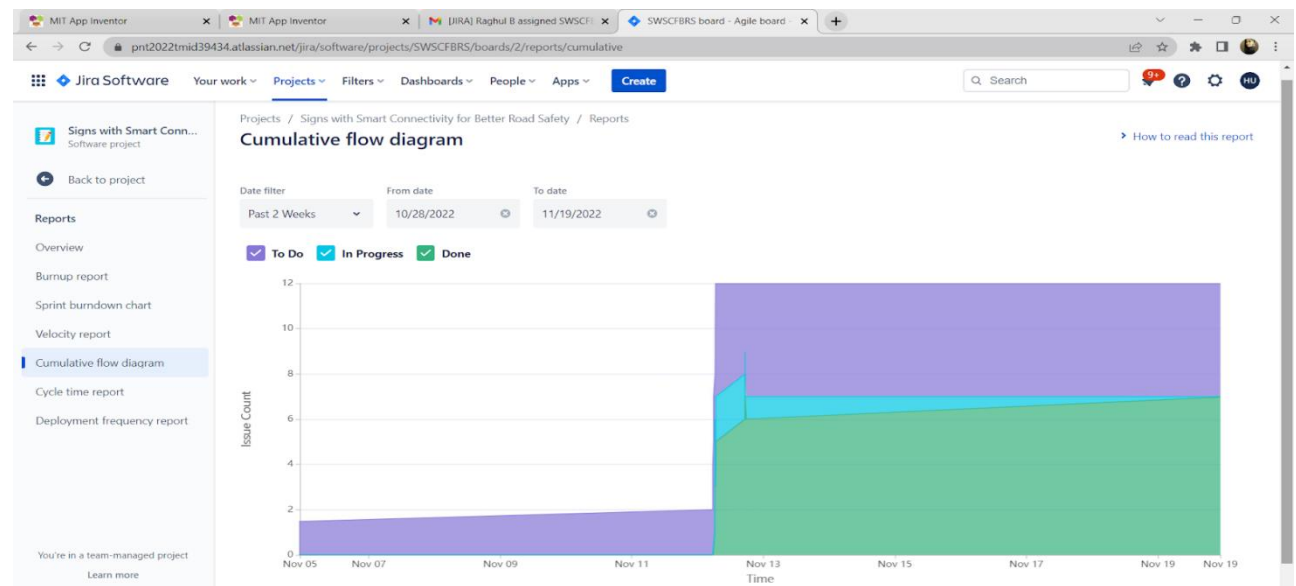
The screenshot shows the Jira Software interface for the same project, but the view is "All sprints". The left sidebar is identical to the previous screenshot. The main content area displays a Kanban board with three columns: "TO DO", "IN PROGRESS", and "DONE 11 ISSUES".

The "DONE 11 ISSUES" column contains the following tasks:

- Create IBM cloud services (SWSCFBRS-31, Status: DONE, Assignee: KK)
- Create IBM Watson IoT platform (SWSCFBRS-32, Status: DONE, Assignee: HU)
- Create the device in IBM IoT platform (SWSCFBRS-33, Status: DONE, Assignee: RB)
- Configure open weather map services. (SWSCFBRS-34, Status: DONE, Assignee: S)
- Develop a python script to publish random sensor data such as temperature, (Status: DONE, Assignee: S)

At the bottom right, there is a "Quickstart" button. The bottom status bar shows the system clock as 22:58 on 19-11-2022.

Burndown chart:**Final velocity report of project:**



7) CODING AND SOLUTIONING:

FEATURE 1:

PYTHON CODE TO PUBLISH THE DATA TO THE IBM IoT DEVICE:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
```

#Provide your IBM Watson Device Credentials

```
organization = "j757k6"
```

```
deviceType = "raghul"
```

```
deviceId = "123"
```

```
authMethod = "token"
```

```
authToken = "12345678 "
```

Initialize GPIO

```
def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
```

```

if status=="lighton":
    print ("led is on")
else :
    print ("led is off")

#print(cmd)

try:
    deviceOptions = {"org": organization, "type": deviceType, "id":
deviceId, "auth-method": authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud
as an event of type "greeting" 10 times
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11

    temp=random.randint(0,100)
    Humid=random.randint(0,100)

    data = { 'temp' : temp, 'Humid': Humid }
    #print data
    def myOnPublishCallback():
        print ("Published Temperature = %s C" % temp, "Humidity
= %s %" % Humid, "to IBM Watson")

    success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoTf")
        time.sleep(1)

    deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()

```


The screenshot displays the IBM Watson IoT Platform interface. On the left, a Python script is shown in a code editor, and on the right, the platform's dashboard is visible.

Python Script (Left Panel):

```

import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#Provide your IBM Watson Device Credentials
organization = "j757k6"
deviceType = "raghul"
deviceId = "123"
authMethod = "token"
authToken = "12345678 "

# Initialize GPIO

def myCommandCallback(cmd):

```

IBM Watson IoT Platform Dashboard (Right Panel):

The dashboard shows the "Device Types" tab. It includes a search bar and a table of devices.

Device ID	Status	Device Type	Class ID	Date Added
123	Connected	raghul	Device	Oct 28, 2022 8:22 PM
1234	Disconnected	raghul1	Device	Nov 11, 2022 9:05 PM

Below the table, it indicates "Simulation running".

IBM WATSON IoT PLATFORM:

IBM Watson IoT Platform

Device Type: SENSORS

Events 1

New event type +

Event type name sensing Send

Schedule 1 Every Minute

Payload Specify the event payload in the editor window or by uploading a [CSV file](#).

```

0 {
1   "randomNumber": random(0, 100),
2   "Temperature": random(-30, 100),
3   "Humidity": random(10, 90)
4 }
5

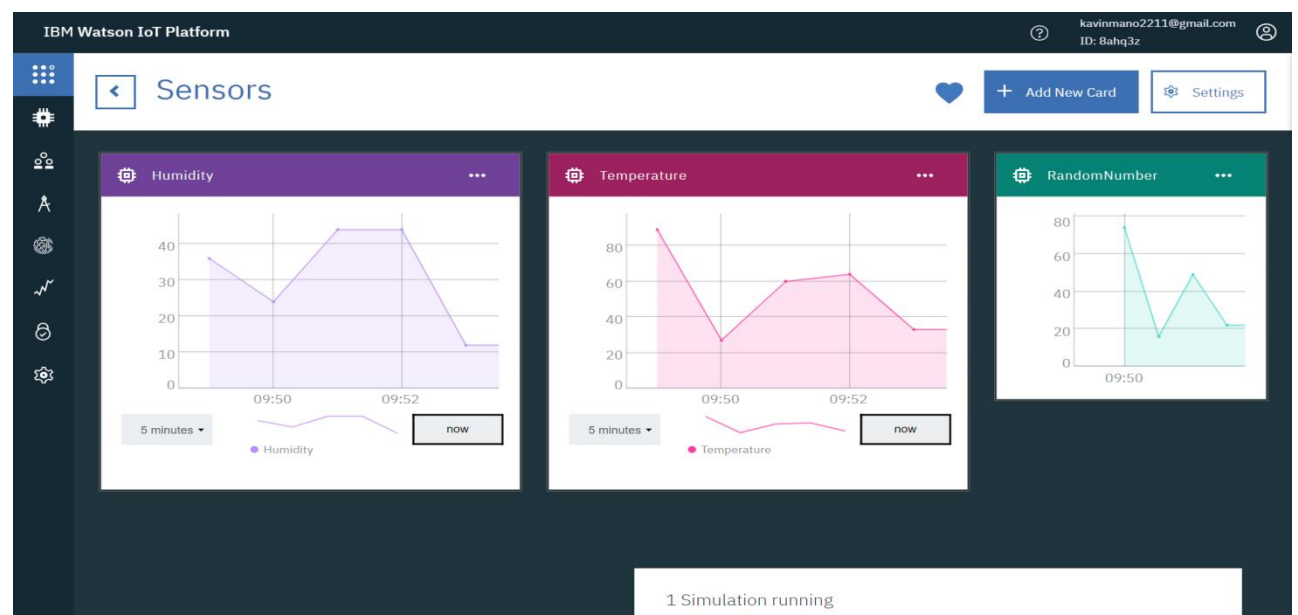
```

Upload a CSV file

Cancel Save

Event	Value
sensing	{"randomNumber":33,"Temperature":86,"Humidity":56,"Time":1637200000000}
sensing	{"randomNumber":42,"Temperature":-8,"Humidity":56,"Time":1637200000000}
sensing	{"randomNumber":89,"Temperature":56,"Humidity":56,"Time":1637200000000}
sensing	{"randomNumber":91,"Temperature":42,"Humidity":56,"Time":1637200000000}
sensing	{"randomNumber":63,"Temperature":-5,"Humidity":56,"Time":1637200000000}

SENSORs_1 Disconnected SENSORS Device Nov 18, 2022 10:29 PM



Configure open weather map services.

Code:

```
#include <WiFi.h>
```

```

const char* host = "api.openweathermap.org";

//http://api.openweathermap.org/data/2.5/weather?q=Porto,PT&APPID=b
b3bbf44669b2a4d7a0d02794894ebda
void setup() {
  Serial.begin(9600);
  Serial.print("Connecting to WiFi");
  WiFi.begin("Wokwi-GUEST", "", 6);
  while (WiFi.status() != WL_CONNECTED) {
    delay(100);
    Serial.print(".");
  }
  Serial.println(" Connected!");
}

int value = 0;

void loop()
{
  delay(5000);
  ++value;

  Serial.print("connecting to ");
  Serial.println(host);

  // Use WiFiClient class to create TCP connections
  WiFiClient client;
  const int httpPort = 80;
  if (!client.connect(host, httpPort)) {
    Serial.println("connection failed");
    return;
  }

  // We now create a URI for the request
  String url =
"/data/2.5/weather?q=Porto,PT&APPID=27c3fd2d668ceb8332f42e3b4f9
43524";

  Serial.print("Requesting URL: ");
  Serial.println(url);

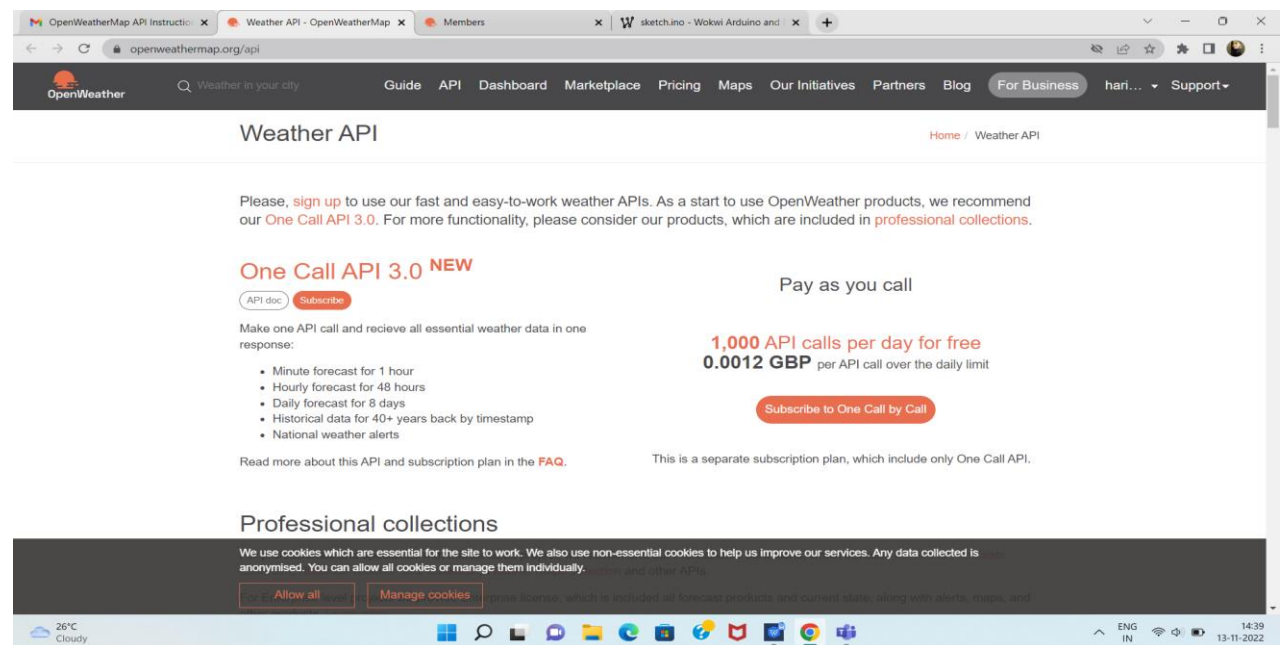
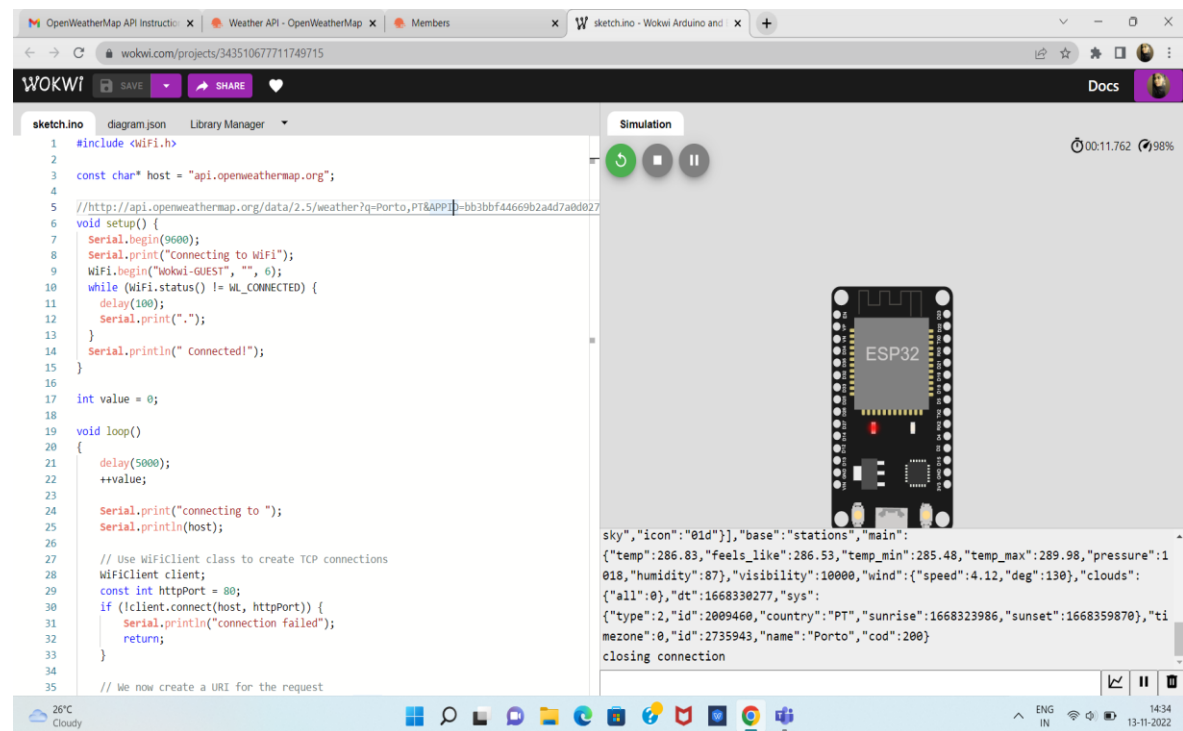
```

```

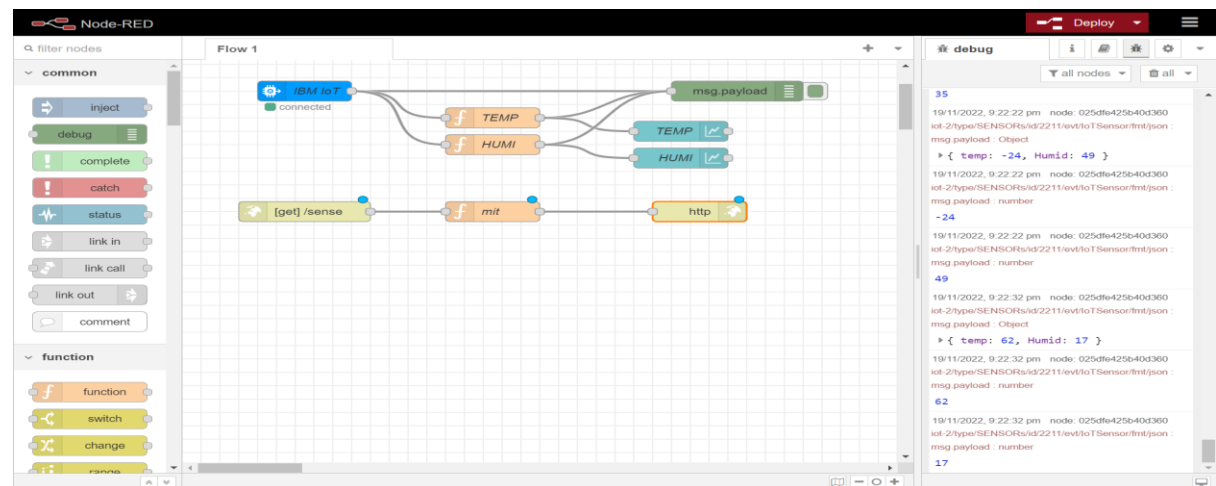
// This will send the request to the server
client.print(String("GET ") + url + " HTTP/1.1\r\n" +
    "Host: " + host + "\r\n" +
    "Connection: close\r\n\r\n");
unsigned long timeout = millis();
while (client.available() == 0) {
    if (millis() - timeout > 5000) {
        Serial.println(">>> Client Timeout !");
        client.stop();
        return;
    }
}
// Read all the lines of the reply from server and print them to Serial
while(client.available()) {
    String line = client.readStringUntil('\r');
    Serial.print(line);
}

Serial.println();
Serial.println("closing connection");
}

```



NODE RED WEB UI:



IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

Identity Device Information Recent Events State Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
IoTSensor	{"temp":-7,"Humid":51}	json	a few seconds ago
IoTSensor	{"temp":82,"Humid":42}	json	a minute ago
IoTSensor	{"temp":40,"Humid":47}	json	a minute ago
IoTSensor	{"temp":3,"Humid":47}	json	a minute ago
IoTSensor	{"temp":71,"Humid":43}	json	a minute ago

SENSORS_1 Disconnected SENSORS

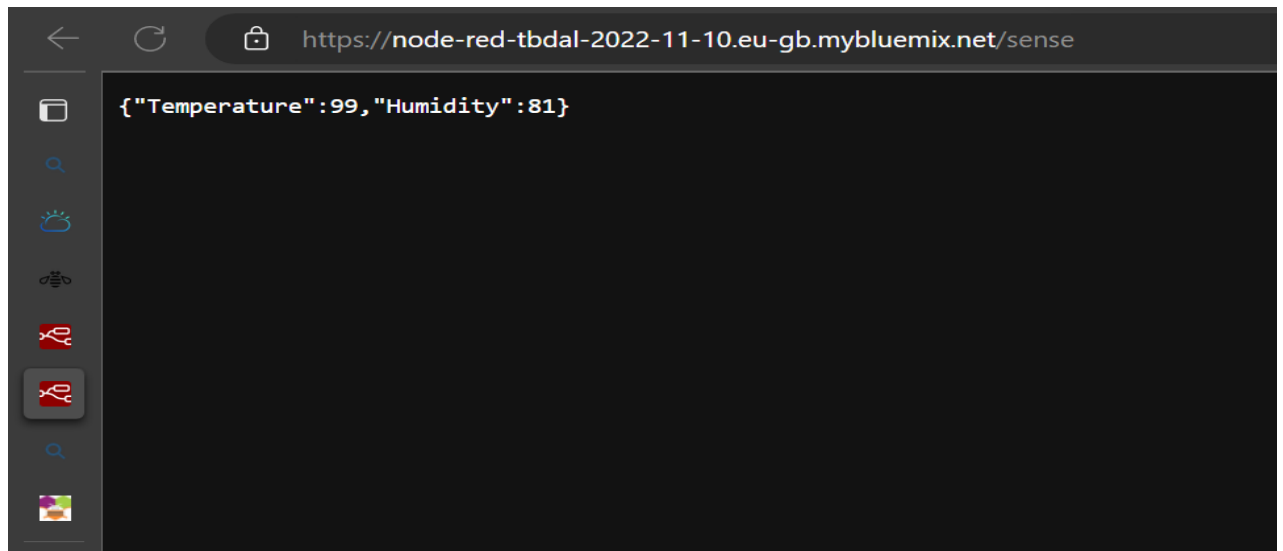
Items per page 50 | 1-4 of 4 items

0 Simulations running

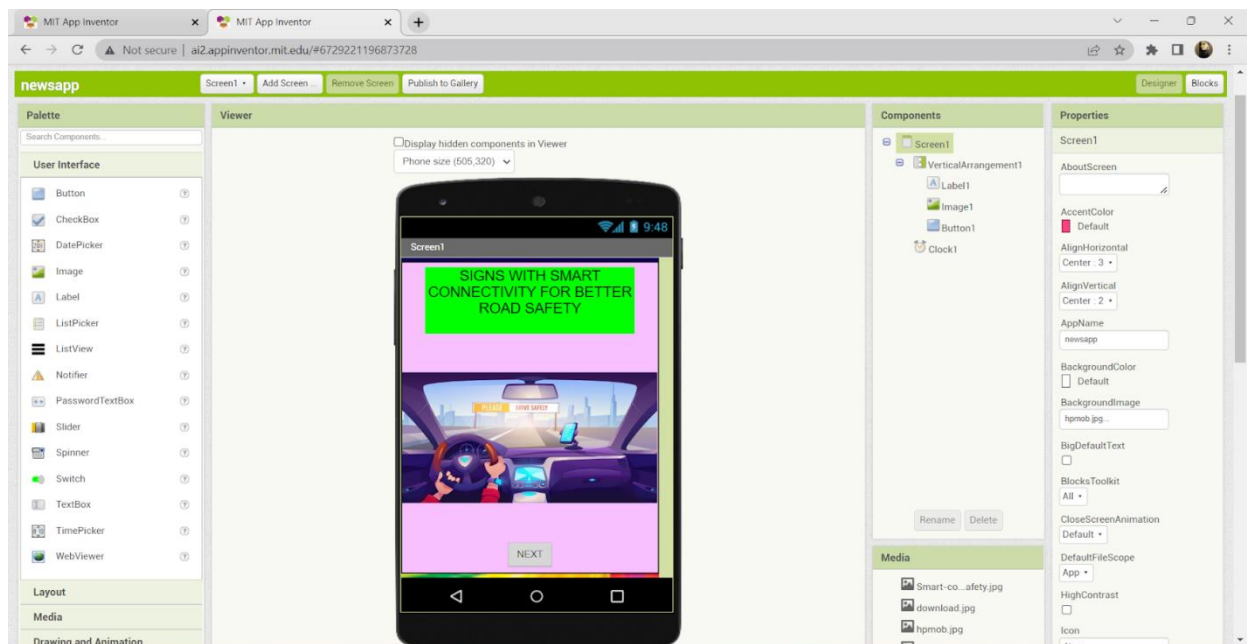
```

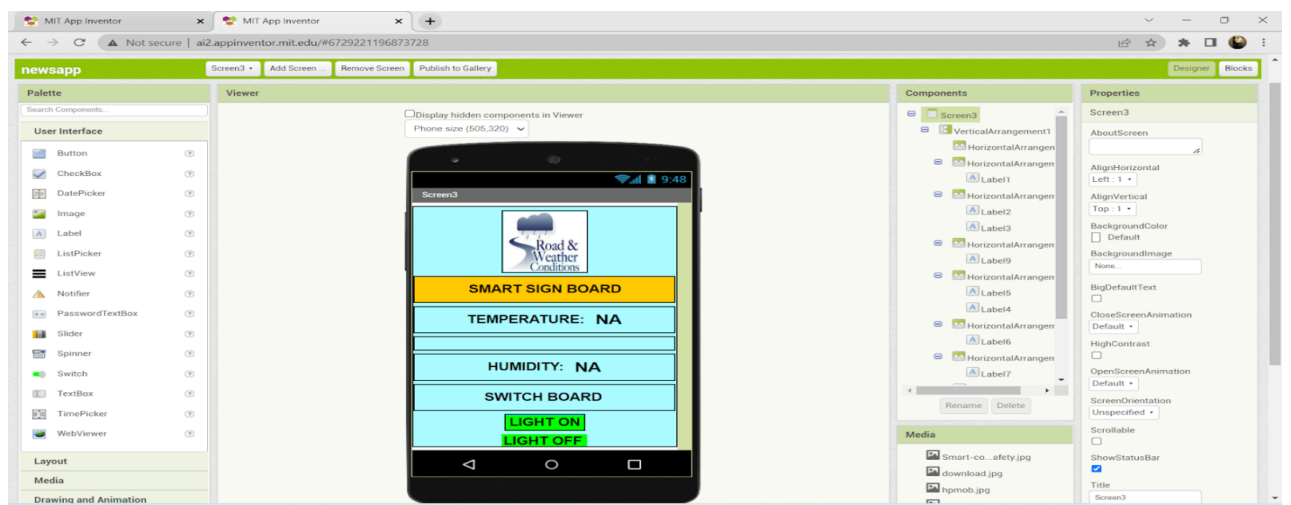
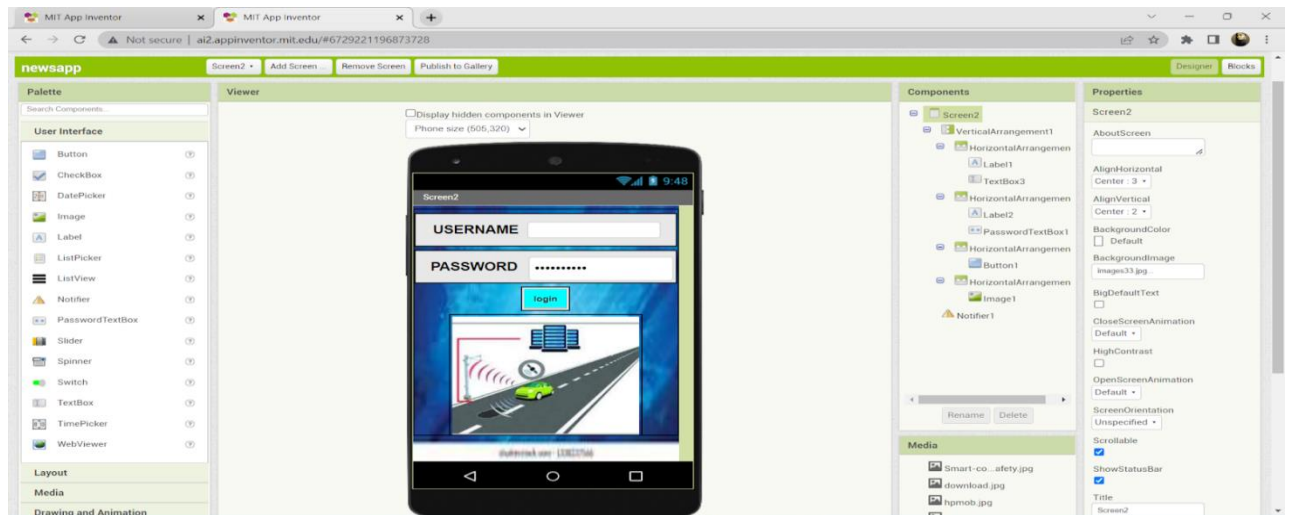
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Temperature = 6 C Humidity = 44 % to IBM Watson
Temperature = 18 C Humidity = 23 % to IBM Watson
Temperature = 82 C Humidity = 26 % to IBM Watson
Temperature = 67 C Humidity = 69 % to IBM Watson
Temperature = 58 C Humidity = 33 % to IBM Watson
Temperature = 61 C Humidity = 43 % to IBM Watson
Temperature = 20 C Humidity = 79 % to IBM Watson
Temperature = 20 C Humidity = 38 % to IBM Watson
Temperature = 64 C Humidity = 36 % to IBM Watson
Temperature = 56 C Humidity = 57 % to IBM Watson
Temperature = -5 C Humidity = 31 % to IBM Watson
Temperature = 22 C Humidity = 49 % to IBM Watson
Temperature = 15 C Humidity = 83 % to IBM Watson
Temperature = 34 C Humidity = 80 % to IBM Watson
Temperature = 72 C Humidity = 87 % to IBM Watson
Temperature = -1 C Humidity = 20 % to IBM Watson
Temperature = 38 C Humidity = 71 % to IBM Watson
Temperature = 51 C Humidity = 37 % to IBM Watson
Temperature = 89 C Humidity = 13 % to IBM Watson
Temperature = -24 C Humidity = 27 % to IBM Watson
Temperature = 56 C Humidity = 41 % to IBM Watson
Temperature = 79 C Humidity = 27 % to IBM Watson
Temperature = 87 C Humidity = 60 % to IBM Watson
Temperature = -24 C Humidity = 12 % to IBM Watson
Temperature = -16 C Humidity = 59 % to IBM Watson
Temperature = 8 C Humidity = 39 % to IBM Watson
Temperature = -17 C Humidity = 61 % to IBM Watson
Temperature = 7 C Humidity = 54 % to IBM Watson
Temperature = 45 C Humidity = 28 % to IBM Watson

```

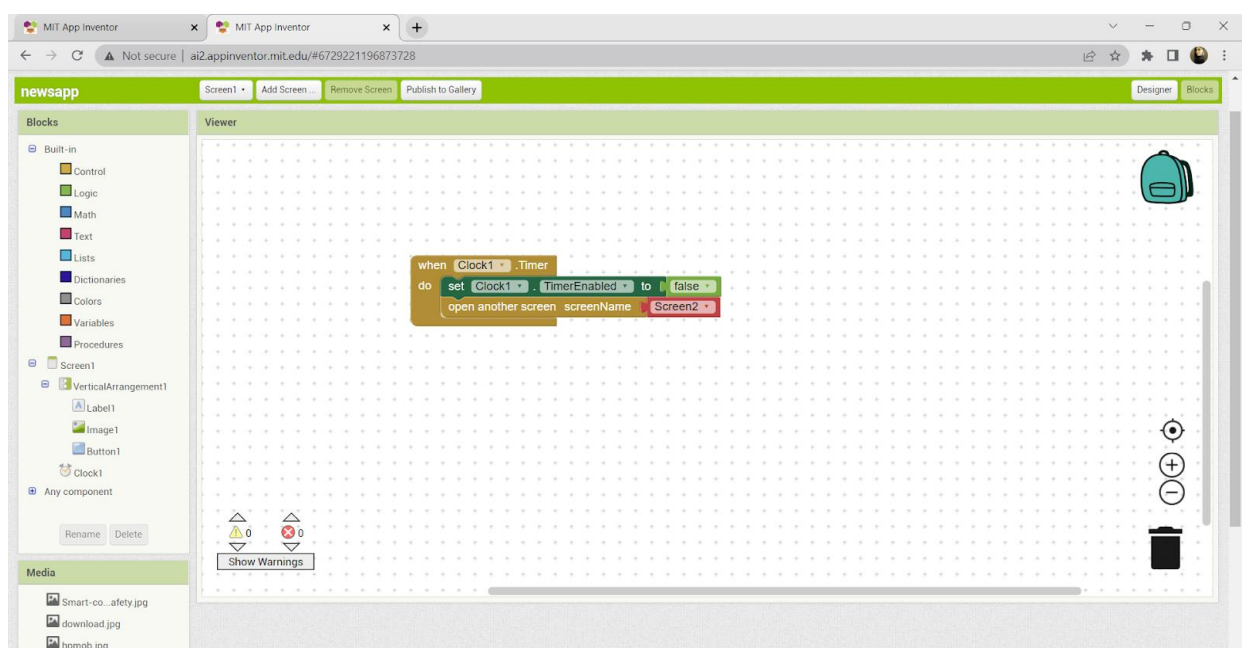


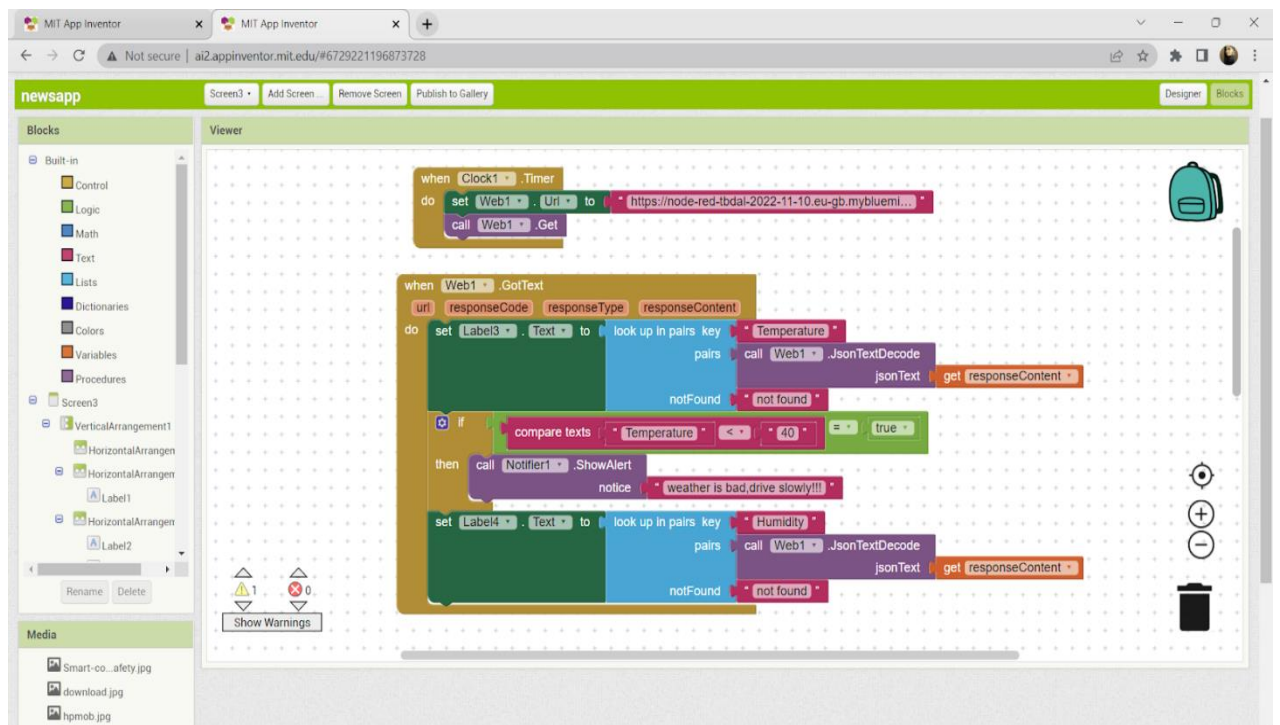
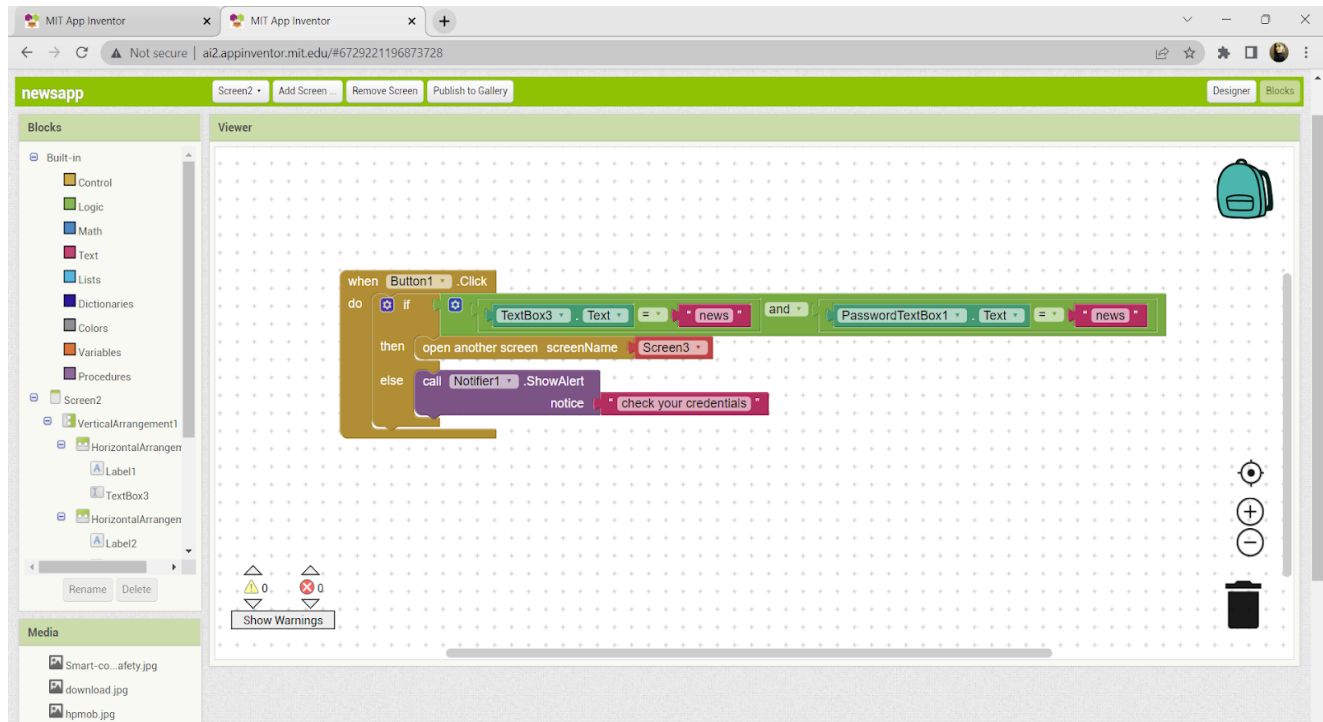
MIT APP INVENTOR: feature-2





Blocks for the app:





8.TESTING:

8.1.TEST CASES

- TEST CASE 1
CLEAR WEATHER - USUAL SPEED LIMIT
- TEST CASE 2
COLD WEATHER-REDUCE SPEED LIMIT AND ALERT THE DRIVER THROUGH MOBILE APP TO DRIVE SLOWLY.
- TEST CASE 3
RAINY WEATHER-FURTHER REDUCE SPEED LIMIT.

8.2.USER ACCEPTANCE TESTING:

To avoid traffic and reduce the accidents ,dynamic speed & diversion variations based on weather conditions is developed to have a safe journey.The user would be happy and feel less stressed while riding and welcome this concept to implement everywhere.

9.RESULTS:

9.1.Performance metrics:

The system is horizontally scalable,an even higher demands of customers can be served with the NODE RED ,since it is capable of handling upto 10,000 requests per second,It is very light and high performance.Based on the IBM pack we chose, the performance of the website varies.

10.ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- Helps in reducing the frequency and severity of different types of crashes or accidents
- Increases traffic handling capacity at a given intersection
- Dynamic sign updating
- Cheaper and low requirement of the microcontroller
- Low battery consumption since processing is done mostly by node red service in cloud.

DISADVANTAGES:

- Excessive delay due to time allocated by the traffic signals.
- Some drivers disobey these signals
- Dependent on opeanweather api and speed reduction is same for large area in scale of cities.

11.CONCLUSION:

Our project is used for serving as a replacement of static sign boards for a comparatively lower cost and can be implemented in a very near future.It mainly helps to reduce the number of accidents and maintain a more peaceful traffic atmosphere to have a smooth journey.

12.FUTURE SCOPE:

Intelligence Networks of integrated sensors detect weather conditions that impact road safety. Road Weather Information Systems (RWIS) in use today are limited because they only collect data from a small set of weather stations. A larger future network could use automated weather stations to collect atmospheric and weather dataand instantly upload it to the cloud. Dynamic temperature-sensitive paint could be used to highlight invisible roadway conditions like black ice,which results in smoother traffic flows and increase accuracy about road conditions.