Om Sakthi

ADHIPARASAKTHI COLLEGE OF ENGINEERING

G.B.NAGAR, KALAVAI - 632 506. RANIPET DT.,

SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

IBM PROJECT

In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR: 2021-2022 (EVEN SEM)

ANNA UNIVERSITY, CHENNAI - 600 025.

PROJECT REPORT

SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Submitted by

Team Id : PNT2022TMID39403

Dinesh V -510119104005

Saran C -510119104019

Manoj J -510119104013

Gunasekaran T -510119104009

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CHAPTER1
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.

CHAPTER2
LITERATURE SURVEY

2.1 EXISTING PROBLEM:

- Conventional traffic system does not have proper monitoring system and often requires manual handing at traffic junction. This not only causes mental stress in passengers but also lot of fuel goes wasted due to delay at traffic junctionAccording 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.Reasearches 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://vrioeurope.com/en/smart-road-technology-digital-highways-of-the-future**
- **https://www.trafficinfratech.com/technology-for-road-safety**
- **https://www.researchgate.net/publication/221701886_Pedestrian_Gap_Acceptance_for_Mid-Block_Street_Crossin**

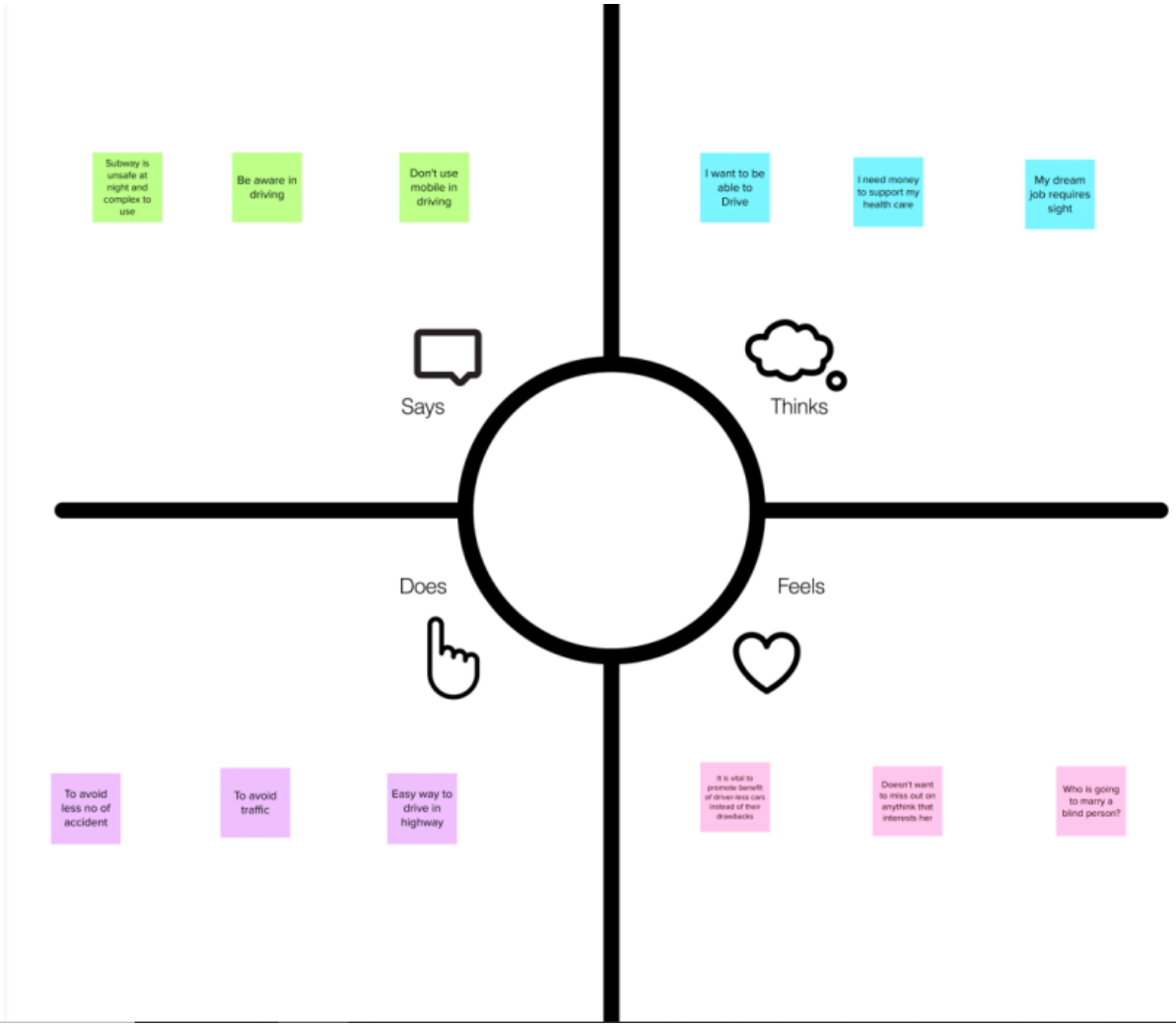
2.1 PROBLEM STATEMENT DEFINITION

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 webapplication the user will get to know about road condition.

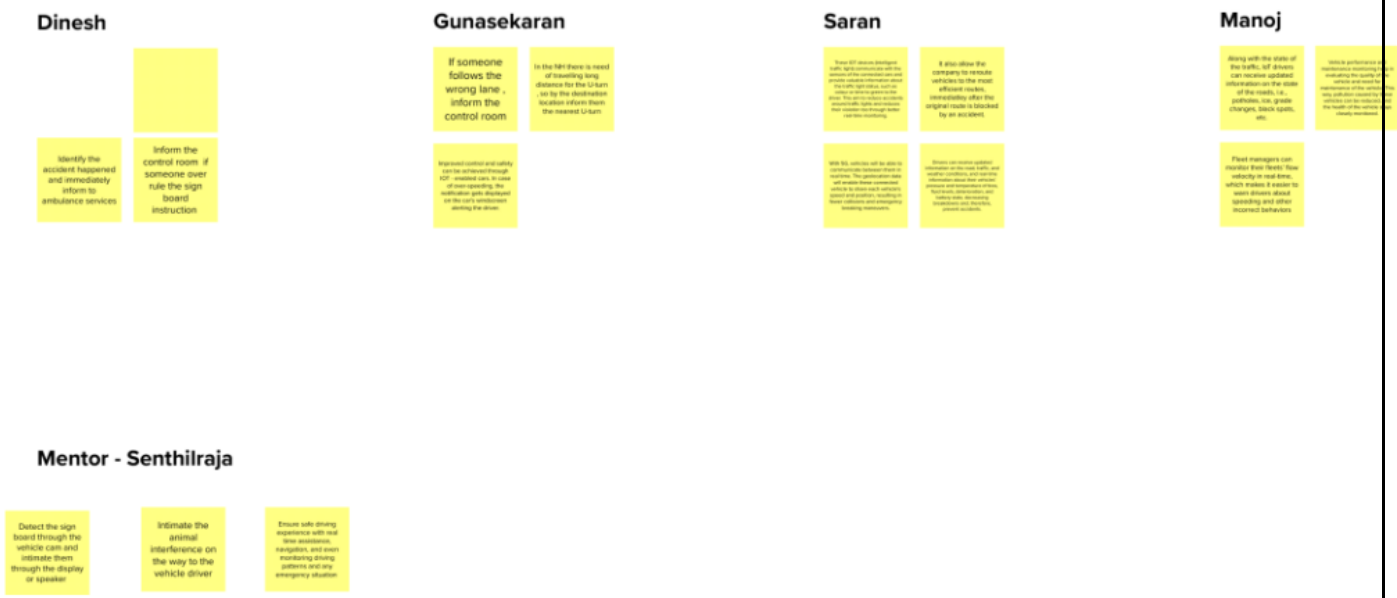
CHAPTER3

IDEATIONANDPROPOSEDSOLUTION

3.1 EMPATHY MAP CANVAS:



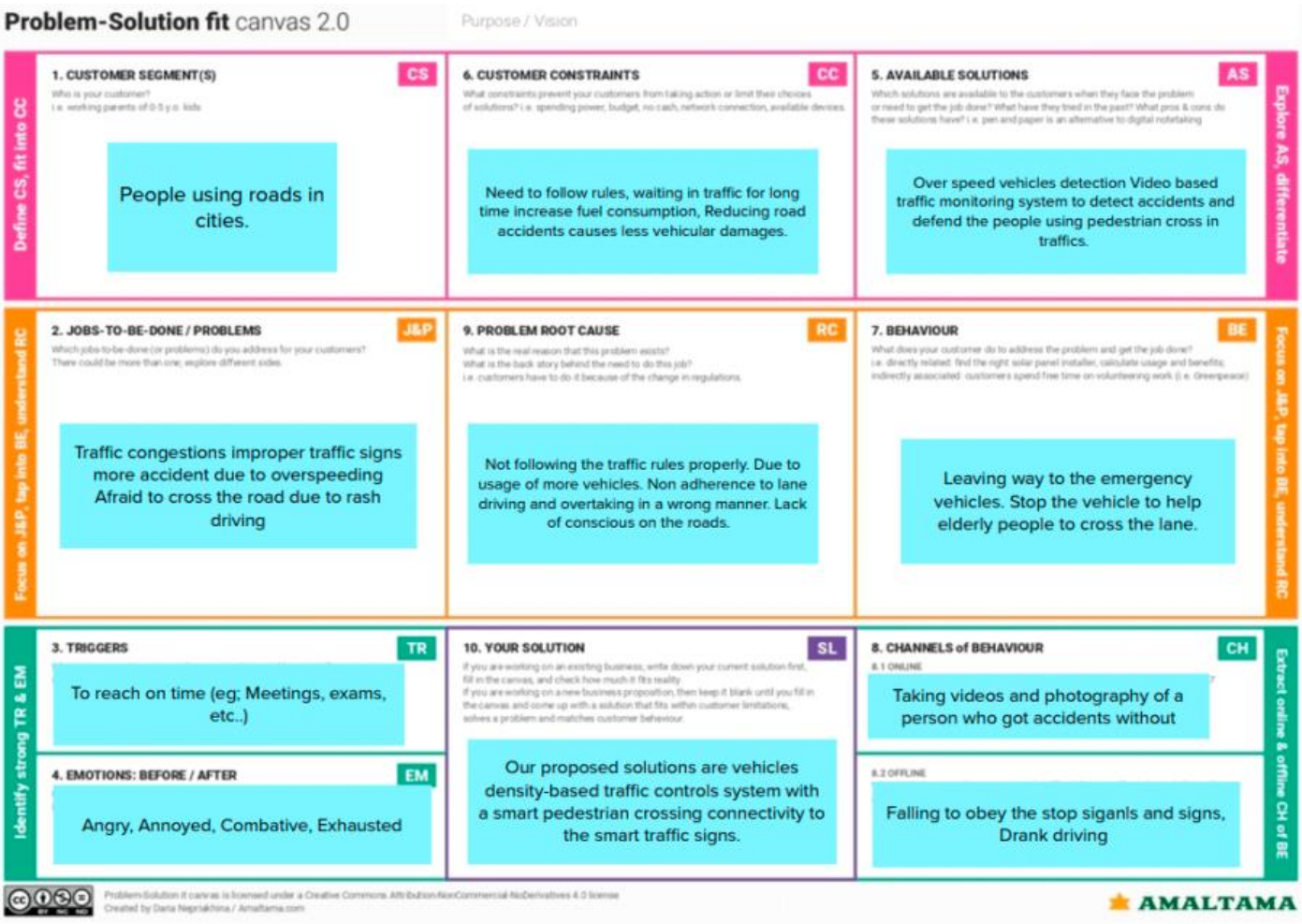
3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION:

S.No.	Parameter	Description
•	Problem Statement (Problem to be solved)	The major problem statement of our project is animal interference on te way of user ride. Ten in thousands may escape from this incidents and in remaining cases either there will be injury or accident for the user or the animal. User dosen't know about the interference of the animal , it will be just a second of time to notice it so he/she will lose the control of the vehicle.
•	Idea / Solution description	Automobile need to be modified in such a way that each vehicle has a inbuilt wide angle camera of 180 degree that does the image processing through the snapshots of the video capturing. If any unknown object comes infront of the vehicle and then intimate to the user through the alert sounds installed in rthe vehicle.
•	Novelty / Uniqueness	There is no existing project based on our idea. Our project is a fresh idea that remain unique.
•	Social Impact / Customer Satisfaction	With the successful implementation of our idea users no need to panic because of the prior alert of the interference that saves their life and indirectly the animal life too.
•	Business Model (Revenue Model)	
•	Scalability of the Solution	

3.4 PROBLEM SOLUTIONFIT



CHAPTER4

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

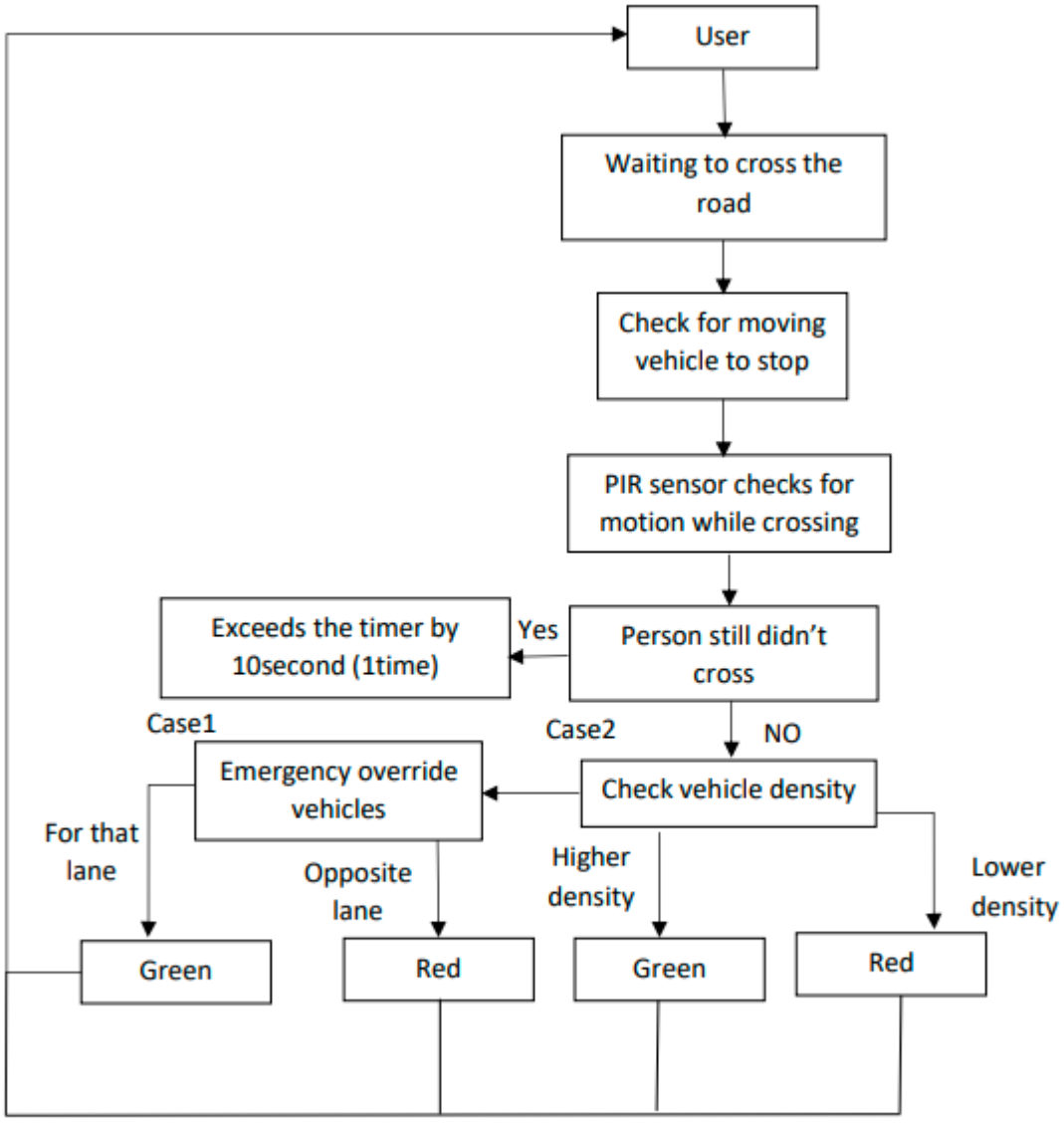
4.2 NON-FUNCTIONAL REQUIREMENTS

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**	The storing data are not important for any kind of illegal activity. 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.
NFR-3	**Reliability**	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.
NFR-4	**Performance**	It provides Quality of service by reducing the latency in the traffic sign boards. Thus, the processors are faster
NFR-5	**Availability**	It's available for 24x7 hours and in any climate conditions.
NFR-6	**Scalability**	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.

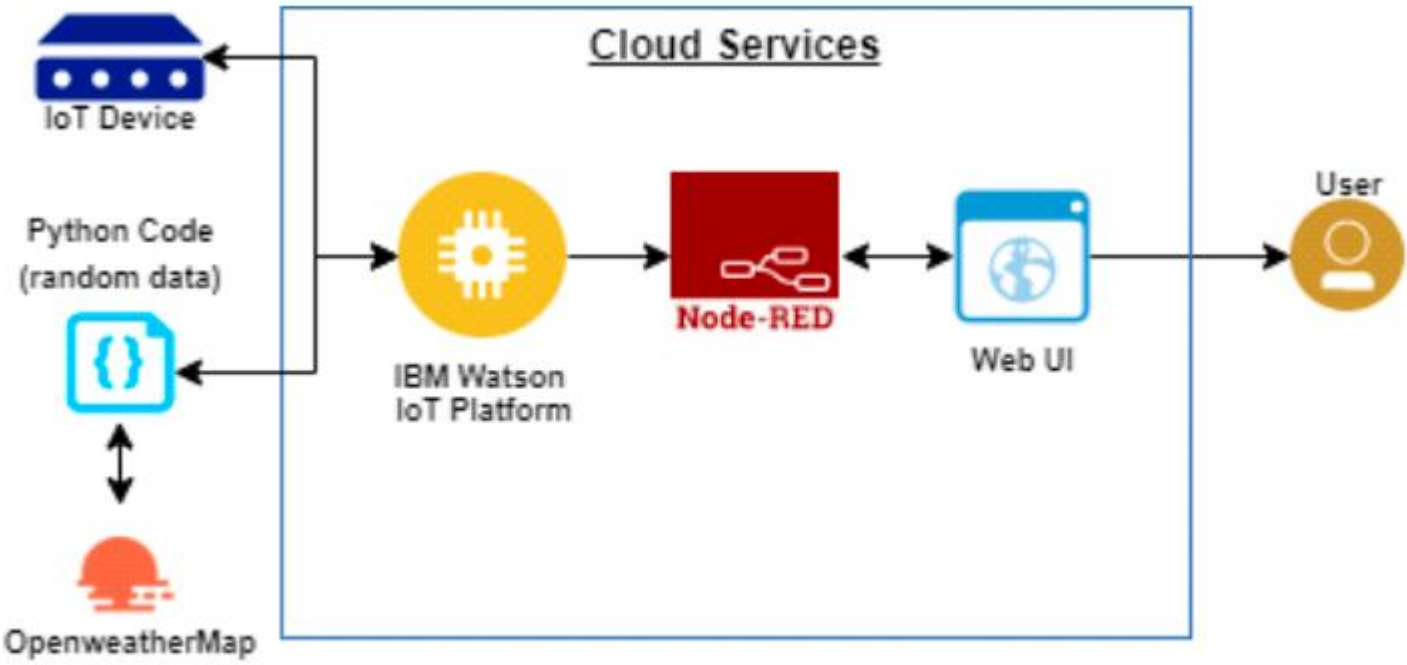
CHAPTER5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 COMPONENTS & TECHNOLOGIES:

Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Mobile App	HTML, CSS, JavaScript
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other StorageService or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / CloudLocal Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Opensource framework
2.	Security Implementations	List all the security / access controls implemented,use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Technology used
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Technology used

5.4 USERSTORIES

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 ans 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 vehicles 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

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

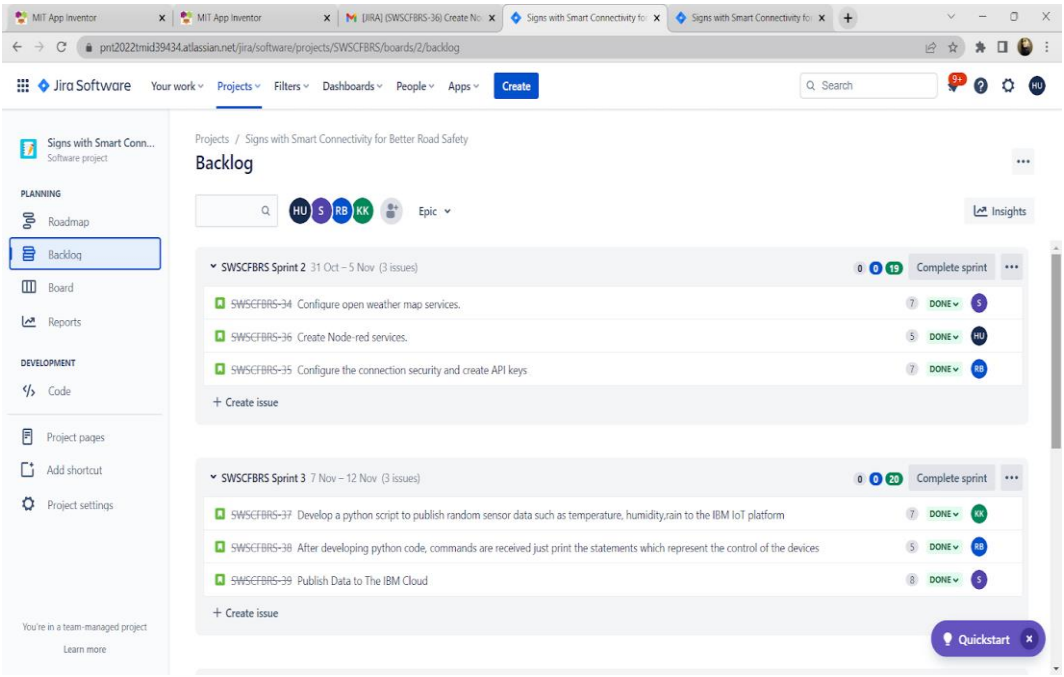
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-1	Create IBM cloud services.	6	High	Dinesh V Gunasekaran T Saran C Manoj J
Sprint-1		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices.	5	Medium	Dinesh V Gunasekaran T
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		Saran C Monoj J
Sprint-2		US-1	Configure open weather map services.	7	High	Saran C Manoj J
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	Gunasekaran T Saran C
Sprint-2		US-3	Create Node-red services.	5	HIgh	Dinesh V Manoj J
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	Dinesh V Gunasekaran T
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	High	Saran C Manoj J
Sprint 3		US-3	Publish Data to The IBM Cloud	8	High	Dinesh V Saran C
Sprint-4		US-1	Create Web UI in Node- Red	10	High	Dinesh V Gunasekaran T Saran C Manoj J
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	Dinesh V Gunasekaran T Saran C Manoj J

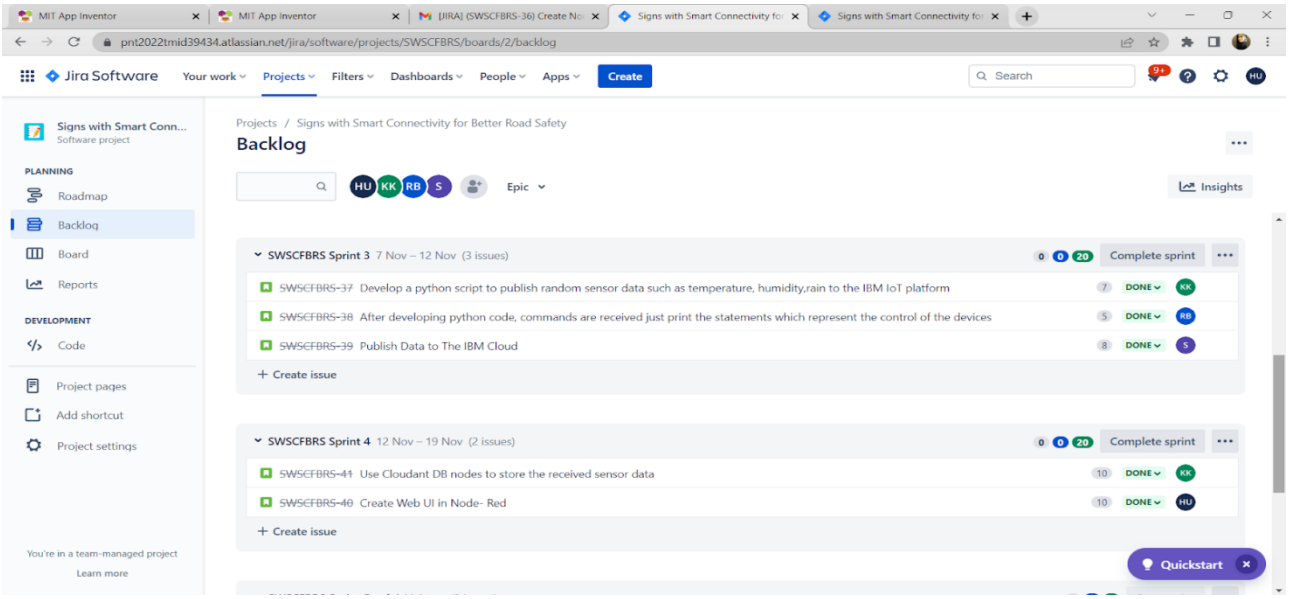
6.2 SPRINT DELIVERY SCHEDULE

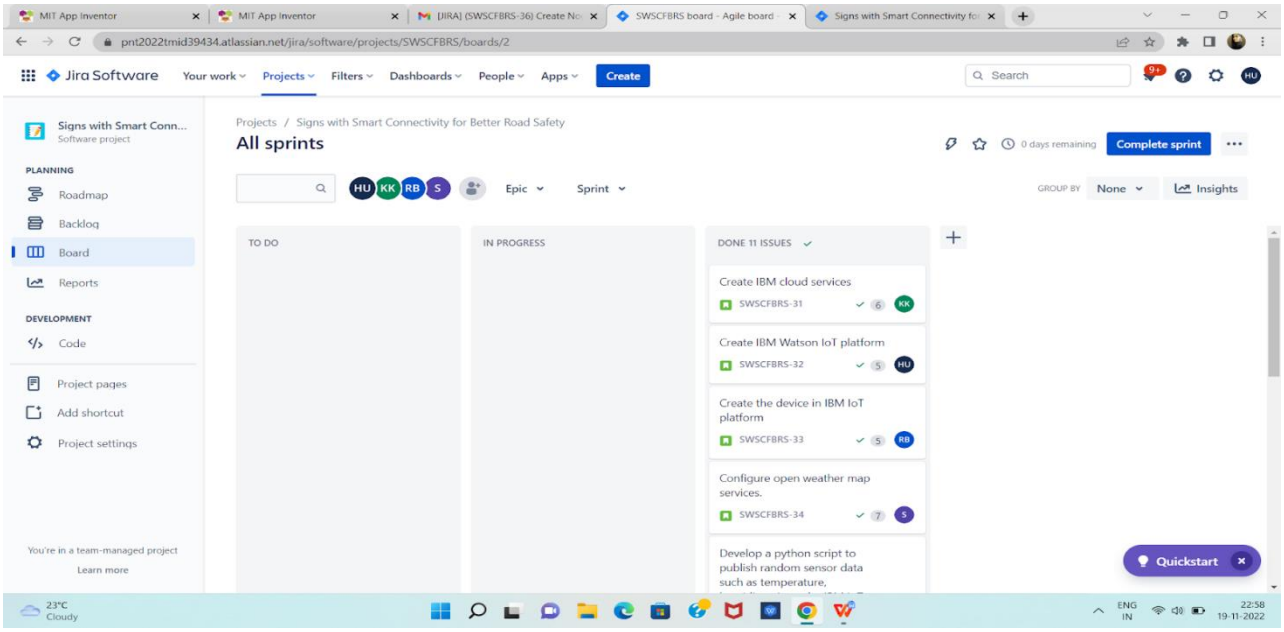
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022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

6.3 REPORT FROM JIRA

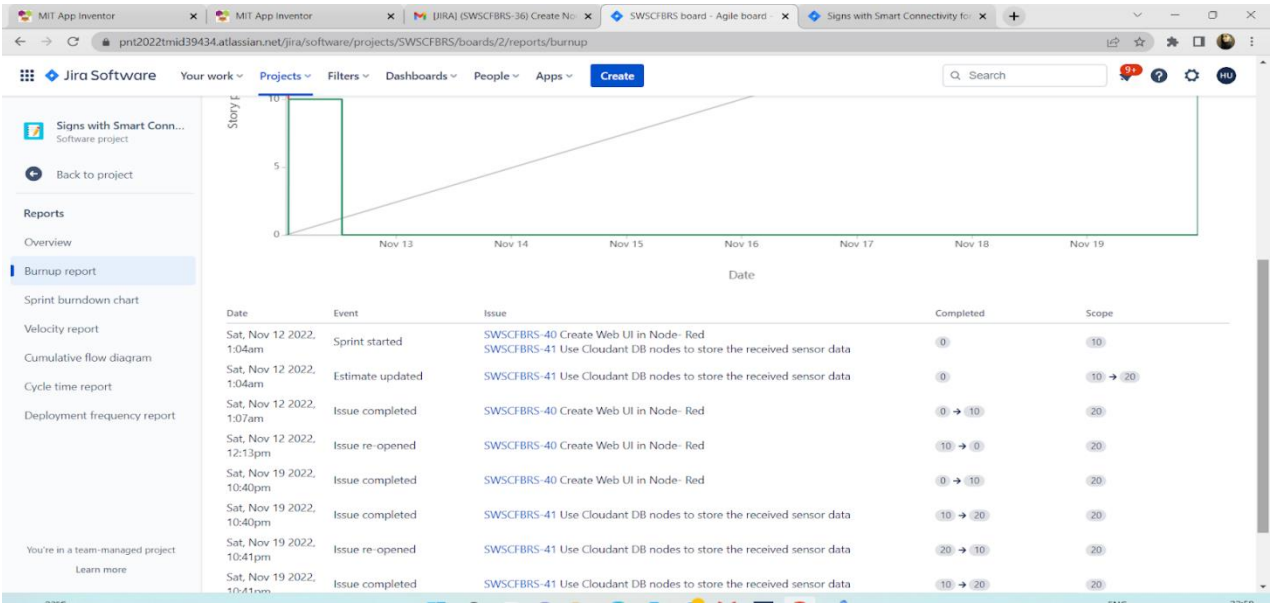
ISSUES CREATED FOR SPRINT :



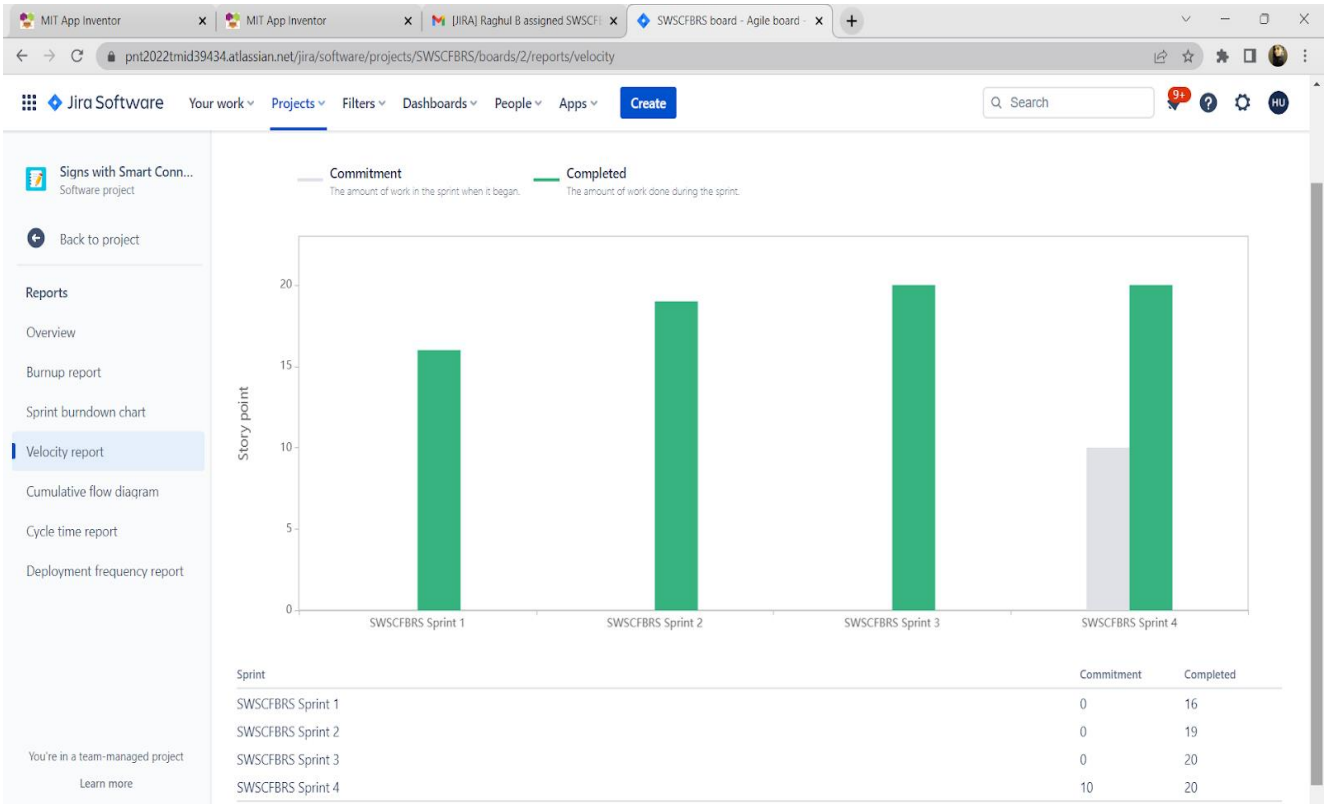

Jira Software
Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
Signs with Smart Conn...
Software project
PLANNING
Roadmap
Backlog
Board
Reports
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Projects / Signs with Smart Connectivity for Better Road Safety
Backlog
Epic
Insights
SWSCFBRS Sprint 3 7 Nov – 12 Nov (3 issues)
Complete sprint
SWSCFBRS-37 Develop a python script to publish random sensor data such as temperature, humidity,rain to the IBM IoT platform
SWSCFBRS-38 After developing python code, commands are received just print the statements which represent the control of the devices
SWSCFBRS-39 Publish Data to The IBM Cloud
DONE
Create issue
SWSCFBRS Sprint 4 12 Nov – 19 Nov (2 issues)
SWSCFBRS-41 Use Cloudant DB nodes to store the received sensor data
SWSCFBRS-40 Create Web UI in Node- Red
Quickstart


Jira Software
Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
Signs with Smart Conn...
Software project
PLANNING
Roadmap
Backlog
Board
Reports
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Projects / Signs with Smart Connectivity for Better Road Safety
All sprints
0 days remaining
Complete sprint
Epic
Sprint
GROUP BY
None
Insights
TO DO
IN PROGRESS
DONE 11 ISSUES
Create IBM cloud services
SWSCFBRS-31
Create IBM Watson IoT platform
SWSCFBRS-32
Create the device in IBM IoT platform
SWSCFBRS-33
Configure open weather map services.
SWSCFBRS-34
Develop a python script to publish random sensor data such as temperature,
Quickstart
23°C
Cloudy
ENG
IN
22:58
19-11-2022

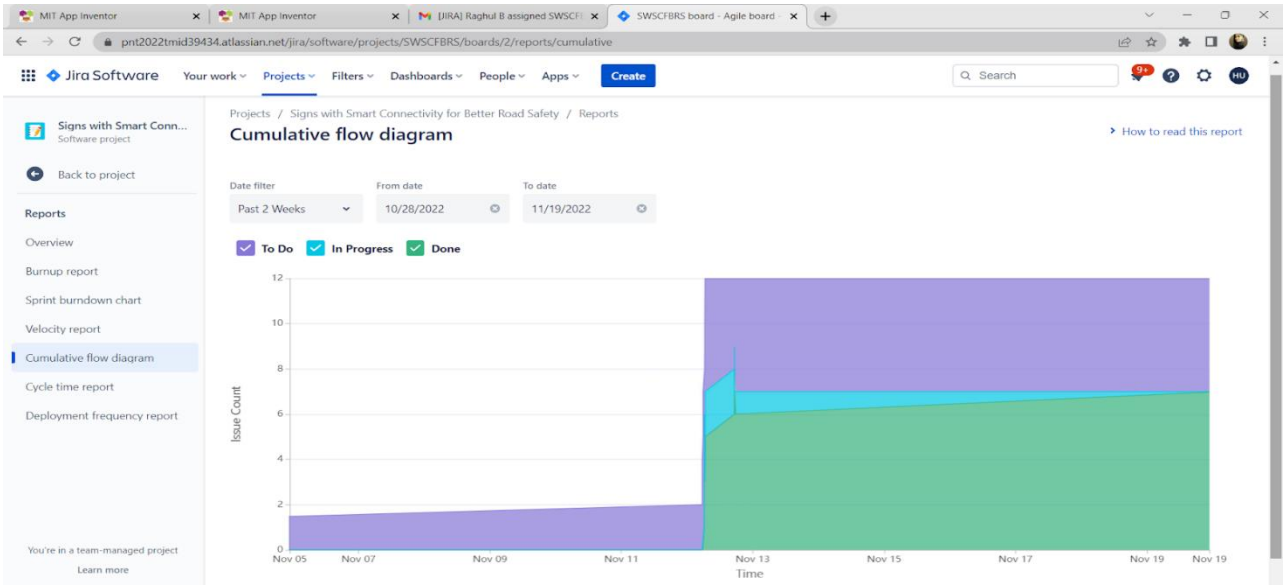
BURNDOWN CHART:



FINAL VELOCITY OF PROJECTS REPORT:



Sprint	Commitment	Completed
SWSCFBRS Sprint 1	0	16
SWSCFBRS Sprint 2	0	19
SWSCFBRS Sprint 3	0	20
SWSCFBRS Sprint 4	10	20



CHAPTER 7
CODING & SOLUTION

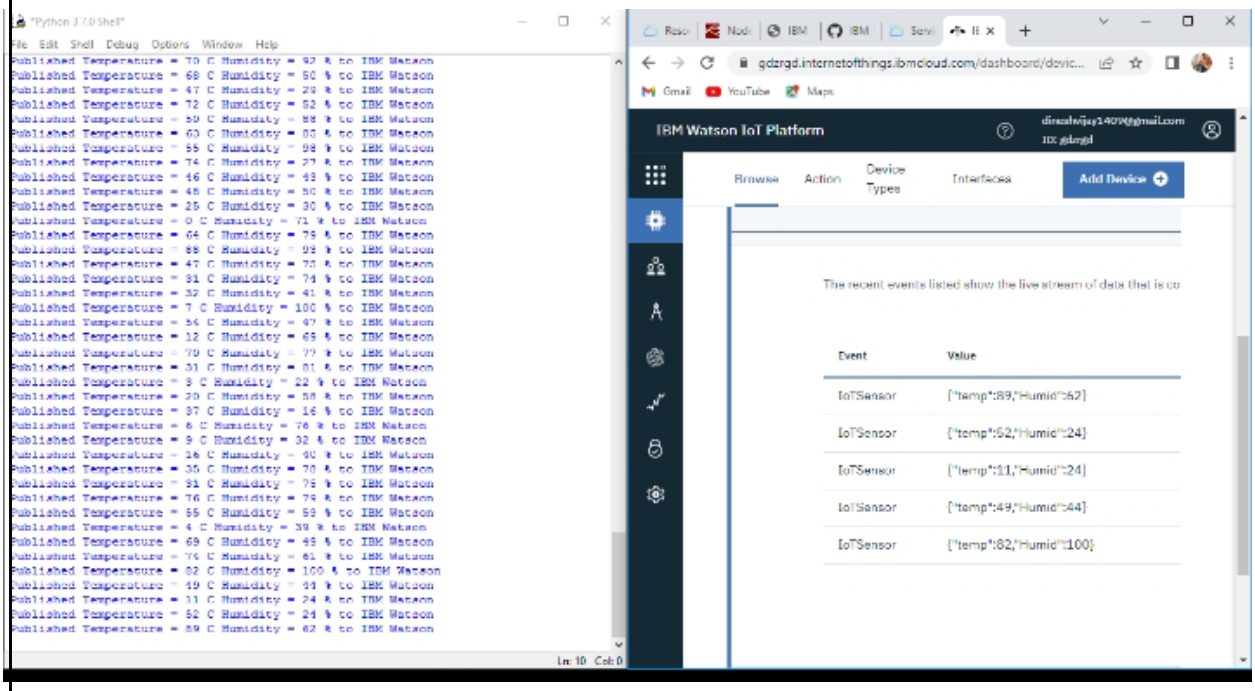
7.1 FEATURE 1

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 = "8ahq3z"
deviceType = "SENSORs"
deviceId = "2211"
authMethod = "token"
authToken = "22112001"
# 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")
```

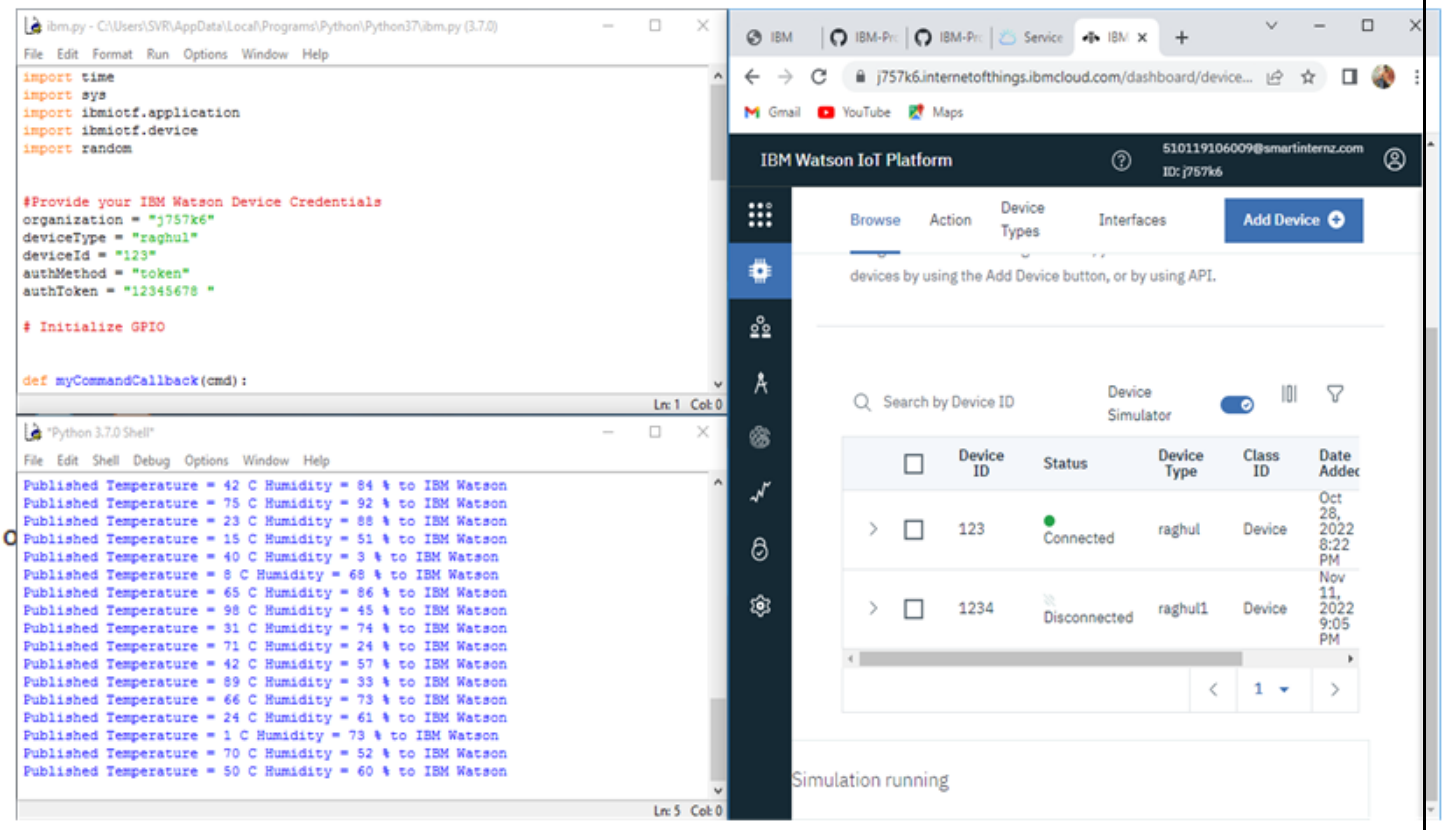
```
  #print(cmd)
try:
        deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
authMethod, "auth-token": authToken}
        deviceCli = ibmiotf.device.Client(deviceOptions)
```

```
        #.....
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
```

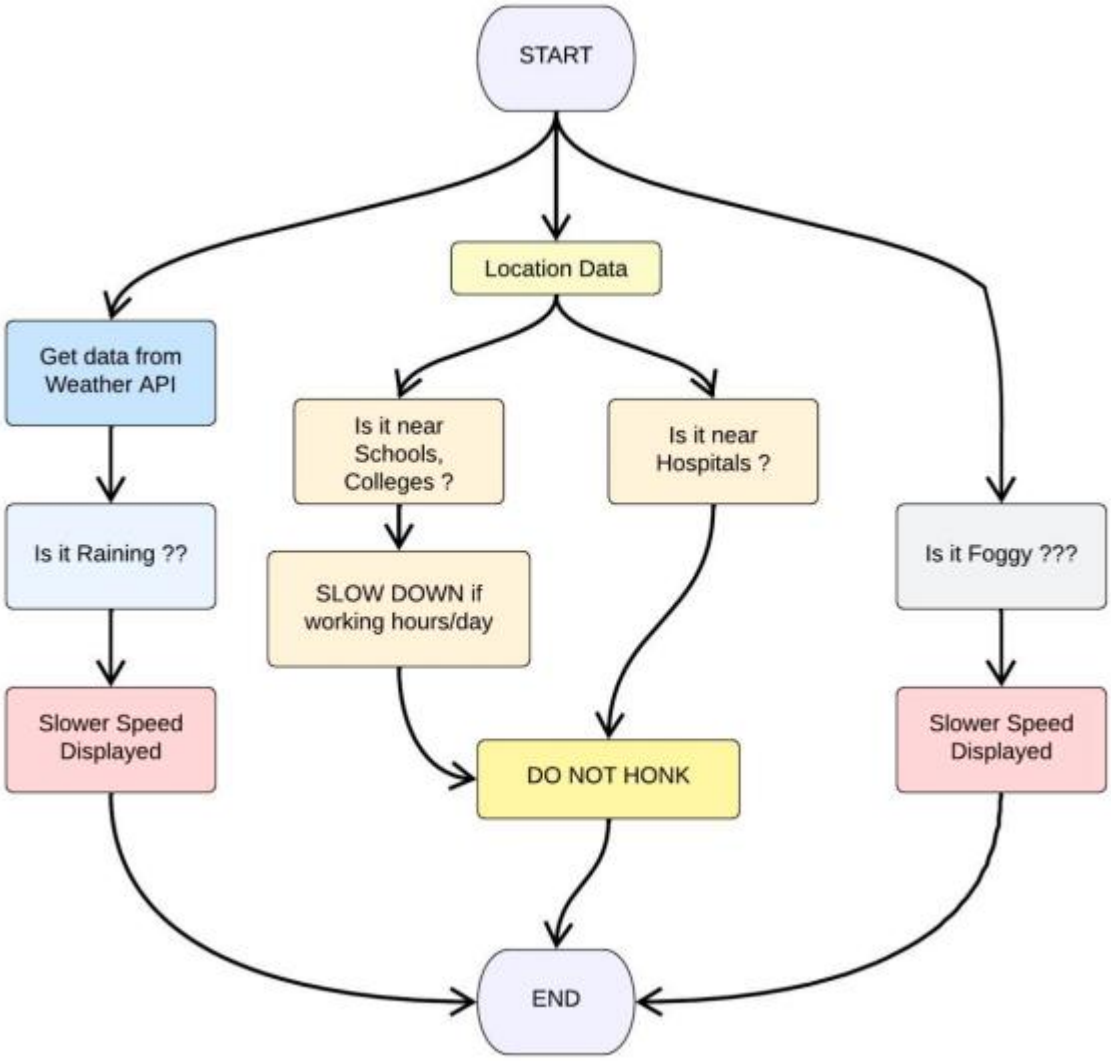

"Python 3.7.0 Shell"
File Edit Shell Debug Options Window Help
Published Temperature = 70 C Humidity = 92 % to IBM Watson
Published Temperature = 68 C Humidity = 50 % to IBM Watson
Published Temperature = 47 C Humidity = 29 % to IBM Watson
Published Temperature = 72 C Humidity = 52 % to IBM Watson
Published Temperature = 59 C Humidity = 88 % to IBM Watson
Published Temperature = 63 C Humidity = 83 % to IBM Watson
Published Temperature = 55 C Humidity = 98 % to IBM Watson
Published Temperature = 74 C Humidity = 27 % to IBM Watson
Published Temperature = 46 C Humidity = 48 % to IBM Watson
Published Temperature = 48 C Humidity = 50 % to IBM Watson
Published Temperature = 25 C Humidity = 30 % to IBM Watson
Published Temperature = 0 C Humidity = 71 % to IBM Watson
Published Temperature = 64 C Humidity = 75 % to IBM Watson
Published Temperature = 88 C Humidity = 99 % to IBM Watson
Published Temperature = 47 C Humidity = 75 % to IBM Watson
Published Temperature = 81 C Humidity = 74 % to IBM Watson
Published Temperature = 32 C Humidity = 41 % to IBM Watson
Published Temperature = 7 C Humidity = 100 % to IBM Watson
Published Temperature = 54 C Humidity = 97 % to IBM Watson
Published Temperature = 12 C Humidity = 69 % to IBM Watson
Published Temperature = 79 C Humidity = 79 % to IBM Watson
Published Temperature = 31 C Humidity = 81 % to IBM Watson
Published Temperature = 9 C Humidity = 22 % to IBM Watson
Published Temperature = 20 C Humidity = 58 % to IBM Watson
Published Temperature = 37 C Humidity = 16 % to IBM Watson
Published Temperature = 6 C Humidity = 76 % to IBM Watson
Published Temperature = 9 C Humidity = 32 % to IBM Watson
Published Temperature = 16 C Humidity = 40 % to IBM Watson
Published Temperature = 35 C Humidity = 70 % to IBM Watson
Published Temperature = 81 C Humidity = 75 % to IBM Watson
Published Temperature = 76 C Humidity = 79 % to IBM Watson
Published Temperature = 55 C Humidity = 59 % to IBM Watson
Published Temperature = 4 C Humidity = 39 % to IBM Watson
Published Temperature = 69 C Humidity = 45 % to IBM Watson
Published Temperature = 76 C Humidity = 61 % to IBM Watson
Published Temperature = 82 C Humidity = 100 % to IBM Watson
Published Temperature = 19 C Humidity = 44 % to IBM Watson
Published Temperature = 11 C Humidity = 24 % to IBM Watson
Published Temperature = 52 C Humidity = 24 % to IBM Watson
Published Temperature = 89 C Humidity = 62 % to IBM Watson
Ln: 10 Col: 0
qdzrgd.internetofthings.ibmcloud.com/dashboard/devic...
IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
The recent events listed show the live stream of data that is co
Event
Value
IoTSensor
{"temp":89,"Humid":62}
IoTSensor
{"temp":52,"Humid":24}
IoTSensor
{"temp":11,"Humid":24}
IoTSensor
{"temp":49,"Humid":44}
IoTSensor
{"temp":82,"Humid":100}

```
        #Get Sensor Data from DHT11


        temp=random.randint(-30,100)

        Humid=random.randint(10,90)


        data = { 'temp' : temp, 'Humid': Humid }

        #print data

        def myOnPublishCallback():

            print ("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(10)


        deviceCli.commandCallback = myCommandCallback


# Disconnect the device and application from the cloud
```

```
deviceCli.disconnect()
```


ibm.py - C:\Users\SVR\AppData\Local\Programs\Python\Python37\ibm.py (3.7.0)
File Edit Format Run Options Window Help
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):
Ln: 1 Col: 0
"Python 3.7.0 Shell"
File Edit Shell Debug Options Window Help
Published Temperature = 42 C Humidity = 84 % to IBM Watson
Published Temperature = 75 C Humidity = 92 % to IBM Watson
Published Temperature = 23 C Humidity = 88 % to IBM Watson
Published Temperature = 15 C Humidity = 51 % to IBM Watson
Published Temperature = 40 C Humidity = 3 % to IBM Watson
Published Temperature = 8 C Humidity = 68 % to IBM Watson
Published Temperature = 65 C Humidity = 86 % to IBM Watson
Published Temperature = 98 C Humidity = 45 % to IBM Watson
Published Temperature = 31 C Humidity = 74 % to IBM Watson
Published Temperature = 71 C Humidity = 24 % to IBM Watson
Published Temperature = 42 C Humidity = 57 % to IBM Watson
Published Temperature = 89 C Humidity = 33 % to IBM Watson
Published Temperature = 66 C Humidity = 73 % to IBM Watson
Published Temperature = 24 C Humidity = 61 % to IBM Watson
Published Temperature = 1 C Humidity = 73 % to IBM Watson
Published Temperature = 70 C Humidity = 52 % to IBM Watson
Published Temperature = 50 C Humidity = 60 % to IBM Watson
Ln: 5 Col: 0
j757k6.internetofthings.ibmcloud.com/dashboard/device...
Gmail YouTube Maps
IBM Watson IoT Platform
510119106009@smartinternz.com
ID: j757k6
Browse Action Device Types Interfaces Add Device
devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
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
1
Simulation running

CODE FLOW:


START
Location Data
Get data from Weather API
Is it near Schools, Colleges ?
Is it near Hospitals ?
Is it Foggy ???
Is it Raining ??
SLOW DOWN if working hours/day
Slower Speed Displayed
DO NOT HONK
Slower Speed Displayed
END

brain.py

```
# IMPORT SECTION STARTS
import weather
from datetime import datetime as dt
# IMPORT SECTION ENDS
# UTILITY LOGIC SECTION STARTS
def processConditions(myLocation,APIKEY,localityInfo):
 weatherData = weather.get(myLocation,APIKEY)
 finalSpeed = localityInfo["usualSpeedLimit"] if "rain" not in weatherData
else localityInfo["usualSpeedLimit"]/2
 finalSpeed = finalSpeed if weatherData["visibility"]>35 else
 finalSpeed/2 if(localityInfo["hospitalsNearby"]):
 # hzone of the hospital
   doNotHonk = True
 else:
   if(localityInfo["schools"]["schoolZone"]==False):
 # neither hospital zone nor school
    doNotHonk = False
   else:
 # school zone
    now = [dt.now().hour,dt.now().minute]
activeTime = [list(map(int,_.split(":"))) for _ in
localityInfo["schools"]["activeTime"]]
 doNotHonk = activeTime[0][0]<=now[0]<=activeTime[1][0] and
activeTime[0][1]<=now[1]<=activeTime[1][1] return({

 "speed" : finalSpeed,
 "doNotHonk" : doNotHonk
 })
```

brain.py - D:\suganya\S.RAHUL KUMAR\python\brain.py (3.11.0)

File Edit Format Run Options Window Help

```
#Python code
# IMPORT SECTION STARTS
import weather
from datetime import datetime as dt
# IMPORT SECTION ENDS
# UTILITY LOGIC SECTION STARTS
def processConditions(myLocation,APIKEY,localityInfo):
 weatherData = weather.get(myLocation,APIKEY)
 finalSpeed = localityInfo["usualSpeedLimit"] if "rain" not in weatherData else  localityInfo["usualSpeedLimit"]/2
 finalSpeed = finalSpeed if weatherData["visibility"]>35 else finalSpeed/2
 if(localityInfo["hospitalsNearby"]):
 # hzone of the hospital
   doNotHonk = True
 else:
   if(localityInfo["schools"]["schoolZone"]==False):
 # neither hospital zone nor school
    doNotHonk = False
   else:
 # school zone
    now = [dt.now().hour,dt.now().minute]
 activeTime = [list(map(int,_.split(":"))) for _ in localityInfo["schools"]["activeTime"]]
 doNotHonk = activeTime[0][0]<=now[0]<=activeTime[1][0] and activeTime[0][1]<=now[1]<=activeTime[1][1]
 return({
 "speed" : finalSpeed,
 "doNotHonk" : doNotHonk
 })
```

 # weather.py

```
import requests as reqs
def get(myLocation,APIKEY):
   apiURL =
"https://api.openweathermap.org/data/2.5/weather?q={myLocation}&appid={APIKEY}"
   responseJSON = (reqs.get(apiURL)).json()
   returnObject = {
      "temperature" : responseJSON['main']['temp'] - 273.15,
      "weather" : [responseJSON['weather'][_]['main'].lower() for _
in range(len(responseJSON['weather']))],
      "visibility" : responseJSON['visibility']/100,
   }
   if("rain" in responseJSON):
      returnObject["rain"] = [responseJSON["rain"][key] for key in
   responseJSON["rain"]] return(returnObject)
```

weather.py - D:/suganya/S.RAHUL KUMAR/python/weather.py (3.11.0)

File Edit Format Run Options Window Help

```
import requests as reqs

def get(myLocation,APIKEY):
    apiURL = "https://api.openweathermap.org/data/2.5/weather?q={myLocation}&appid={APIKEY}"
    responseJSON = (reqs.get(apiURL)).json()
    returnObject = {
        "temperature" : responseJSON['main']['temp'] - 273.15,
        "weather" : [responseJSON['weather'][_]['main'].lower() for _ in range(len(responseJSON['weather']))],
        "visibility" : responseJSON['visibility']/100,
    }
    if("rain" in responseJSON):
        returnObject["rain"] = [responseJSON["rain"][key] for key in responseJSON["rain"]]
    return(returnObject)
```

 # main.py

```
import brain
# IMPORT SECTION ENDS
# USER INPUT SECTION STARTS
myLocation = "Chennai,IN"
APIKEY =
"c7388b7d0d823ee0ee0be65c6fd40411"
localityInfo = {
   "schools" : {
      "schoolZone" : True,
      "activeTime" : ["7:00","17:30"] # schools active from 7 AM till 5:30 PM
      },
   "hospitalsNearby" : False,
   "usualSpeedLimit" : 40 # in km/hr
}
# USER INPUT SECTION ENDS
# MICRO-CONTROLLER CODE STARTS
while True :
   print(brain.processConditions(myLocation,APIKEY,localityInfo))
```

main.py - D:\suganya\S.RAHUL KUMAR\python\main.py (3.11.0)

File Edit Format Run Options Window Help

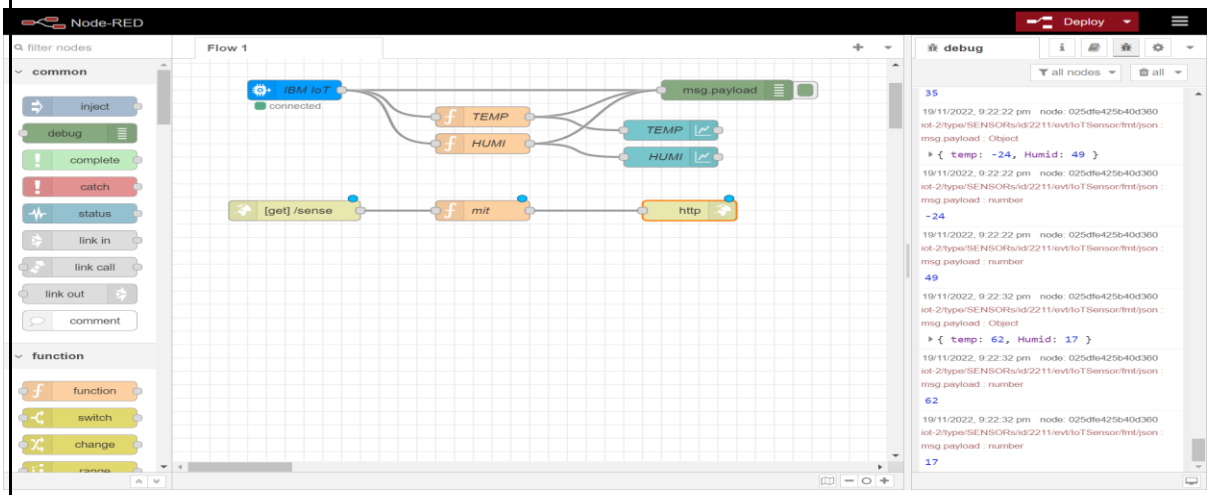
```
import brain
# IMPORT SECTION ENDS
# USER INPUT SECTION STARTS
myLocation = "Chennai,IN"
APIKEY = "c7388b7d0d823ee0ee0be65c6fd40411"
localityInfo = {
    "schools" : {
        "schoolZone" : True,
        "activeTime" : ["7:00","17:30"] # schools active from 7 AM till 5:30 PM
        },
    "hospitalsNearby" : False,
    "usualSpeedLimit" : 40 # in km/hr
}
# USER INPUT SECTION ENDS
# MICRO-CONTROLLER CODE STARTS
while True :
    print(brain.processConditions(myLocation,APIKEY,localityInfo))
```

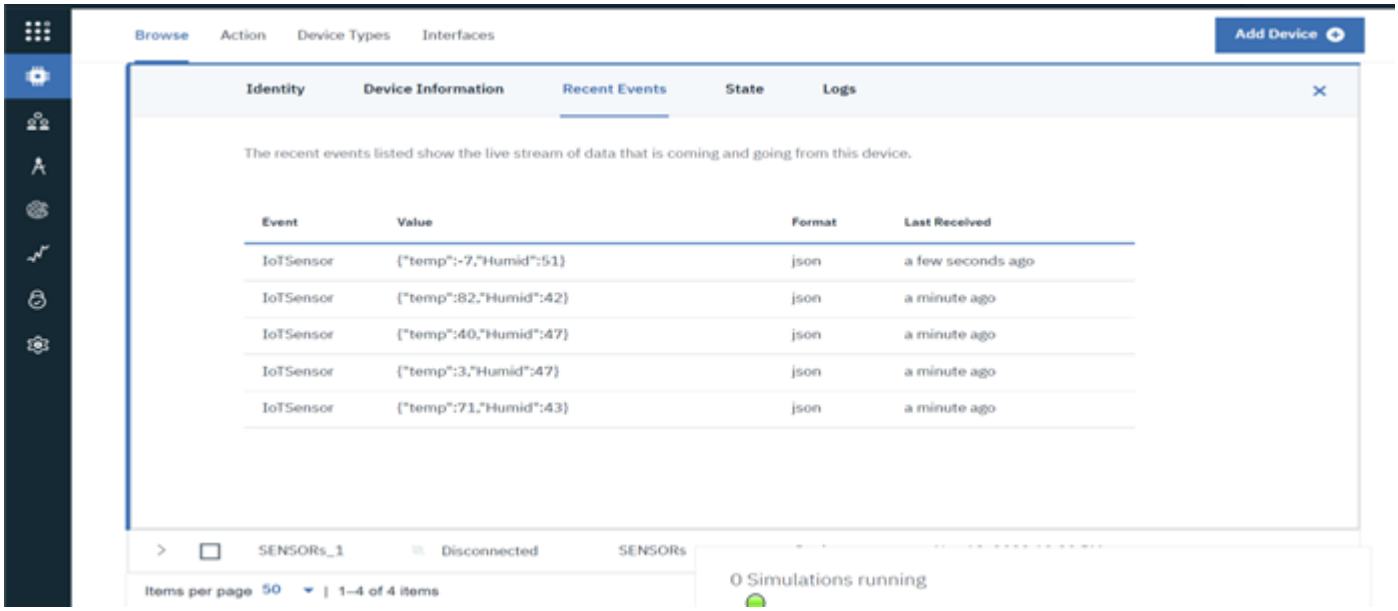
Output :

Code Output

{'speed': 40, 'doNotHonk': False}

NODE RED WEB UI:

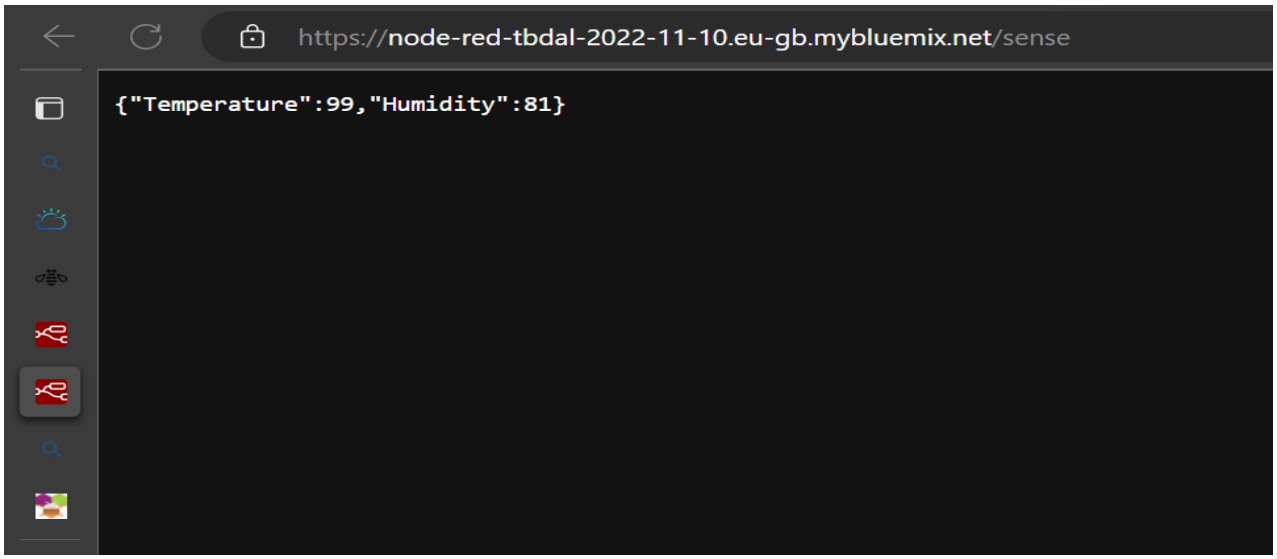




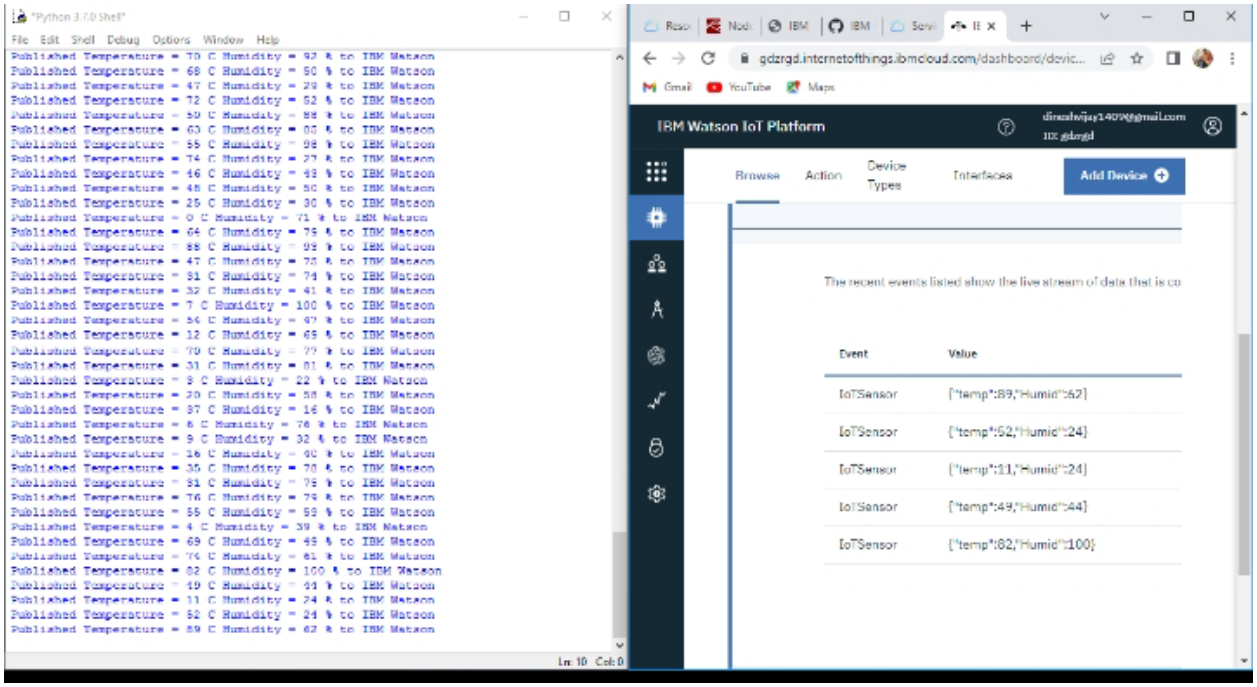
Python 3.7.0 Shell

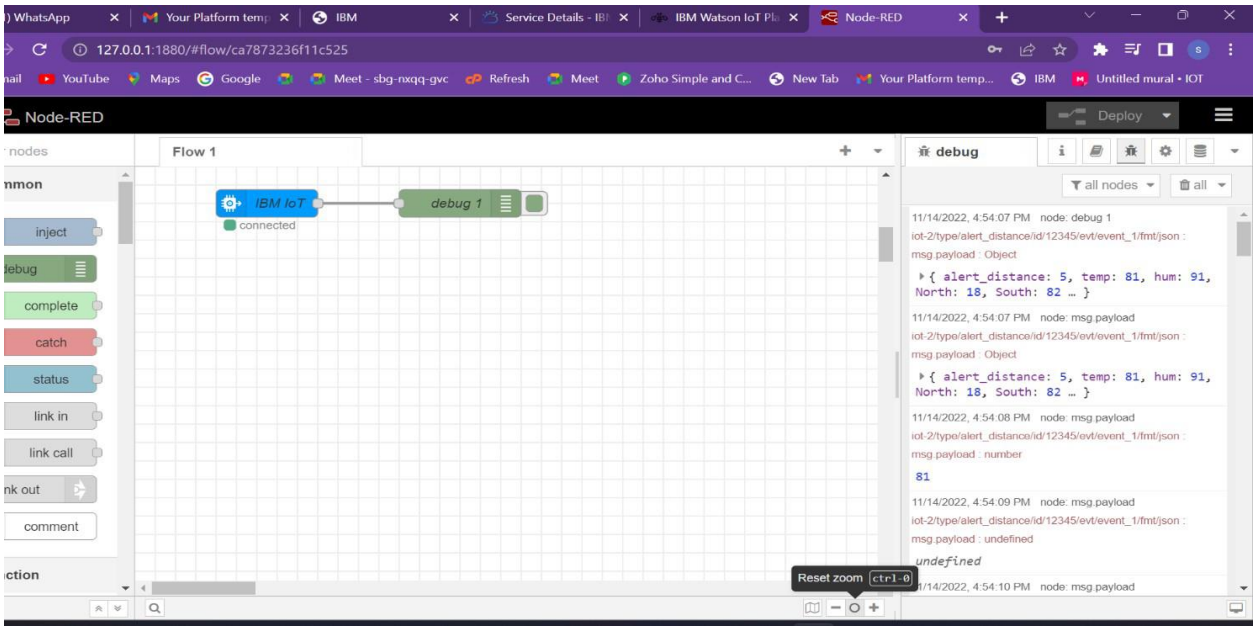
File Edit Shell Debug Options Window Help

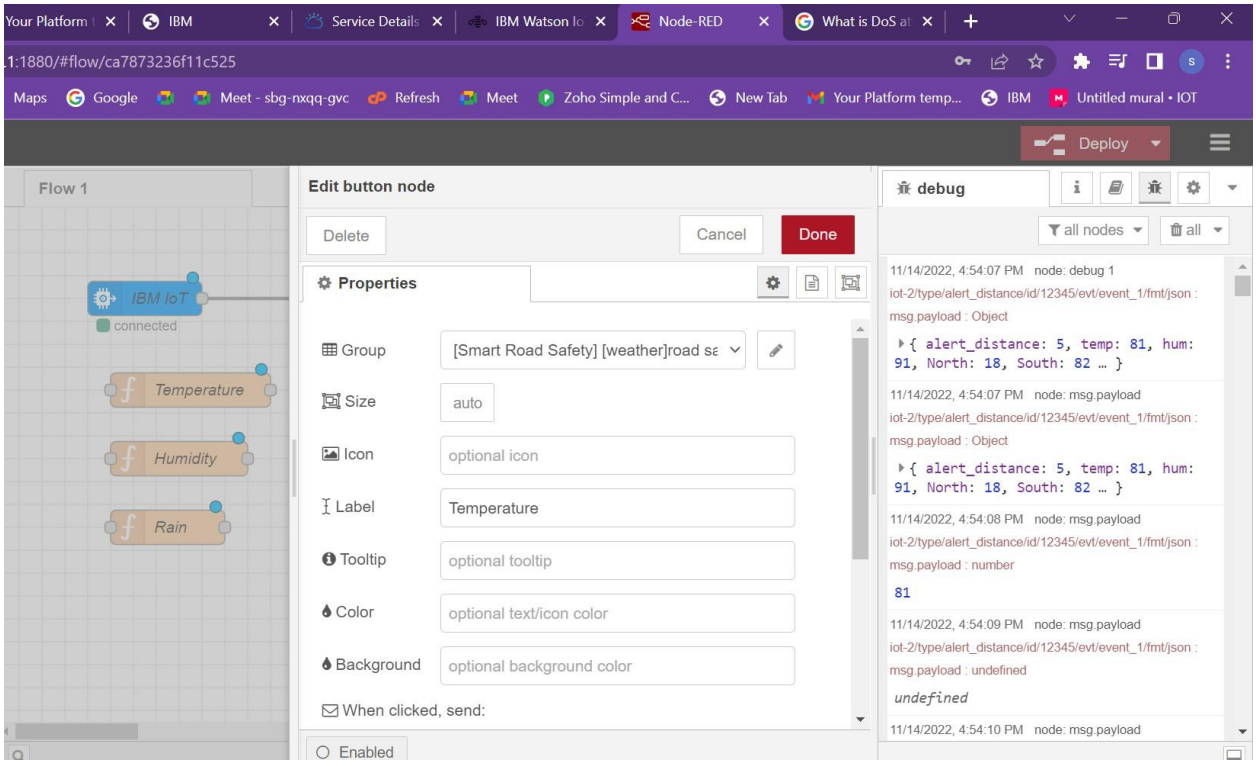
```
Temperature = 6 C Humidity = 44 % to IBM Watson
Temperature = 18 C Humidity = 23 % to IBM Watson
Temperature = 82 C Humidity = 26 % to IBM Watson
Temperature = 67 C Humidity = 69 % to IBM Watson
Temperature = 58 C Humidity = 33 % to IBM Watson
Temperature = 61 C Humidity = 43 % to IBM Watson
Temperature = 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
```


https://node-red-tbdal-2022-11-10.eu-gb.mybluemix.net/sense
{"Temperature":99,"Humidity":81}

FEATURE 2 :


IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Event
Value
IoTSensor
{"temp":89,"Humid":62}
IoTSensor
{"temp":62,"Humid":24}
IoTSensor
{"temp":11,"Humid":24}
IoTSensor
{"temp":49,"Humid":44}
IoTSensor
{"temp":82,"Humid":100}


Node-RED
Deploy
Flow 1
IBM IoT
connected
debug 1
debug
inject
debug
complete
catch
status
link in
link call
comment
Reset zoom ctrl-0
11/14/2022, 4:54:07 PM node: debug 1
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : Object
{ alert_distance: 5, temp: 81, hum: 91, North: 18, South: 82 … }
11/14/2022, 4:54:07 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : Object
{ alert_distance: 5, temp: 81, hum: 91, North: 18, South: 82 … }
11/14/2022, 4:54:08 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : number
81
11/14/2022, 4:54:09 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : undefined
undefined


Node-RED
Deploy
Flow 1
IBM IoT
connected
Temperature
Humidity
Rain
Edit button node
Delete
Cancel
Done
Properties
Group
[Smart Road Safety] [weather]road sa
Size
auto
Icon
optional icon
Label
Temperature
Tooltip
optional tooltip
Color
optional text/icon color
Background
optional background color
When clicked, send:
Enabled
debug
11/14/2022, 4:54:07 PM node: debug 1
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : Object
{ alert_distance: 5, temp: 81, hum: 91, North: 18, South: 82 … }
11/14/2022, 4:54:07 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : Object
{ alert_distance: 5, temp: 81, hum: 91, North: 18, South: 82 … }
11/14/2022, 4:54:08 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : number
81
11/14/2022, 4:54:09 PM node: msg.payload
iot-2/type/alert_distance/id/12345/evt/event_1/fmt/json : msg.payload : undefined
undefined

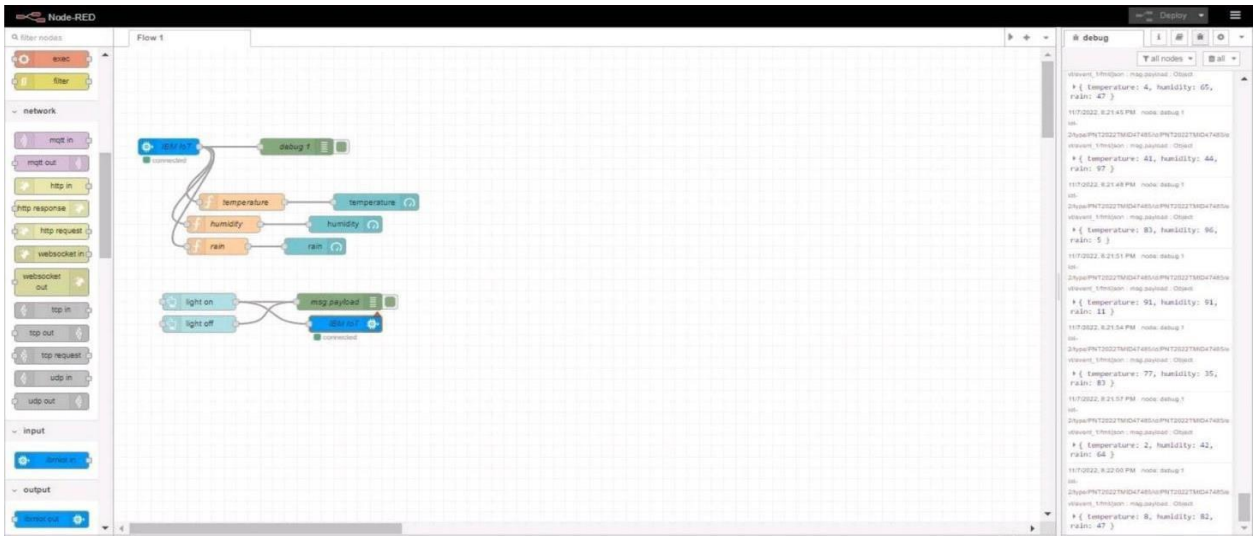


Fig: output from recent events

CHAPTER8

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.

CHAPTER9

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.

CHAPTER10

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.**

CHAPTER11

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.**

CHAPTER12

FUTURESCOPE

- **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 data and 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.**

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-4001-1658678914

Team Id : PNT2022TMID39403

Project Name : SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Team Id : PNT2022TMID39403

Dinesh V -510119104005

Saran C -510119104019

Manoj J -510119104013

Gunasekaran T -510119104009