PROJECT DOCUMENTATION

Date	15November 2022
Team ID	PNT2022TMID23864
Project Name	Signs with Smart Connectivity for Better Road Safety

1. INTRODUCTION

1.1 Project Overview

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. These smart connected sign boards get the speed limitations from a web app using weather API and update automatically. 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.

1.2 Purpose

- To improve vehicle safety by providing real-time traffic information to the driver. Road signs play an important role in road safety.
- To be effective, road signs must be visible at a distance that enables drivers to take the necessary actions.
- To avoid the accidents, due to the increasing vehicle speed.
- To provides a voice alert to a needed action that enhances driver’s attention.

2. LITERATURE SURVEY

2.1 Existing Problem

- Increased traffic can increase carbon emissions and other pollution.
- Land use for roads can damage built and natural environment, impose mortality on wildlife if habitats are severed.
- construction has associated environmental costs.

2.2 Reference

W.E.Marshall, “Understanding international road safety disparities: Why is Australia so much safer than the United States?” Accident Analysis & Prevention, vol. 111, pp. 251–265, 2018

Digital signage is evolving to smart signage which provides personalized service by adaptively changing contents according to the user context. However, previous smart signage services have difficulty to expend their service because it is not easy to connect additional sensing devices. Furthermore, previous smart signage systems only consider single signage for a service. In this paper, we propose IoT based smart signage platform. The proposed platform provides IoT based connectivity between sensors and signage platform for flexible service extension. Also, we suggest IoT based signage connection, status sensing, and controlling. Therefore, our platform can make a service group of signages dynamically and enables signages to collaborate for a service in wide area. To show the performance of proposed platform, we implemented smart nursing home service. The service shows that IoT devices and signages can be connected to the platform dynamically and collaborate together for a service in wide area.

This paper presents an approach to detect traffic signs using You Only Look Once version 4 (YOLOv4) model. The traffic sign detection and recognition system (TSDR) play an essential role in the intelligent transportation system (ITS). TSDR can be utilized for driver assistance and, eventually, driverless cars to reduce accidents. When driving an automobile, the driver's attention is usually drawn to the road. On the other hand, most traffic signs are situated on the side of the road, which may have contributed to the collision. TSDR allows drivers to view traffic sign information without having to divert their attention. Due to the existence of a large background, clutter, fluctuating degrees of illumination, varying sizes of traffic signs, and changing weather conditions, TSDR is an important but difficult process in intelligent transport systems. Many efforts have been made to find answers to the major issues that they face. The objective of this study addresses road traffic sign detection and recognition using a technique that initially detects the bounding box of a traffic sign. Then the detected traffic sign will be recognized for usage in a speeded-up process. Since safe driving necessitates real-time traffic sign detection, the YOLOv4 network was employed in this research. YOLOv4 was evaluated on our dataset, which consisted of manual annotations to identify 43 distinctive traffic signs classes. It was able to achieve an average recognition accuracy of 84.7%. Overall, the work adds by presenting a basic yet effective model for real-time detection and recognition of traffic signs.

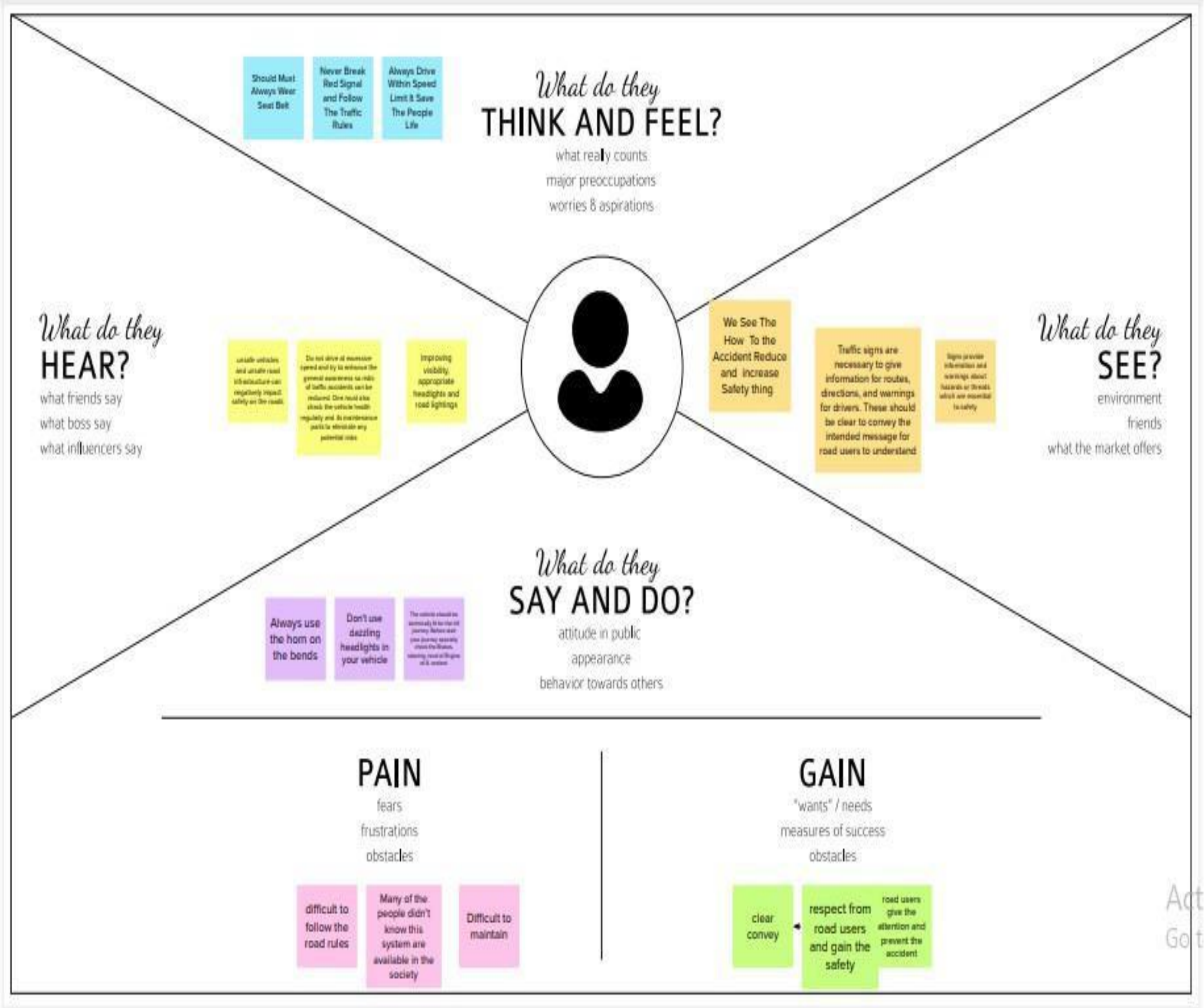
Ubiquitous nature of smart cities requires multiple technologies to be implemented in this area. To develop the smart cities in practice, there is huge need of “Smart Traffic Management”. Smart Traffic Management is a system to monitor and control the traffic signals using sensors to regulate the flow of traffic and to avoid the congestion for smooth flow of traffic. Prioritizing the traffic like ambulance, police etc. is also one application comes under smart traffic management. Traffic sign board plays important role to make the traffic in shape and to control and manage the traffic on roads. Many at times the driver misses the sign boards while driving due to various reasons like insufficient light, fog, rain, traffic etc. In this paper, a framework of the Smart Traffic Sign Boards (STSB) is proposed, which can communicate with the system deployed in all the vehicles to make the drivers of those vehicles aware of speed breakers, speed limits, schools, or ‘U’ turn ahead, etc. beforehand, to avoid the mishap due to sudden appearing of such unusual features of the road during the road journey.

2.3 Problem Statement Definition:

- A driver who wants to drive safely on road but there are many obstacles because of heavy traffic, weather condition, etc..,
- A driver who wants to avoid the heavy traffic roads but they are unpredictable because they change from time to time.
- A passenger who wants to travel safely but there are many road accidents because of some drivers who drive very fast and carelessly.
- A driver who wants to reach the destination but unable to choose the route and turn in wrong direction because there are no navigation instructions.

3. IDEATION AND PROPOSED SOLUTION:

3.1 Empathy Map Canvas:



What do they THINK AND FEEL?

what really counts

major preoccupations

worries & aspirations

Should Must Always Wear Seat Belt

Never Break Red Signal and Follow The Traffic Rules

Always Drive Within Speed Limit & Save The People Life

What do they HEAR?

what friends say

what boss say

what influencers say

unsafe vehicles and unsafe road infrastructure can negatively impact safety on the roads

Do not drive at excessive speed and try to enhance the general awareness so risks of traffic accidents can be reduced. One must also check the vehicle health regularly and its maintenance parts to eliminate any potential risks

Improving visibility appropriate headlights and road lightings

What do they SEE?

environment

friends

what the market offers

We See The How To the Accident Reduce and Increase Safety thing

Traffic signs are necessary to give information for routes, directions, and warnings for drivers. These should be clear to convey the intended message for road users to understand

Signs provide information and warnings about hazards or threats which are essential to safety

What do they SAY AND DO?

attitude in public

appearance

behavior towards others

Always use the horn on the bends

Don't use dazzling headlights in your vehicle

The vehicle should be [illegible] journey. Before start your journey [illegible] check the Brakes, steering, [illegible] oil & coolant

PAIN

fears

frustrations

obstacles

difficult to follow the road rules

Many of the people didn't know this system are available in the society

Difficult to maintain

GAIN

"wants" / needs

measures of success

obstacles

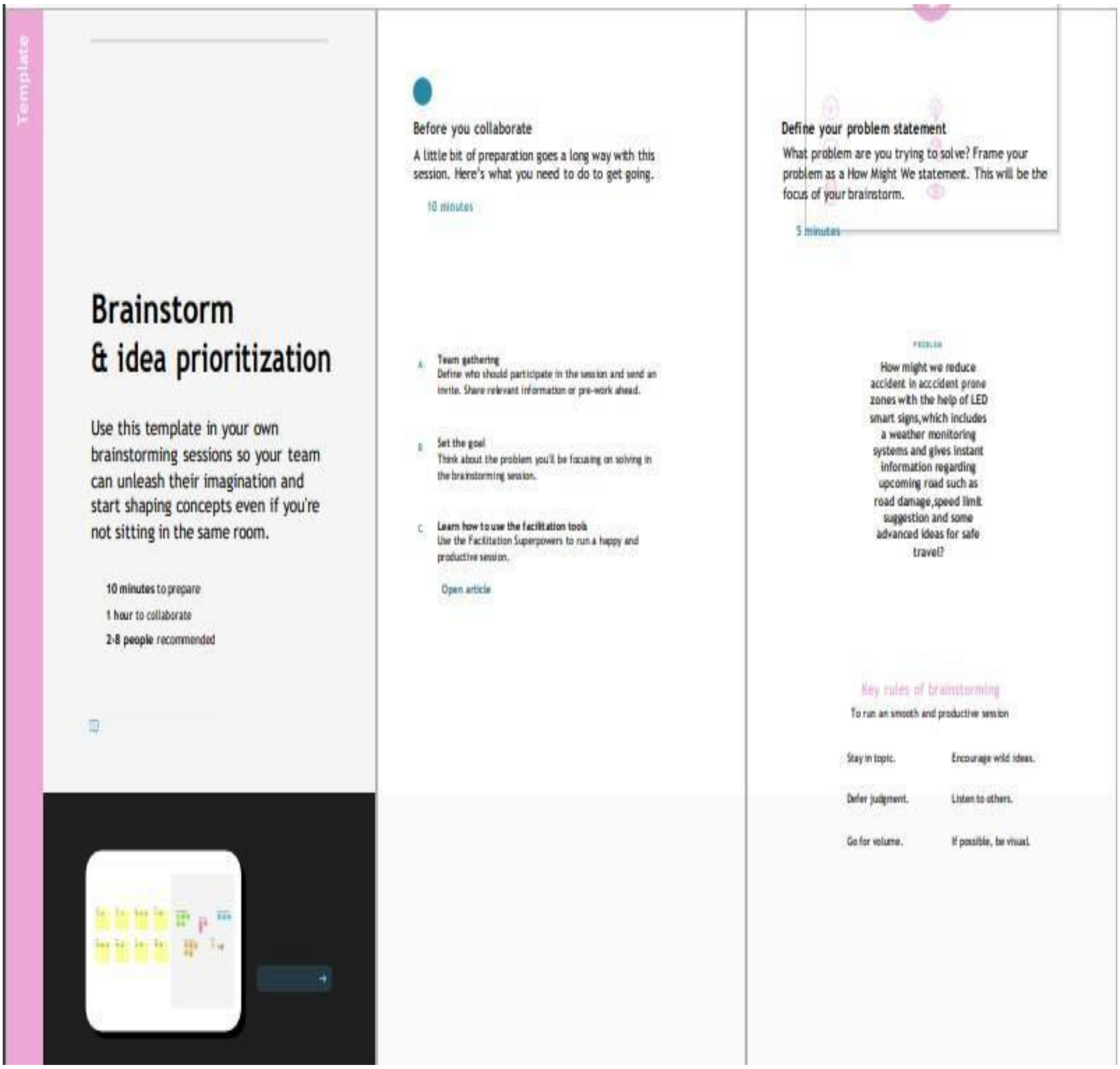
clear convey

respect from road users and gain the safety

road users give the attention and prevent the accident

3.2 Ideation & Brainstorming:

Step-1: Team Gathering, Collaboration and Select the Problem Statement.



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A. Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B. Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C. Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

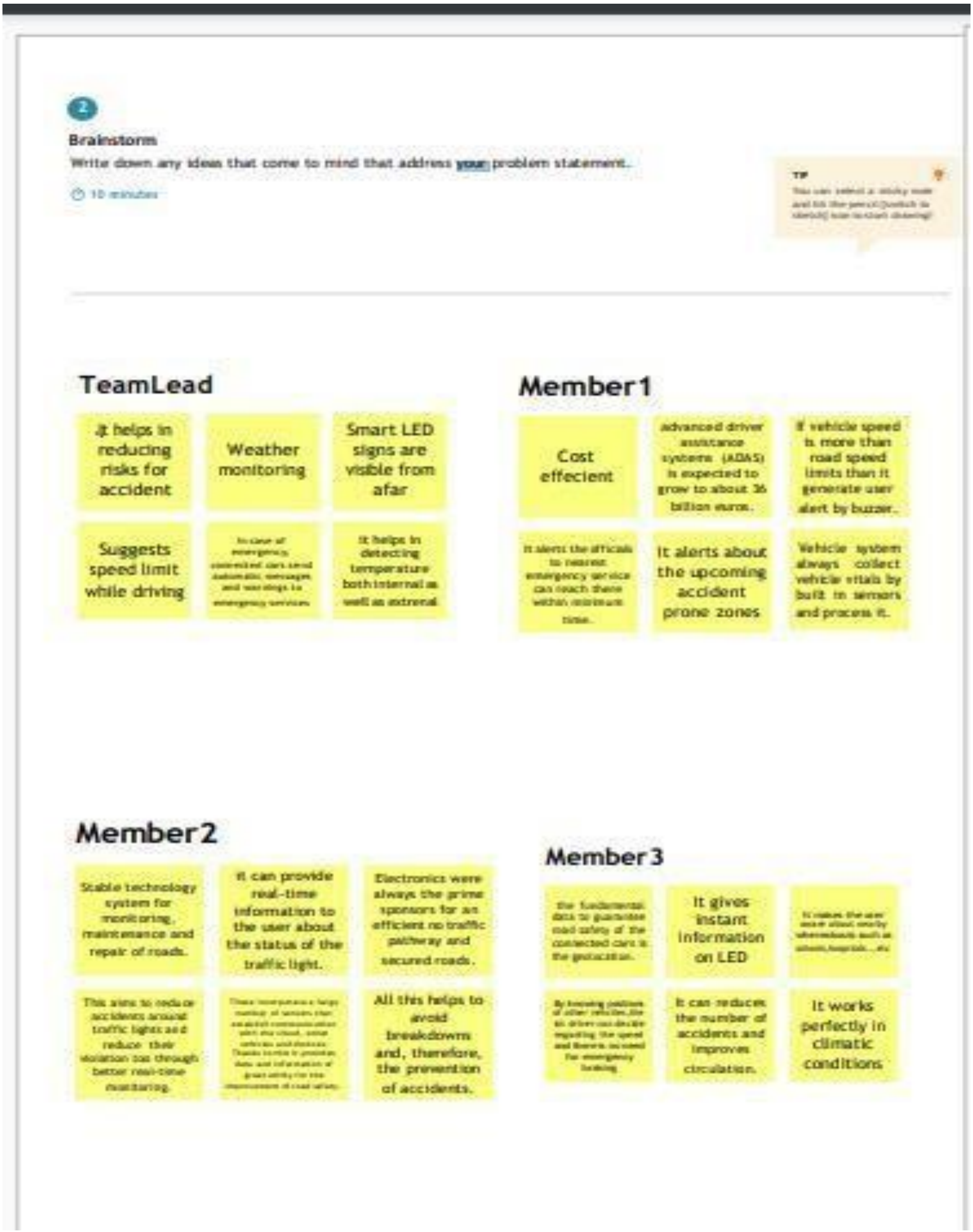
How might we reduce accident in acccident prone zones with the help of LED smart signs,which includes a weather monitoring systems and gives instant information regarding upcoming road such as road damage,speed limit suggestion and some advanced ideas for safe travel?

Key rules of brainstorming

To run an smooth and productive session

Stay in topic.
Encourage wild ideas.
Defer judgment.
Listen to others.
Go for volume.
If possible, be visual.

Step-2: Brainstorm, Idea Listing and Grouping



2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

TeamLead

- It helps in reducing risks for accident
- Weather monitoring
- Smart LED signs are visible from afar
- Suggests speed limit while driving
- In case of emergency, connected cars send automatic messages and warnings to emergency services
- It helps in detecting temperature both internal as well as extrenal

Member1

- Cost effecient
- advanced driver assistance systems (ADAS) is expected to grow to about 36 billion euros.
- If vehicle speed is more than road speed limits than it generate user alert by buzzer.
- It alerts the officials to nearest emergency service can reach there within minimum time.
- It alerts about the upcoming accident prone zones
- Vehicle system always collect vehicle vitals by built in sensors and process it.

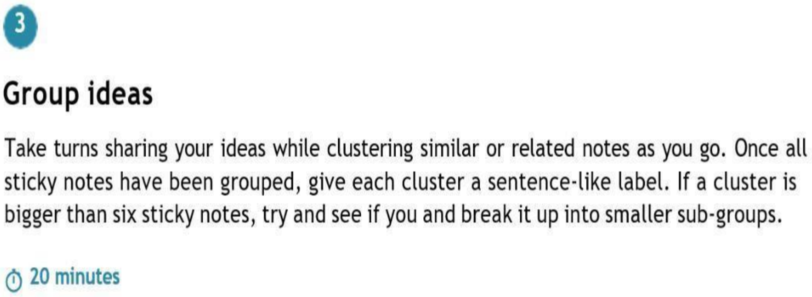
Member2

- Stable technology system for monitoring, maintenance and repair of roads.
- It can provide real-time information to the user about the status of the traffic light.
- Electronics were always the prime sponsors for an efficient no traffic pathway and secured roads.
- This aims to reduce accidents around traffic lights and reduce their violation too through better real-time monitoring.
- These incorporate a large number of sensors that establish communication with the cloud, other vehicles and devices. Thanks to this it provides data and information of great utility for the improvement of road safety.
- All this helps to avoid breakdowns and, therefore, the prevention of accidents.

Member3

- the fundamental data to guarantee road safety of the connected cars is the geolocation.
- It gives instant information on LED
- It makes the user aware about nearby whereabouts such as schools,hospitals....etc
- By knowing positions of other vehicles,the drivers can decide regarding the speed and lanes to be used for emergency braking.
- It can reduces the number of accidents and improves circulation.
- It works perfectly in climatic conditions

Step-3: Idea Prioritization

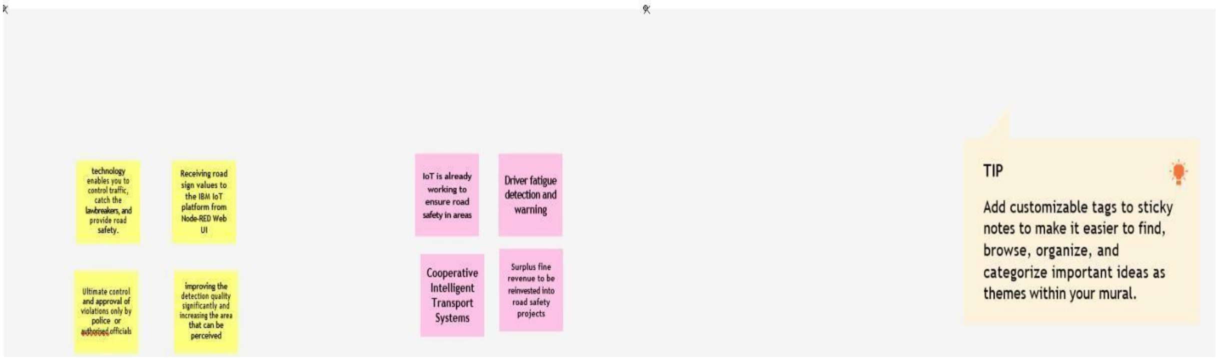


3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes



technology enables you to control traffic, catch the lawbreakers, and provide road safety.

Receiving road sign values to the IBM IoT platform from Node-RED Web UI

Ultimate control and approval of violations only by police or authorised officials

improving the detection quality significantly and increasing the area that can be perceived

IoT is already working to ensure road safety in areas

Driver fatigue detection and warning

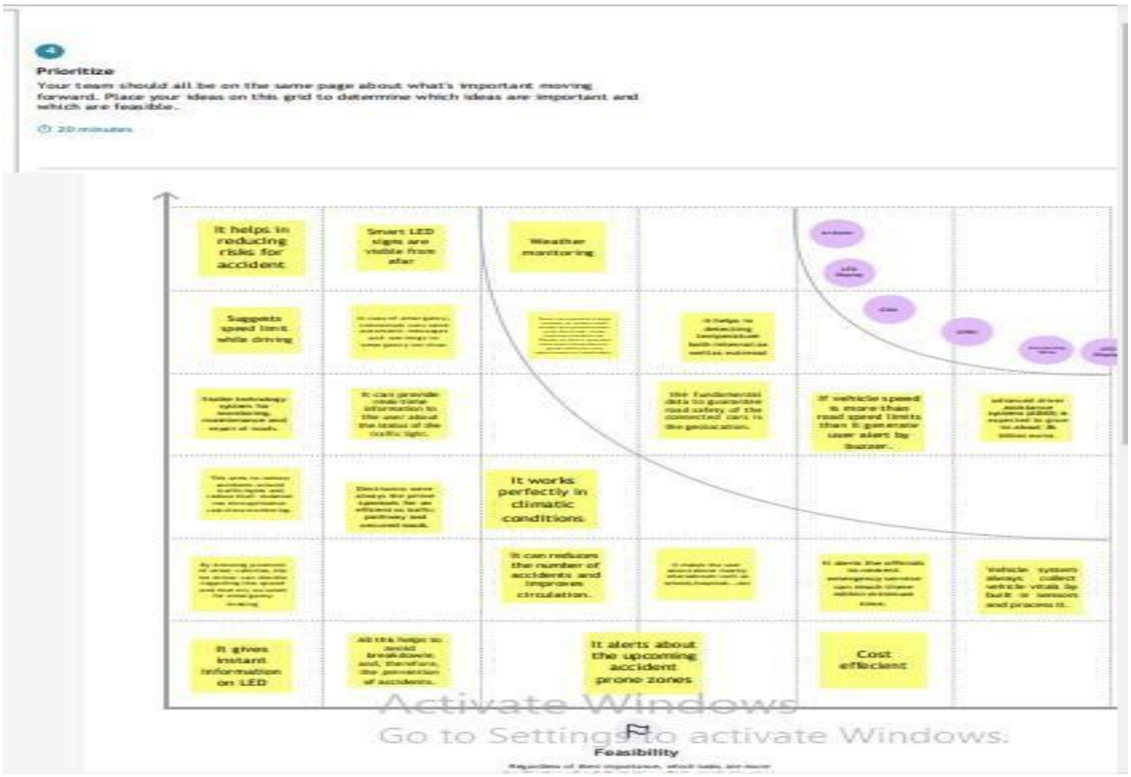
Cooperative Intelligent Transport Systems

Surplus fine revenue to be reinvested into road safety projects

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Prioritize:



4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

It helps in reducing risks for accident

Smart LED signs are visible from afar

Weather monitoring

Suggests speed limit while driving

[illegible]

[illegible]

It helps in detecting temperature both internal as well as external

[illegible]

It can provide real-time information to the user about the status of the traffic light.

the fundamental data to guarantee road safety of the connected cars is the geolocation.

If vehicle speed is more than road speed limits than it generate user alert by buzzer.

advanced driver assistance systems (ADAS) is expected to grow to about [illegible] billion euros.

[illegible]

[illegible]

It works perfectly in climatic conditions

[illegible]

It can reduces the number of accidents and improves circulation.

[illegible]

[illegible]

Vehicle system always collect vehicle vitals by built in sensors and process it.

It gives instant information on LED

All this helps to avoid breakdowns and, therefore, the prevention of accidents.

It alerts about the upcoming accident prone zones

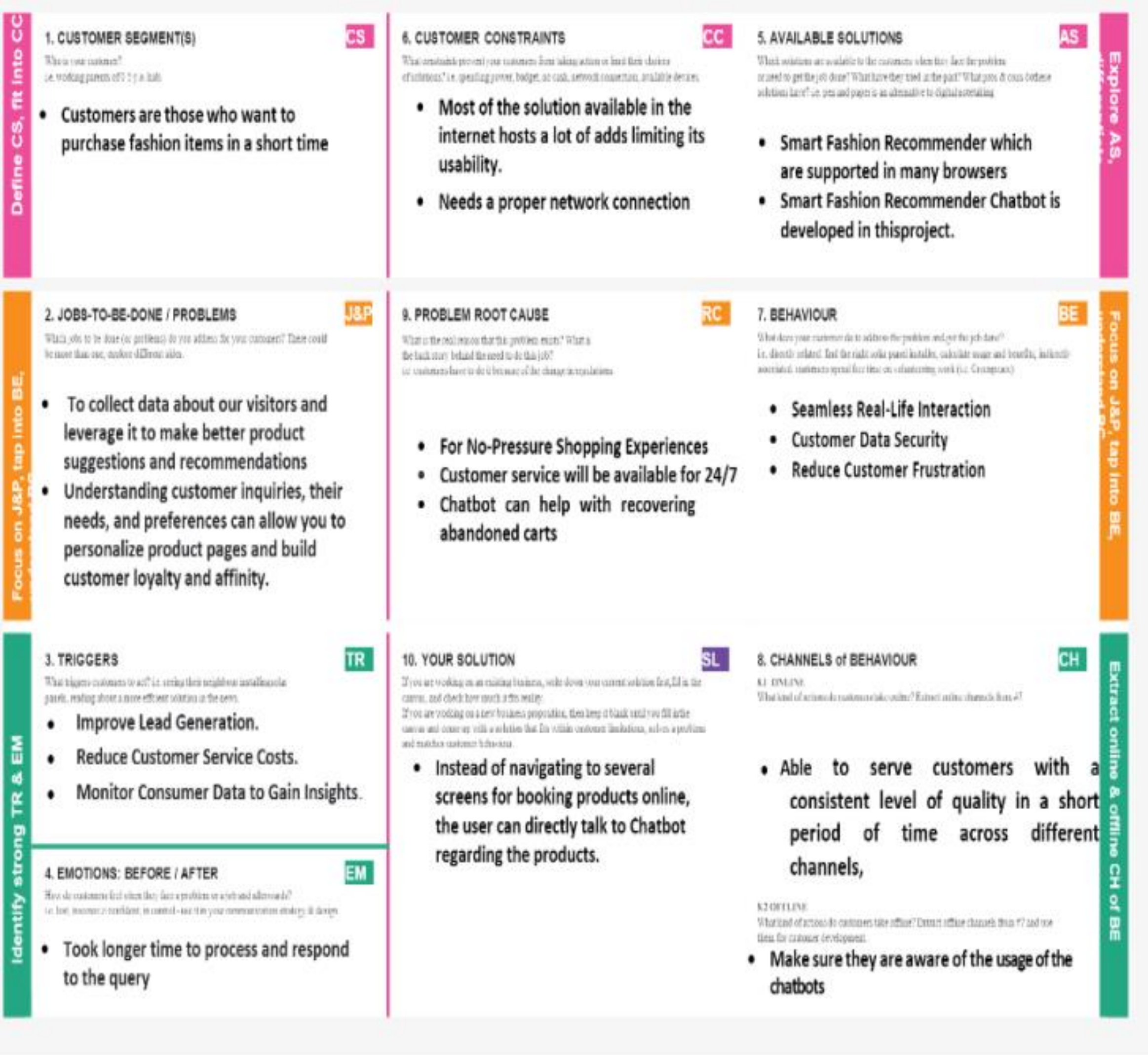
Cost effecient

3.3 Proposed Solution:

S.No	Parameter	Description
1.	Problem Statement (Problem to besolved)	The problems in these curve roads ar that the drivers are not able to see th vehicle or obstacles coming from anothe end of the curve. If the vehicle is in grea speed, then it is difficult to control and there are chances of falling off a clif Hence there is a need of many road safet systems.
2.	Idea / Solution description	To avoid these problems in curve roads of mountain areas, Nevon projects has proposed this vehicle accident prevention system. This accident prevention system using sensors is powered by Arduino board, it consists of IR sensors, LED lights, and buzzer. When two cars pass from the opposite side of a mountain curve the IR sensor senses the car and LED colour changes to red and raises the buzzer giving signal of danger and then it changes oneLED colour into green to allow the one car to pass and then the other LED colour turns green. In this way we can prevent the accidents of curved road.

3.	Novelty / Uniqueness	One or more of the fundamental data to guarantee road safety of the connected cars is the geolocation. The connected cars can communicate with each othe so that, depending on the speed an position of each vehicle, collisions ar avoided, like maneuvers involving emergency braking.
4.	Social Impact / Customer Satisfaction	Ensuring safe driving experience with real-time assistance, navigation, and even monitoring driving patterns and any emergency situation. Additionally, along with the state of the traffic, IoT drivers can receive updated information on the state of the roads potholes, grade changes, black spots, etc..
5.	Business Model (Revenue Model)	We can introduce product-based approach to earn a good revenue . Adding precise, low-cost, always-connected IoT sensors and monitoring devices to the products that you sell and install enhances the types of services.
6.	Scalability of the Solution	The IOT applications must have the ability to support an increasing number of connected devices, users, application features, and analytics.

3.4 Problem Solution Fit:



Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

- Customers are those who want to purchase fashion items in a short time

6. CUSTOMER CONSTRAINTS CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

- Most of the solution available in the internet hosts a lot of adds limiting its usability.
- Needs a proper network connection

5. AVAILABLE SOLUTIONS AS

Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

- Smart Fashion Recommender which are supported in many browsers
- Smart Fashion Recommender Chatbot is developed in thisproject.

Explore AS,

Focus on J&P, tap into BE,

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

- To collect data about our visitors and leverage it to make better product suggestions and recommendations
- Understanding customer inquiries, their needs, and preferences can allow you to personalize product pages and build customer loyalty and affinity.

9. PROBLEM ROOT CAUSE RC

What is the real reason that this problem exists? What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

- For No-Pressure Shopping Experiences
- Customer service will be available for 24/7
- Chatbot can help with recovering abandoned carts

7. BEHAVIOUR BE

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

- Seamless Real-Life Interaction
- Customer Data Security
- Reduce Customer Frustration

Focus on J&P, tap into BE,

Identify strong TR & EM

3. TRIGGERS TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

- Improve Lead Generation.
- Reduce Customer Service Costs.
- Monitor Consumer Data to Gain Insights.

4. EMOTIONS: BEFORE / AFTER EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

- Took longer time to process and respond to the query

10. YOUR SOLUTION SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

- Instead of navigating to several screens for booking products online, the user can directly talk to Chatbot regarding the products.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

- Able to serve customers with a consistent level of quality in a short period of time across different channels,

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

- Make sure they are aware of the usage of the chatbots

Extract online & offline CH of BE

4. REQUIREMENT ANALYSIS:

4.1 Functional Requirements:

FR No.	**Functional Requirement (Epic)**	**Sub Requirement (Story / Sub-Task)**
FR-1	USER REGISTRATION	• Through google forms • Through mail • Through linked in • Through Facebook
FR-2	USER CONFIRMATION	• Through verification mails • Through OTP
FR-3	USER APPROVAL	• Through mails • Through phone calls • Through SMS
FR-4	USER TRANSACTION	• Through net banking • Through UPI
FR-5	TESTING	• Testing through components • Testing through API and UI
FR-6	END RESULT	• End result through product features • By using the technology

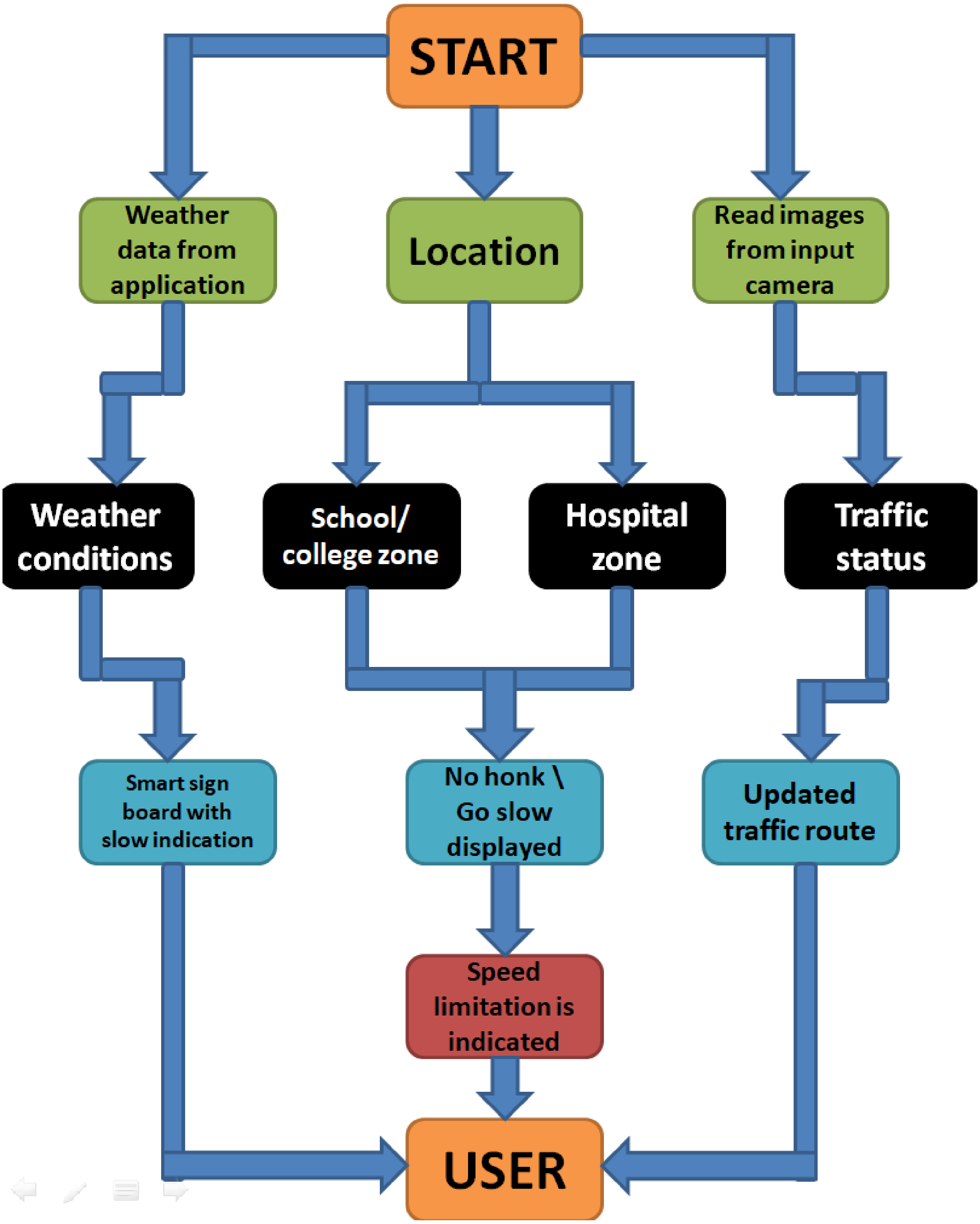
4.2 Non-Functional Requirements:

FR No.	Non Functional Requirement	Description
NFR-1	Usability	• Situations never remain the same. Therefore, there must be a constant check of the conditions prevailing and accordingly there must be changes made in these boards. • Sign boards with caution or alerts must be placed well in advance so that the drivers could be more alert with the journey. • The text content must be available in different languages to help the drivers. • Boards must be large and clear for better visibility. • Sign boards should be bright coloured so that it catches the drivers' sight. • The illustrations or the symbols used in the boards must be easily understandable.
NFR-2	Security	• The security system should be strong enough that no one can modify it other than the authority. • No one should be able to enter into the network to change, delete or manage the intimations or messages delivered through the sign boards.
NFR-3	Reliability	• There should not be any miscommunications or confusions regarding the messages displayed. •Maximumaccuracy must be ensured.

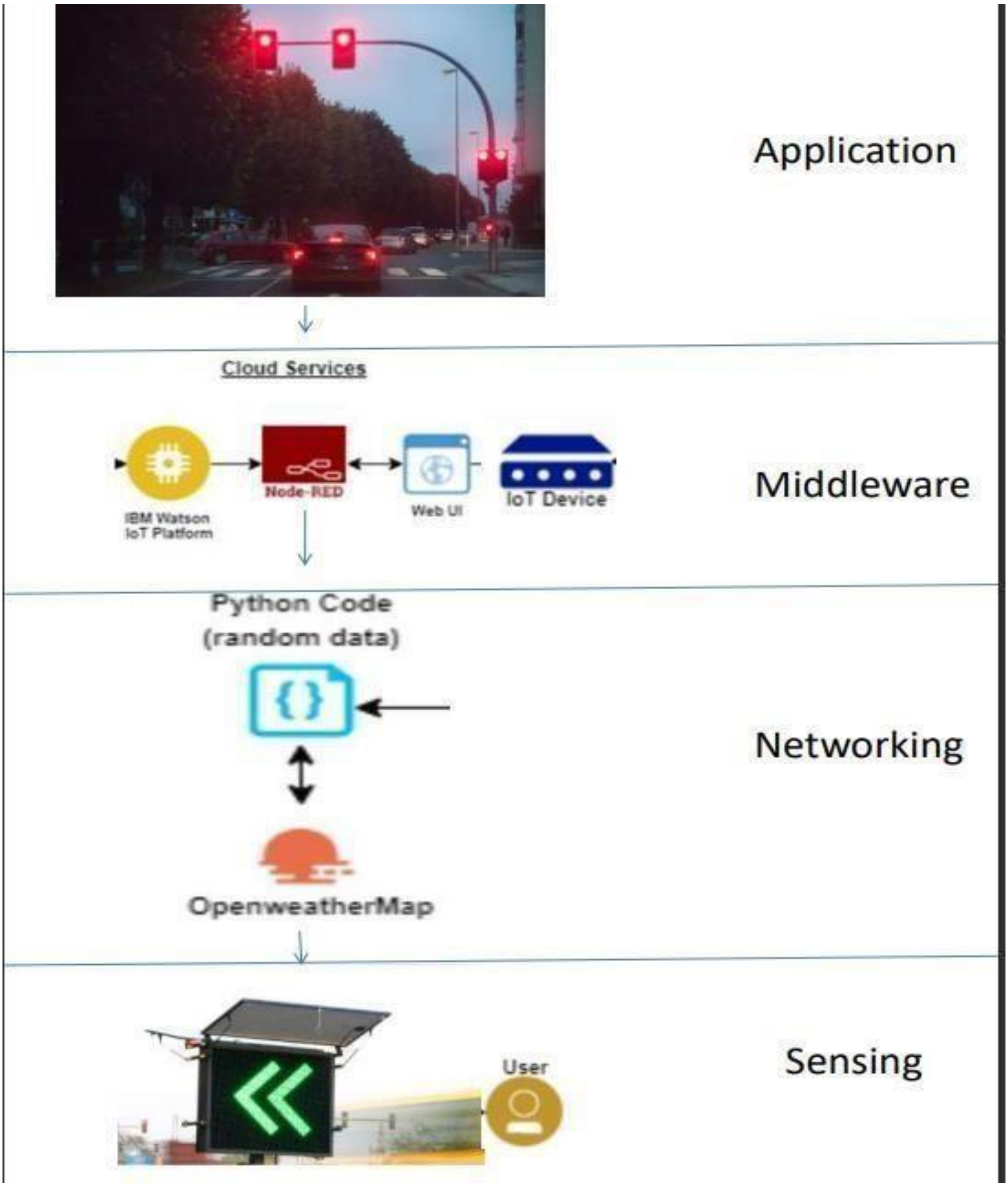
		• All the information displayed must be checked periodically and updated if any changes are needed for error-free intimation.
NFR-4	Performance	• The efficiency and the accuracy of the information hence calculated should be maximum • It should be ensured that minimum amount of energy, time and cost is required for the operation.
NFR-5	Availability	• These should be available anytime and everywhere that is 24/7. • Sign boards should be located in places which has direct view from the road. It should not present amidst bushes, trees, building etc • It should be properly monitored that no sign boards are damaged, repaired or malfunctioning at any time. • The sign boards should be made available only in places where they are required the most. Frequent availability of boards may lead to confusion and mistakes.
NFR-6	Scalability	• It should be easy to scale according to the requirement. • It should be in such a way that the network at any time of period should be ready to beexpanded and implemented on a wider scale.

5. PROJECT DESIGN:

5.1 Data Flow Diagrams:


START
Weather data from application
Location
Read images from input camera
Weather conditions
School/ college zone
Hospital zone
Traffic status
Smart sign board with slow indication
No honk \ Go slow displayed
Updated traffic route
Speed limitation is indicated
USER

5.2 Solution & Technical Architecture:



5.3 User Stories:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Visibility	Sign Boards should be made with LED's which are bright coloured and are capable of attracting the drivers attention but it should also not be too distracting or blinding cause it may lead to accidents.
FR-2	User Need	The smart sign boards should be placed frequently in places it is needed and less in places where it is not needed much to avoid confusion for the user during travel.
FR-3	User Understanding	For better understanding of the driver, the signs should be big, clear and legible and it can also include illustrations which will make it easily understandable to the driver.
FR-4	User Convenience	The display should be big enough that it should even be visible from far distance clearly.

6. PROJECT PLANNING & SCHEDULING:

6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-1	As a weather data controller, I log into my profile and start monitoring the weather updates	3	High	Ramya Dharshini
Sprint-1	dashboard	USN-2	I receive all the information about weather at a particular city from web from weather API.Whenever there is change in weather, corresponding updates about speed limits are made on sign boards.	2	High	Vinobha
Sprint-2	Login	USN-1	As a image controller, I keep note of all the images received from various areas and detect traffic in that particular area.	3	High	Praneetha

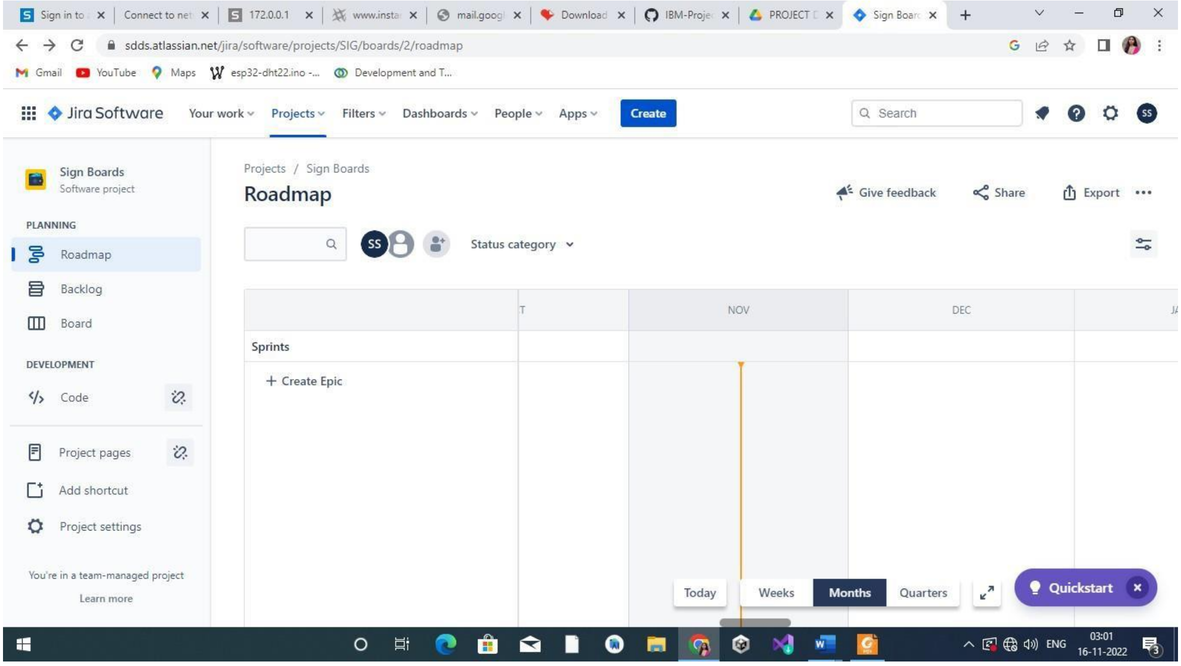
Sprint-2	Dashboard	USN-2	With traffic, distance between the vehicles is detected by ultrasonic sensor and the vehicle will be automatically stopped if the distance isbelow the limit.	2	Medium	Ramya Dharshini
Sprint-3	Login	USN-1	A traffic controller, I keep note of all the vehicle's speed received from various areas usinglocation sensor.	2	High	Praneetha
Sprint-3	Dashboard	USN-2	I ensure that the boards display "slow down" if high speed is detected.	2	Medium	Rithika
Sprint-3	Login	USN-3	As a user, I move the marker to my current location and the destination location.	1	Medium	Vinobha
Sprint-3	Dashboard	USN-4	I receive the fastest route to the destination and it is navigation instructions like "Turn left", "Turn right" will be displayed.	1	Medium	Rithika
Sprint-4	Login	USN-1	As a zonal officer, I ensure that boards near school display "slow down" near hospitals display "no horn".	3	High	Ramya Dharshini

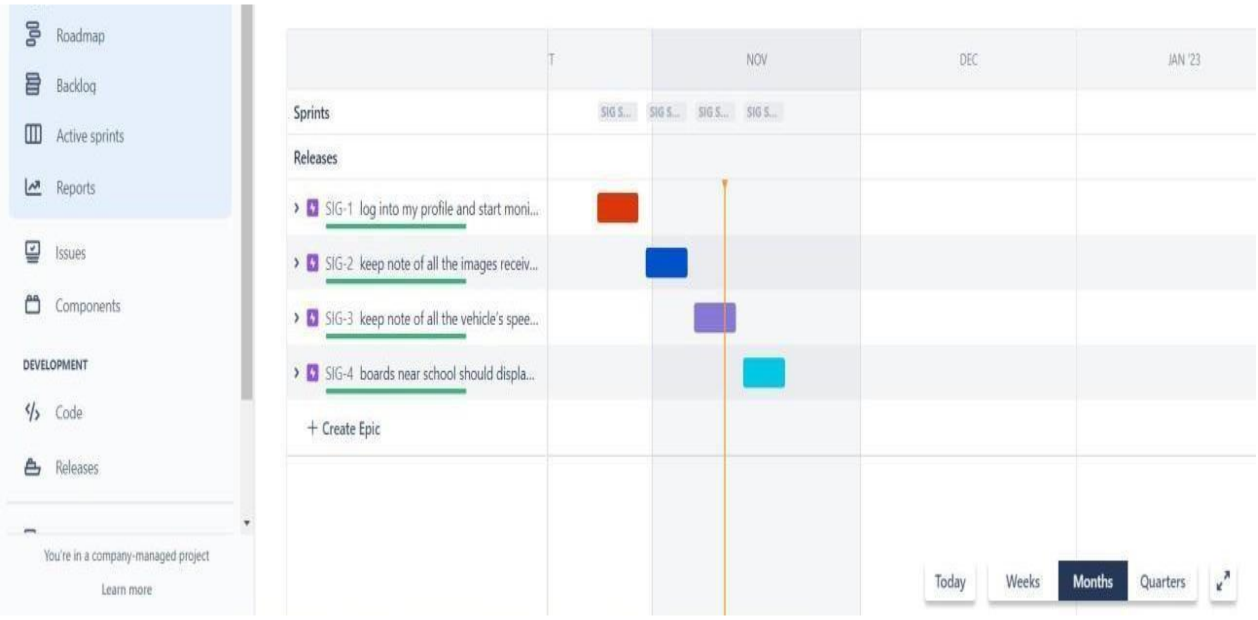
Sprint-4	Login	USN-2	As an administrator, I ensure that the boards display the "drive carefully" in near construction site, narrow and uneven roads.	2	Medium	Praneetha

6.2 Sprint Delivery Schedule:

Sprint	Total Story Point	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:





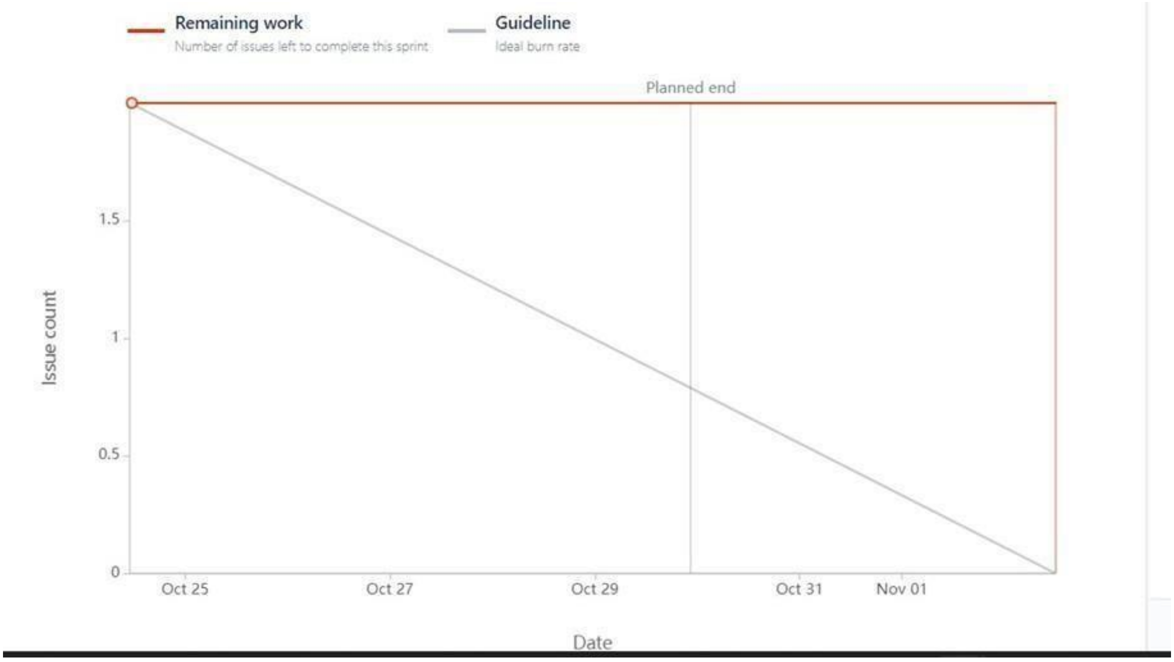
SIG-1 log into my profile and start moni...

SIG-2 keep note of all the images receiv...

SIG-3 keep note of all the vehicle's spee...

SIG-4 boards near school should displa...

Burndown Chart:

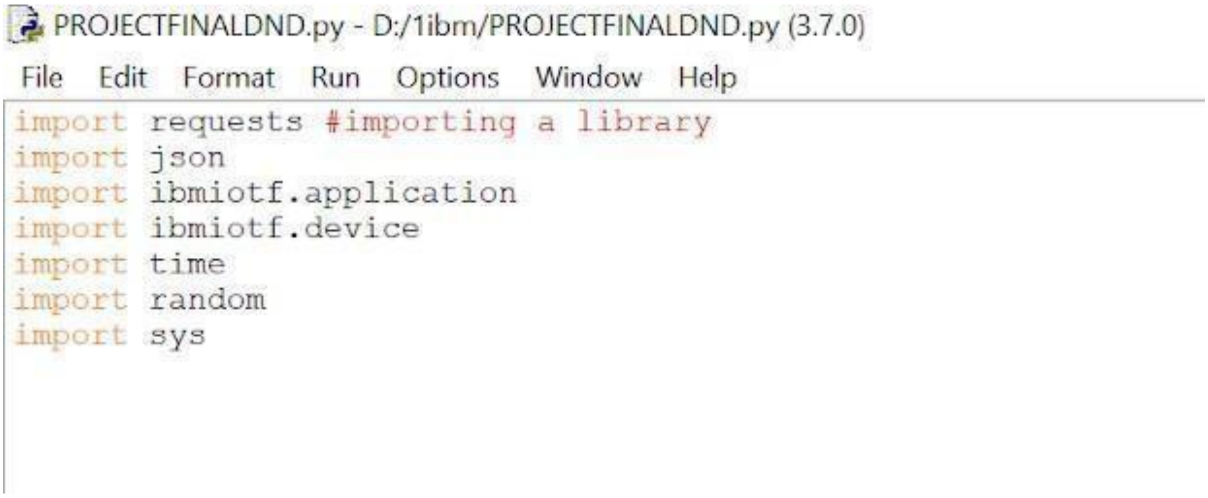


7. CODING & SOLUTIONING:

Code Explanation:

Libraries:

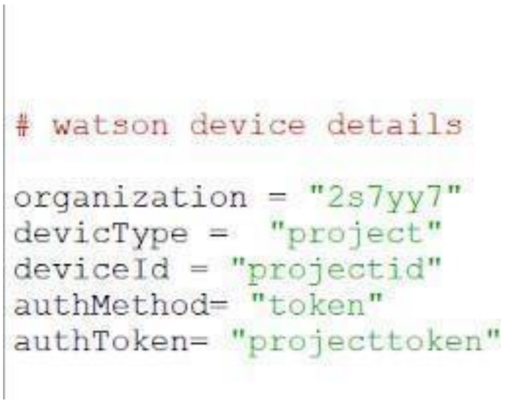
Including all libraries like json, random, time, sys, ibmiotf etc.



```
import requests #importing a library
import json
import ibmiotf.application
import ibmiotf.device
import time
import random
import sys
```

Credentials:

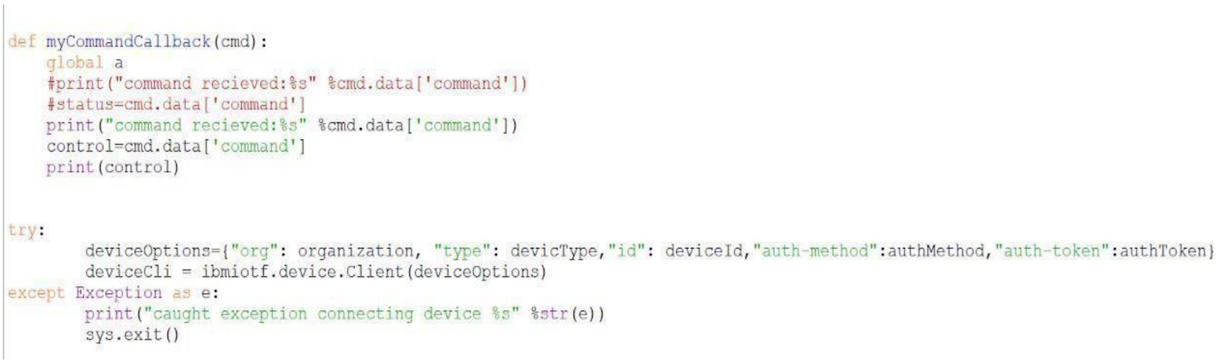
Entering all the credentials corresponding to IoT Watson device in order to publish data to it.



```
# watson device details

organization = "2s7yy7"
devicType =  "project"
deviceId = "projectid"
authMethod= "token"
authToken= "projecttoken"
```

MIT Inventor Interruption:

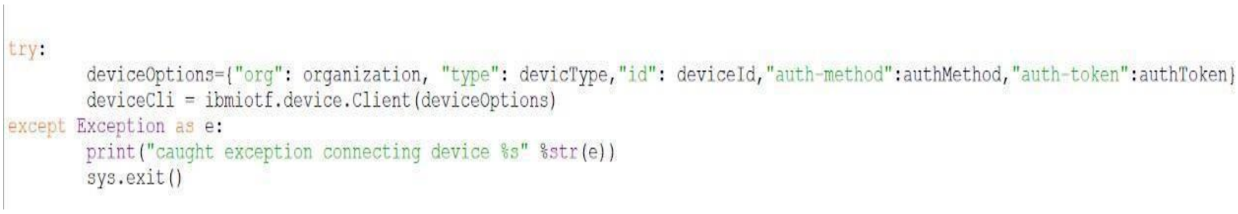
Receiving commands as inputs when buttons are pressed in MIT inventor in order to perform separate functions.



```
def myCommandCallback(cmd):
    global a
    #print("command recieved:%s" %cmd.data['command'])
    #status=cmd.data['command']
    print("command recieved:%s" %cmd.data['command'])
    control=cmd.data['command']
    print(control)


try:
        deviceOptions={"org": organization, "type": devicType,"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()
```

Exception Handling:

To handle exception if occurs while connecting with IBM IOT WATSON device

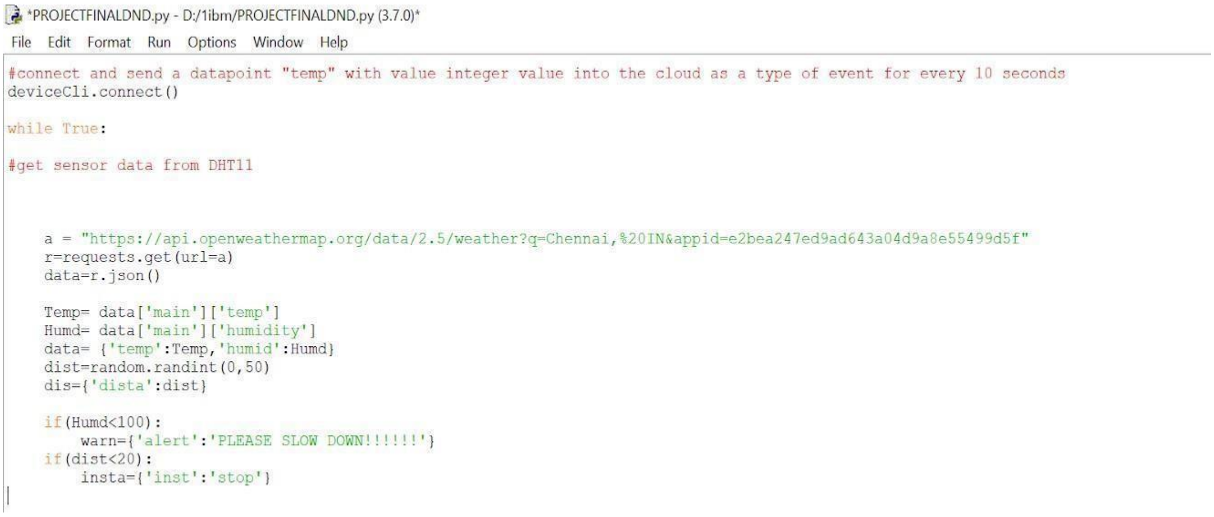


```
try:
        deviceOptions={"org": organization, "type": devicType,"id": deviceId,"auth-method":authMethod,"auth-token":authToken}
        deviceCli = ibmiotf.device.Client(deviceOptions)
except Exception as e:
        print("caught exception connecting device %s" %str(e))
        sys.exit()
```

Main Body:

- Connecting to IBM IoT device.
- Getting temperature and humidity values in json format from open weather map as inputs.
- Accessing the values using their corresponding keys.
- Generating random values for distance since hardware sensors are not implemented.
- Passing a warning “stating please slow down” when humidity is less than 100 in order to promote safe driving experience.

- Passing instruction when distance is less than 20 in order to avoid accidents and clashes.

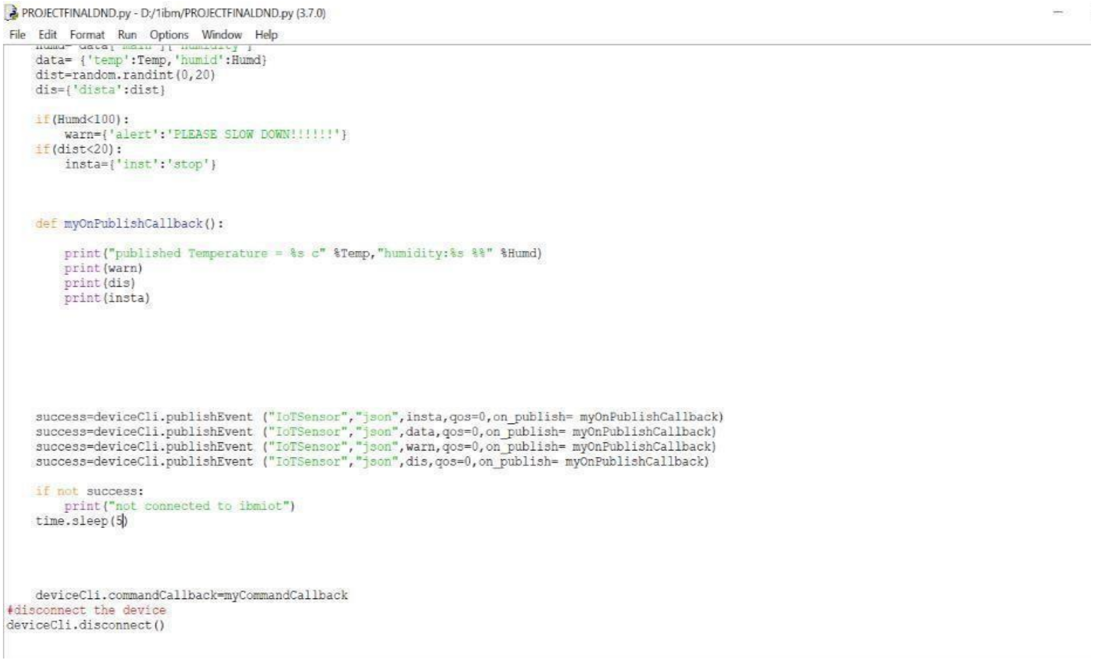

PROJECTFINALDND.py - D:/1ibm/PROJECTFINALDND.py (3.7.0)
File Edit Format Run Options Window Help

```
#connect and send a datapoint "temp" with value integer value into the cloud as a type of event for every 10 seconds
deviceCli.connect()

while True:

#get sensor data from DHT11



    a = "https://api.openweathermap.org/data/2.5/weather?q=Chennai,%20IN&appid=e2bea247ed9ad643a04d9a8e55499d5f"
    r=requests.get(url=a)
    data=r.json()

    Temp= data['main']['temp']
    Humd= data['main']['humidity']
    data= {'temp':Temp,'humid':Humd}
    dist=random.randint(0,50)
    dis={'dista':dist}

    if(Humd<100):
        warn={'alert':'PLEASE SLOW DOWN!!!!!!'}
    if(dist<20):
        insta={'inst':'stop'}
```

Publish Data To IBM IOT WATSON Platform:

Passing all the data(temperature, humidity, warning, instruction) to ibm iot watson.

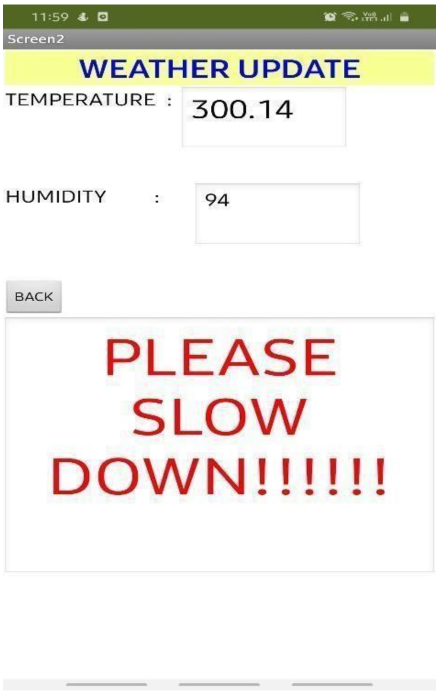
Disconnecting the connection established with IoT Watson device.


PROJECTFINALDND.py - D:/1ibm/PROJECTFINALDND.py (3.7.0)
File Edit Format Run Options Window Help

```
    data= {'temp':Temp,'humid':Humd}
    dist=random.randint(0,20)
    dis={'dista':dist}

    if(Humd<100):
        warn={'alert':'PLEASE SLOW DOWN!!!!!!'}
    if(dist<20):
        insta={'inst':'stop'}


    def myOnPublishCallback():

        print("published Temperature = %s c" %Temp,"humidity:%s %%" %Humd)
        print(warn)
        print(dis)
        print(insta)




    success=deviceCli.publishEvent ("IoTSensor","json",insta,qos=0,on_publish= myOnPublishCallback)
    success=deviceCli.publishEvent ("IoTSensor","json",data,qos=0,on_publish= myOnPublishCallback)
    success=deviceCli.publishEvent ("IoTSensor","json",warn,qos=0,on_publish= myOnPublishCallback)
    success=deviceCli.publishEvent ("IoTSensor","json",dis,qos=0,on_publish= myOnPublishCallback)

    if not success:
        print("not connected to ibmiot")
    time.sleep(5)



    deviceCli.commandCallback=myCommandCallback
#disconnect the device
deviceCli.disconnect()
```

7.1 **Feature 1:** WEATHER UPDATE AND CORRESPONDING COMMAND:

Getting temperature and humidity from Open Weather Map for a particular city and displaying warning regarding the speed when humidity is below 100.

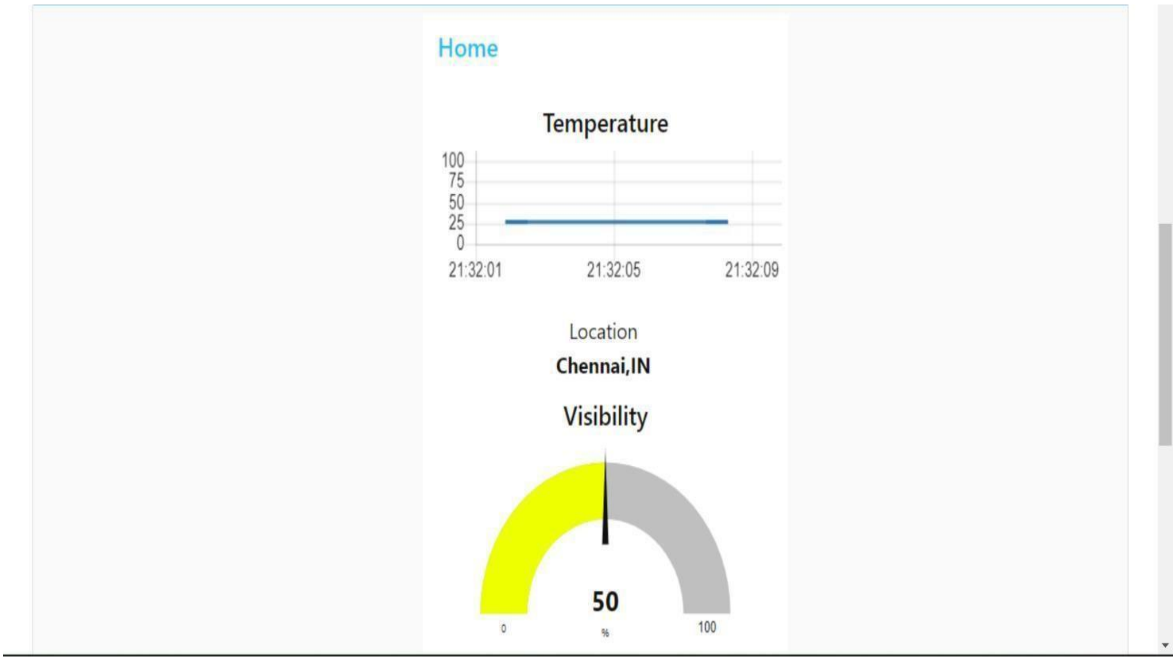


WEATHER UPDATE

TEMPERATURE : 300.14

HUMIDITY : 94

PLEASE SLOW DOWN!!!!!!



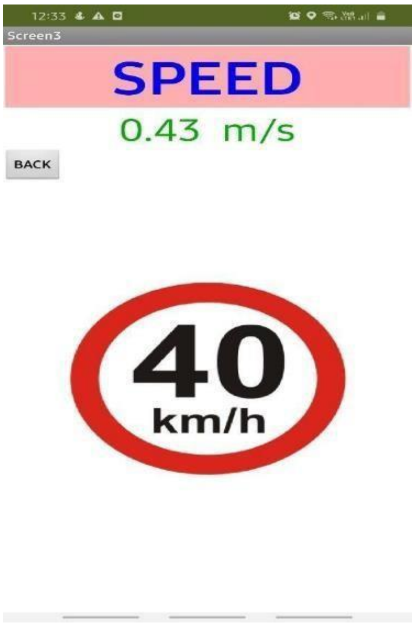
Location
Chennai,IN

7.2 **Feature 2:** SPEED DETECTION

- By implementing a location sensor in MIT APP INVENTOR, with changes in the location with respect to time, speed can easily be detected and displayed in the app to the user.

- This requires location settings from user’s phone to be active.

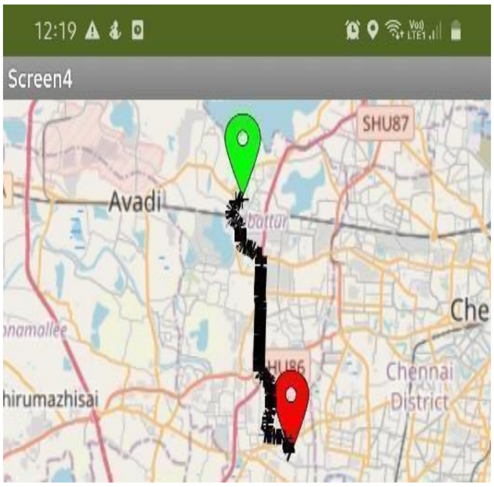
- An image of normal speed limit is also displayed which means that, travelling within that range would be safe.



7.3 **Feature 3:** MAP AND NAVIGATION

- By implementing same location sensor,current location can be detected. This also requires location settings in user’s phone to be active.

- By dragging the green marker to start location and red marker to the destination location to be reached and clicking on the navigate button, displays the street path that connects the start and end point specified.

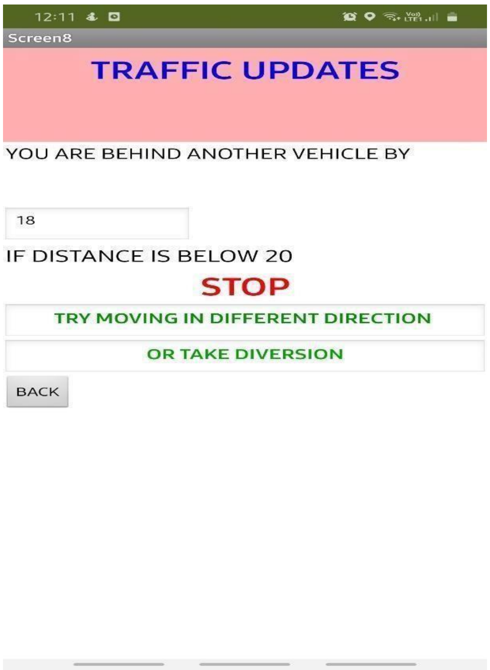


- In addition to this, it also displays the directions to be followed to reach the destination.

7.4 **Feature 4:** ZONAL CLASSIFICATION:

- Here, displays few sign boards indicating different zones like school zone, hospital zone, railway track etc. By clicking on the button below the sign displaysthe meaning and instruction to befollowed in the particular region.

- This provides the user with better understanding about the sign boards and to act accordingly.



TRAFFIC UPDATES

YOU ARE BEHIND ANOTHER VEHICLE BY

18

IF DISTANCE IS BELOW 20

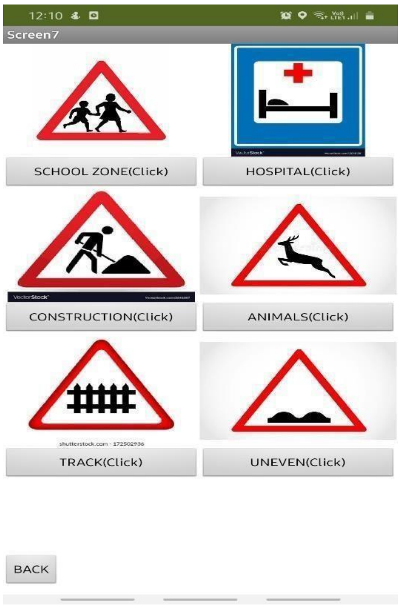
STOP

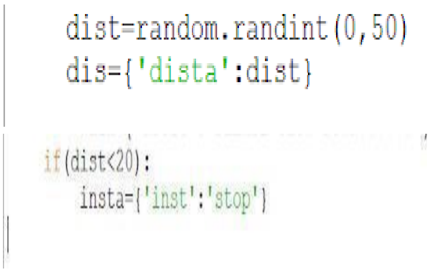
TRY MOVING IN DIFFERENT DIRECTION

OR TAKE DIVERSION

7.4 Feature 5: DETERMINING TRAFFIC:

- Since hardware sensors are not implemented, we have used random function to generate values for the distance between the user and the vehicle ahead.
- If the distance is below 20, it instructs the driver or the user to stop immediately and try moving forward with different direction or to take diversion.





```
dist=random.randint(0,50)
dis={'dista':dist}

if(dist<20):
    insta={'inst':'stop'}
```

8. TESTING

8.1 Test Cases

A test case documents strategy that will be used to verify and ensure that a product or system meets its design specification and other requirements. A test case is usually prepared by or with significant input from the engineer. This document describes the plans for testing the architectural prototype of System. In my Project the system has to be tested to get the Desired Output. I use different speed for testing the system.

8.2 User Acceptance Testing

In engineering and its various sub disciplines, acceptance testing is black-box testing performed on a system (e.g. software, lots of manufactured mechanical parts, or batches of chemical products) prior to its delivery. It is also known as functional testing, black-box testing, release acceptance, QA testing, application testing, confidence testing, final testing, validation testing, or factory acceptance testing.

In software development, acceptance testing by the system provider is often distinguished from acceptance testing by the customer (the user or client) prior to accepting transfer of ownership. In such environments, acceptance testing performed by the customer is known as user acceptance testing (UAT). This is also known as end-user testing, site (acceptance) testing, or field (acceptance) testing.

A smoke test is used as an acceptance test prior to introducing a build to the main testing process. Acceptance test cards are ideally created during sprint planning or iteration planning meeting, before development begins so that the developers have a clear idea of what to develop. Sometimes (due to bad planning!) acceptance tests may span multiple stories (that are not implemented in the same sprint) and there are different ways to test them out during actual sprints.

One popular technique is to mock external interfaces or data to mimick other stories which might not be played out during an iteration (as those stories may have been relatively lower business priority). A user story is not considered complete until the acceptance tests have passed.

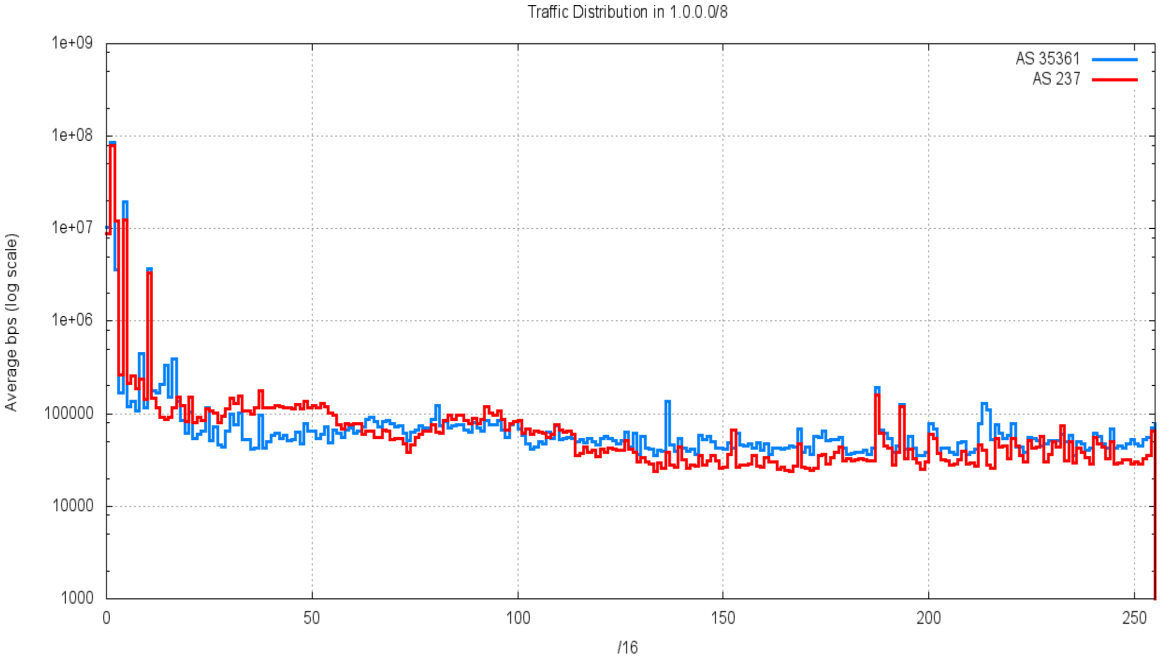
The acceptance test suite is run against the supplied input data or using an acceptance test script to direct the testers. Then the results obtained are compared with the expected results. If there is a correct match for every case, the test suite is said to pass. If not, the system may either be rejected or accepted on conditions previously agreed between the sponsor and the manufacturer.

The objective is to provide confidence that the delivered system meets the business requirements of both sponsors and users. The acceptance phase may also act as the final quality gateway, where any quality defects not previously detected may be uncovered.

In these testing procedures the project is given to the customer to test whether all requirements have been fulfilled and after the user is fully satisfied. The project is perfectly ready. If the user makes request for any change and if they found any errors those all errors has to be taken into consideration and to be correct it to make a project a perfect project.

9. Results:

9.1 performance matrics



10. ADVANTAGES:

- Signs with smart connectivity are an inexpensive and flexible medium that can help transmit information according to particular situation and entertain passengers.

- The digital signboards helps in reducing the air pollution due the emission of vehicles in heavy traffic area.

- The drivers can able to know about the weather condition and accordingly follow the speed limit displayed on the sign boards.

- The increased flexibility of these digital sign boards makes it easy for any private or government department to change the message as per the need of the hour.

- The driver can easily find the route and navigation instructions to reach the destination.

- The speed of the vehicle can be identified using location sensor.

- The digitals sign boards and the app are user-friendly.

DISADVANTAGES:

- The digital signboards involves high Installation Costs.

- Getting digital signboards up and running is a far more involved process than print media.

- If the people managing the screens are not graphic designers, it can be difficult to update the content regularly on the screen.

- The digital sign boards are still new and developing technology in the road safety sector.

- While digital sign boards require power and therefore can’t claim to be green, there is high energy use in the printing, erecting and replacement of traditional print media.

11. CONCLUSION:

Digital road signs are an important part of modern infrastructure and are becoming increasingly common. Digital road signs are becoming more common as technology improves and more states adopt them. The use of digital road signs is expected to continue to grow in the future as it would be observed user-friendly, economic, environment friendly, profitable promoting road safety. Digital road signs are designed to improve road safety and efficiency by providing real-time information to drivers. These signs can display a variety of information, including speed limits, traffic conditions, and weather warnings. Digital road signs can help drivers by providing information that is not always available from traditional signs.

12. FUTURE SCOPE:

One of the benefits of digital road signs is that they can be updated in real-time, which means that they can be used to provide motorists with up-to-the-minute information about conditions on the road ahead. This can be particularly useful in the case of accidents or other incidents that might cause delays. In the future, digital road signs could also be used to provide information about alternative routes that might be available in the event of a problem on the road. This could be particularly useful in the case of major incidents, such as road closures due to bad weather. Finally, digital road signs could be used to provide motorists with information about the best times to travel in order to avoid traffic congestion. This could be particularly useful in areas where there is a lot of traffic.

13. APPENDIX:

Source Code:

```
import requests #importing a library
import json
import ibmiotf.application
import ibmiotf.device
import time
import random
import sys
# watson device details
organization = "2s7yy7"
devicType = "project"
deviceId = "projectid"
authMethod= "token"
authToken= "projecttoken"
#generate random values for randomo variables (temperature&humidity)
def myCommandCallback(cmd):
global a
#print("command recieved:%s" %cmd.data['command'])
#status=cmd.data['command']
print("command recieved:%s" %cmd.data['command'])
```

```
control=cmd.data['command']
print(control)
try:
deviceOptions={"org": organization, "type": devicType,"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 "temp" with value integer value into the cloud as a type of
event for every 10 seconds
deviceCli.connect()
while True:
#get sensor data from DHT11
a = "https://api.openweathermap.org/data/2.5/weather?q=Chennai,%20IN&appid=e2bea247ed9ad643a04d9a8e55499d5f"
r=requests.get(url=a)
data=r.json()
Temp= data['main']['temp']
Humd= data['main']['humidity']
data= {'temp':Temp,'humid':Humd}
```

```
dist=random.randint(0,20)
dis={'dista':dist}
if(Humd<100):
warn={'alert':'PLEASE SLOW DOWN!!!!!!'}
if(dist<20):
insta={'inst':'stop'}
def myOnPublishCallback():
print("published Temperature = %s c" %Temp,"humidity:%s %%" %Humd)
print(warn)
print(dis)
print(insta)
success=deviceCli.publishEvent ("IoTSensor","json",insta,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",data,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",warn,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",dis,qos=0,on_publish=
myOnPublishCallback)
if not success:
print("not connected to ibmiot")
time.sleep(5)
```

```
deviceCli.commandCallback=myCommandCallback

#disconnect the device

deviceCli.disconnect()
```

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-34360-1660234580.git