

IBM PROJECT

Signs with Smart Connectivity for Better Road Safety

Batch: B6-6M2E

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1. INTRODUCTION:

Project Overview:

The aim of the model is to prevent the collision of vehicles by using ultrasonic sensor interfaced with Arduino UNO. The ultrasonic system is used to calculate the distance between the vehicle and the obstacle, then the Arduino microcontroller is used to process the signal and to prevent collision using the auto speed reduction system. The proposed system comprises an idea of having safety while driving. By the study on ultrasonic sensor, we come to know that it uses the sonar waves to calculate the accurate distance between two objects. By using this feature of ultrasonic sensor, we can calculate the distance between vehicles or objects and process the signal to control the vehicle. We can also interface the buzzer or any responding system, that it signals the driver when vehicle reaching to the limited safe distance with another vehicle or object. By this signal the driver can manually reduce the speed by applying brake system.

Purpose:

The main purpose of this project, signs with smart connectivity for better road safety is to save time in times of high traffic and change directions when there is bad weather conditions for the project ,other extra idea can also be added like speed sensors, for checking the speed of the vehicles .passenger counter for counting the number of passenger in a vehicle This project is wireless, costefficient and easy to install .

2. LITERATURE SURVEY:

Existing Problem:

There are a lot of problems that drivers face while driving in highways cause of bad weather condition lead to accidents, Tree's falling which halts traffic and time is wasted. There are a lot of vehicles which are driven far past the speed limit which cause accidents so to speed sensors are placed to alert authorities about over speeding a lot of other ideas can be added according to problems that arises

1. Internet-of-Things-Based Smart Transportation Systems for Safer Roads:

From the beginning of civilizations, transportation has been one of the most important requirements for humans. Over the years, it has been evolved to modern transportation systems such as road, train, an air transportation. With the development of technology, intelligent transportation systems have been enriched with Information and Communications Technology (ICT). Nowadays, smart city concept that integrates ICT and Internet-of-Things (IoT) have been appeared to optimize the efficiency of city operations and services. Recently, several IoT-based smart applications for smart cities have been developed.

2. Reliable Smart Road Signs:

In this paper, they propose a game theoretical adversarial intervention detection mechanism for reliable smart road signs. A future trend in intelligent transportation systems is “smart road signs” that incorporate smart codes (e.g., visible at infrared) on their surface to provide more detailed information to smart vehicles. Such smart codes make road sign classification problem aligned with communication settings more than conventional classification. This enables us to integrate well-established results in communication theory, e.g., error-correction methods, into road sign classification problem. Recently, vision-based road sign classification algorithms have been shown to be vulnerable against them.

3. Smart Road Accident Detection and communication System:

In this paper they proposed that, The number of fatal and disabling road accident are increasing day by day and is a real public health challenge. Many times, in the road accidents, human lives will be lost due to delayed medical assistance. Hence road accident deaths are more prominent. There exist many accident prevention systems which can prevent the accidents to certain extent, but they do not have any facility to communicate to the relatives in case accident happens. In this paper, the authors made an attempt to develop a car accident detection and communication system which will inform the relatives, nearest hospitals and police along with the location of the accident. In the last they concluded that, Smart Road accident and communication system has been developed. Experiments have been conducted by implementing the system in a toy car. It is observed that the system is working properly. The system sends the message to the stored emergency numbers successfully when the car is collided and toppled or tilted by more than 30 degrees and if the reset button is not pressed in the stipulated time interval. Future scope: An android app can be developed for this in which instead of just receiving the co-ordinates of the location, it can be exactly pin pointed on the map. The heart rate can also be continuously at the services.

References:

<https://www.pantechsolutions.net/smart-connected-signs-for-improved-road>

<https://ieeexplore.ieee.org/document/6798327?tp=&signout=success>

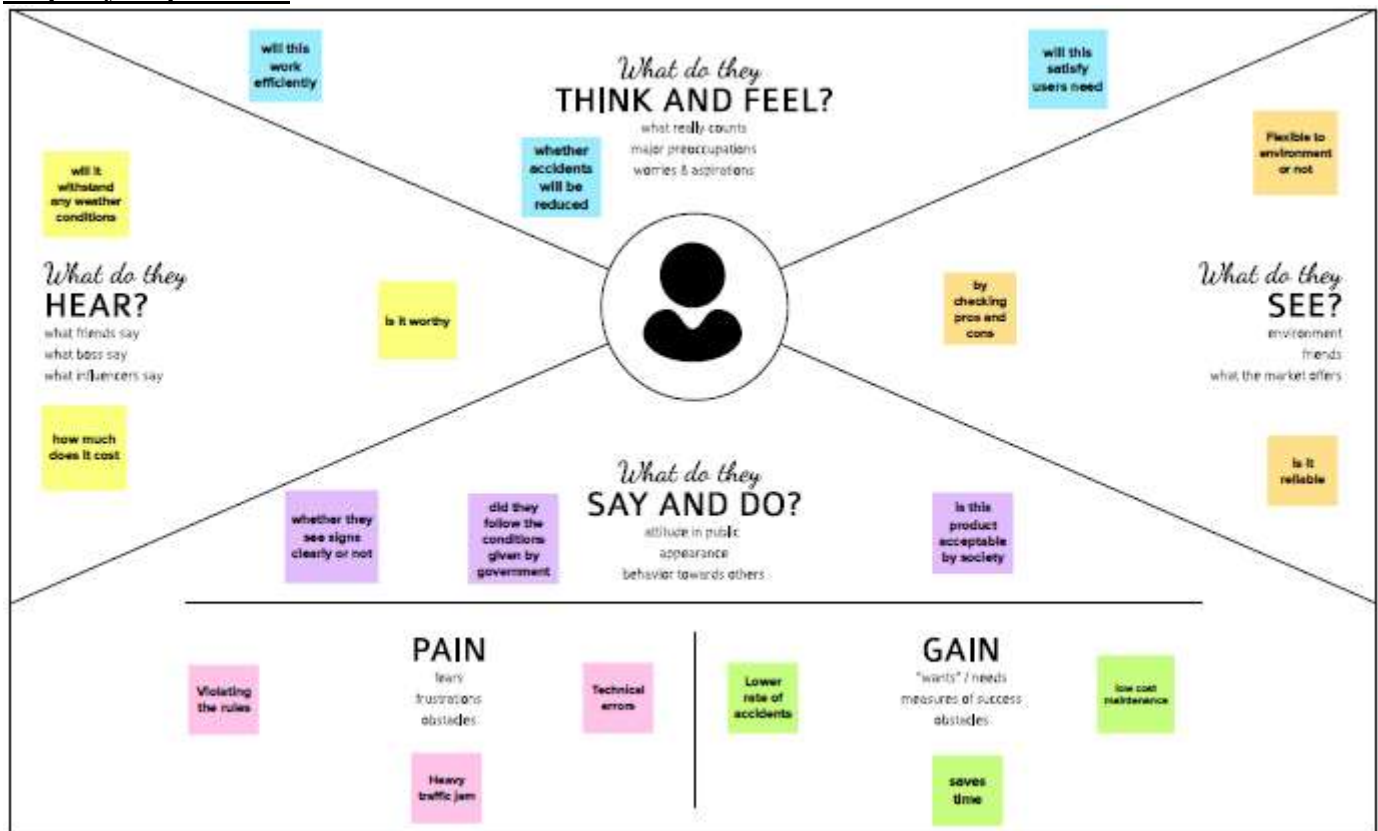
https://www.researchgate.net/publication/269310261_Smart_vehicle_connectivity_for_safety_applications

Problem statement definition:

The avenue symptoms and velocity restrict these days are static so occasionally when there is intense weather condition it's miles very taught for the riders to look the speed restriction and instruction .This task may be very beneficial for the riders purpose when there may be excessive site visitor appropriate virtual symptoms can be shown to alternate the direction .Where there's rainfall the roads get very slippery which may additionally lead to quite few accidents so that you could prevent them technology can be used.

3.IDEATION & PROPOSED SOLUTION

Empathy Map Canvas:



Ideation & Brainstorming:

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 icon to switch to sketch icon to start drawing!

Saranya.B

indicating instructions if schools or hospitals near to the road

showing safety measures during travelling, for example: seatbelts, etc...

indicating about road conditions

educating about various traffic signs

showing instructions and educating about Lane Discipline

showing details about weather conditions like temperature and humidity values

indicating traffic details to save peoples time

Animals crossing detections

Santhya.P

indicating speed limits in different road structures

indication of four way junction

showing details in terms of emergency situations

indication of railway roads

Karjaraman.R

Showing smart signs during taking turns in hilly regions or in highway roads

water level indication in underground roads during rainy season

Limiting the speed of vehicle in hill region when fog is high

Introducing a beep or sound system in signs for blind people

Indicating the roaming wild animals in forest roads

signalling to avoid accidents in connection of service road and bypass road

Indication of vehicle entry from normal road to highway

sign indications in digital mode

Santhya.S

Overtake indication

sign indication if vehicles are slower than railway bridges

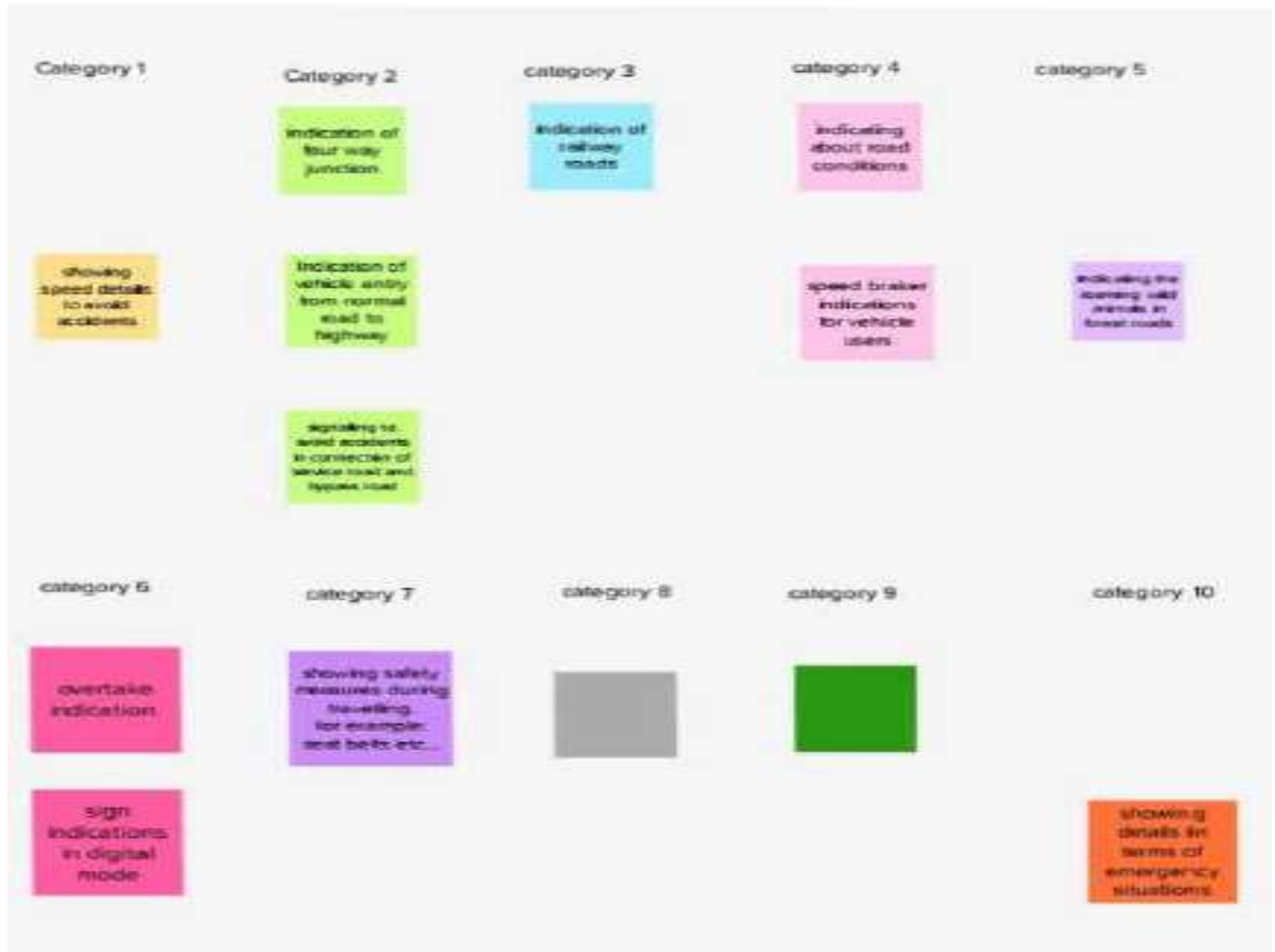
speed brake indications for vehicle users

showing speed details to avoid accidents

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 can break it up into smaller sub-groups.

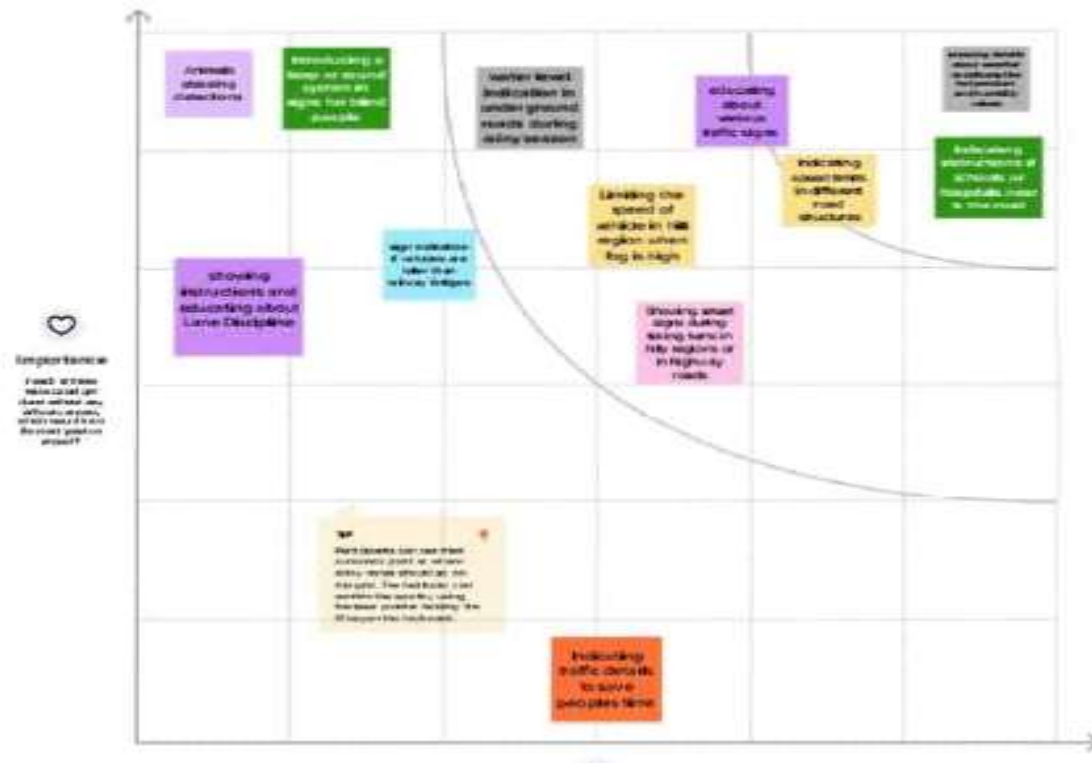
🕒 20 minutes



Prioritize

Your team should agree 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



Proposed Solution:

| S.No. | Parameter | Description |
|-------|--|--|
| 1. | Problem Statement (Problem to be solved) | Project - Signs with Smart Connectivity for Better Road Safety is used to educate the drivers digitally using IOT who do not have knowledge about traffic signs and weather indication for the drivers and passengers convenience. |
| 2. | Idea / Solution description | Replacing the man made painted signs into digital as well as their name which is more visible compared to current signs and also indicating weather in the same sign boards for driver where weather is not predictable. |
| 3. | Novelty / Uniqueness | Weather indication on sign boards is unique which will help mostly the two wheelers from unfortunate heavy rains and winds. Digital traffic signs also educates the drivers to follow traffic rules easily. |
| 4. | Social Impact / Customer Satisfaction | It makes the people to know about traffic signs if they don't know ,it shows signs digitally to avoid the accidents and weather indication based on IOT to avoid accidents and it helps mostly for two wheeler passengers . |
| 5. | Business Model (Revenue Model) | This project can make revenue by selling many equipments to the government sector and also private sectors(educational &medical institutions).Maintain services are also taken by the company. |
| 6. | Scalability of the Solution | It makes the daily life of drivers and passengers better. The product can be scalable by adding new features to the product makes more revenue. |

Problem Solution Fit:

| | | | | |
|--|--|--|---|--|
| Define CS, fit into CC | 1. CUSTOMER SEGMENT(S) Who is your customer? i.e. working parents of 0-5 yrs kids <ol style="list-style-type: none"> 1. Passengers 2. This is useful for drivers those who are travelling in different road structures. | 6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available services <p>Customers no need to spend any money, power, network this project can with stand better than man made painted Connection. These project will available anytime until its gets damaged.</p> | 5. AVAILABLE SOLUTIONS 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 road signs <p>This project gives proper and clear understanding about traffic signs and day to day current weather conditions.</p> | Explore AS, differentiate |
| Focus on J&P, tap into BE, understand RC | 2. JOBS-TO-BE-DONE / PROBLEMS Which jobs to be done (or problems) do you address for your customers? There could be more than one; explore different sides. <ol style="list-style-type: none"> 1. It educates people about traffic signs who are travelling in roads 2. Showing different weather conditions and Most people are not following traffic conditions & not trying to have knowledge about various traffic signs. Indicating Temperature Values for passenger Convenience Back story: Most of the people forget to wear seat belts | 9. PROBLEM ROOT CAUSE 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 <p>The Digital signs educating the customers and the smart Weather condition detection, this helps the customer to address the problems and get job done. And using mobile phones during travelling due to this This type of behaviour it leads to major road accidents.</p> | 7. BEHAVIOUR What does your customer do to address the problem and get the job done? i.e. Steerly wheel, find the right solar panel installer, calculate usage and benefits; indirectly associated. Customers spend less time on volunteering work (i.e. Greenpeace) <p>The Digital signs educating the customers and the smart Weather condition detection, this helps the customer to</p> | Focus on J&P, tap into BE, understand RC |
| | 3. TRIGGERS What triggers customer to act? i.e. seeing their neighbor's car installing a keypad, realizing customer's inefficient solution in the street <ol style="list-style-type: none"> 1. Not every people have knowledge about various traffic signs as, it helps some people about the different traffic signs. 2. Conditions of the weather can't be predictable in some of the times as it shows temperature values to the people who are travelling in roads or highways. | 10. YOUR SOLUTION If you're working on an existing business, verify how your current solution fits, if it does not, and back to your sustainability. If you're working on a new business proposition, then map it to the sustainability curve and come up with a solution that fits within customer limitations, address problem in such a way that customer behaviour. Nowadays road signs and speed limits are static, road signs and speed limits can't be changed in some cases. If we replace static <p>Nowadays road signs and speed limits are static, road signs and speed limits can't be changed in some cases. If we replace static</p> | 8. CHANNELS OF BEHAVIOUR <ol style="list-style-type: none"> 8.1 ONLINE: What is the best way to communicate online? Extract the best channel from #? Customers can address their feedback through app or mail to get their job done. 8.2 OFFLINE: What is the best way to communicate offline? Extract the best channel from #? Customers can address their feedback through toll free number or text messaging. | |

4. REQUIREMENT ANALYSIS:

Functional Requirement:

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|--------|-------------------------------|---|
| FR-1 | User Visibility | Signs boards should be made with LED's which are bright colored 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 Understanding | For better understanding of the driver ,the signs should be big ,clear and legible and it can also include illustration which will make it easily understanding to the driver . |
| FR-3 | User Convenience | The display should be big enough that it should even be visible from far distance clearly. |

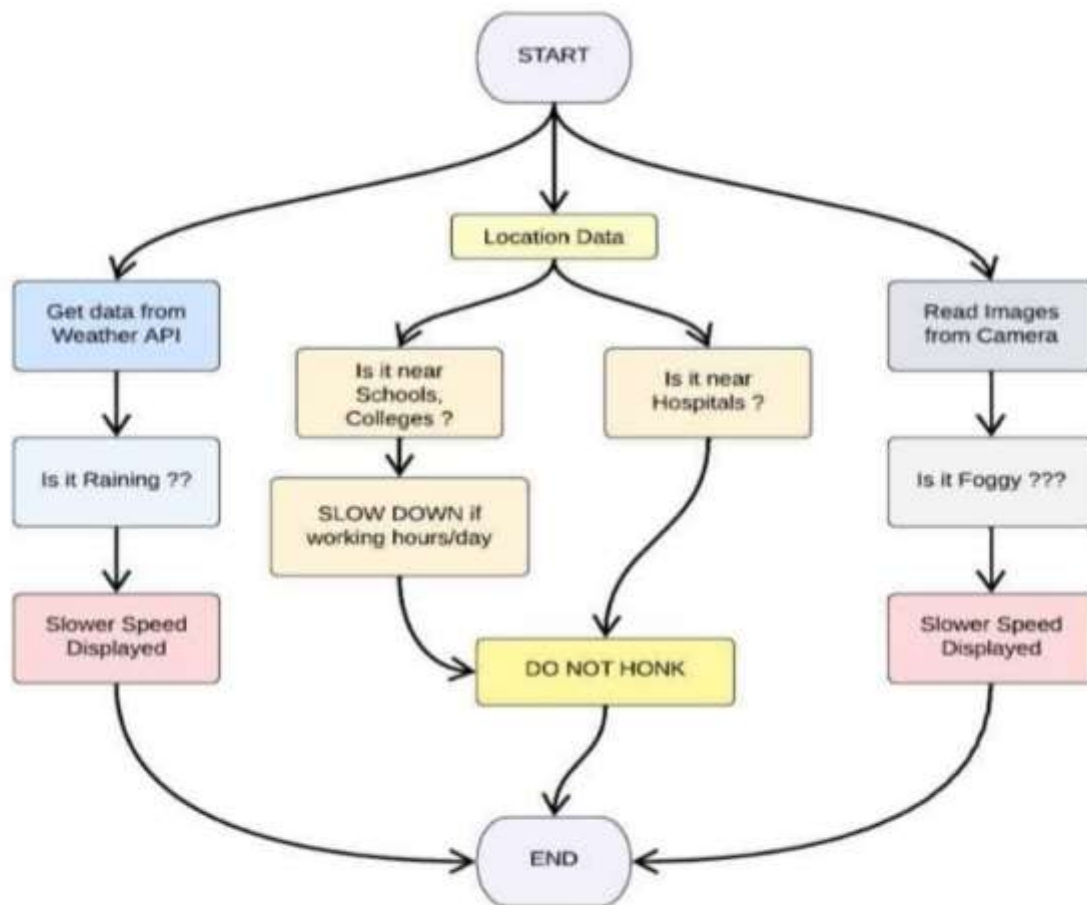
Non-Functional Requirement:

| FR No. | Non-Functional Requirement | Description |
|--------|----------------------------|--|
| NFR-1 | Usability | It should be able to upgrade when there is a need for it. |
| NFR-2 | Security | It should have good security so that no other person is able to hack and display their own directions. |
| NFR-3 | Reliability | It should be able to display to |

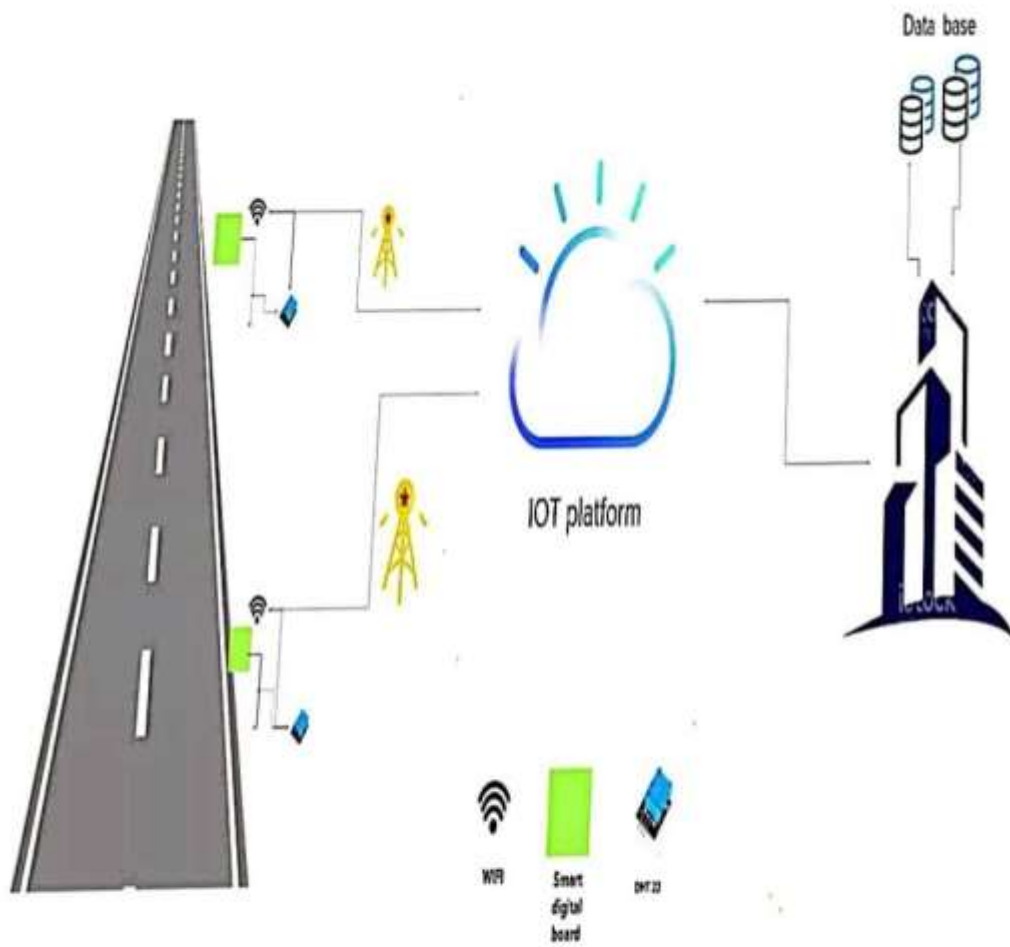
| | | |
|-------|--------------|--|
| | | information correctly and error-free. |
| NFR-4 | Performance | It should be able to automatically update itself when a certain weather or traffic problem occurs. |
| NFR-5 | Availability | It should be available 24/7 so that it can be beneficial to the customer i.e. the driver |
| NFR-6 | Scalability | It should be able to easily change and upgrade according to change and need in requirement |

5.PROJECT DESIGN:

Data flow diagrams:



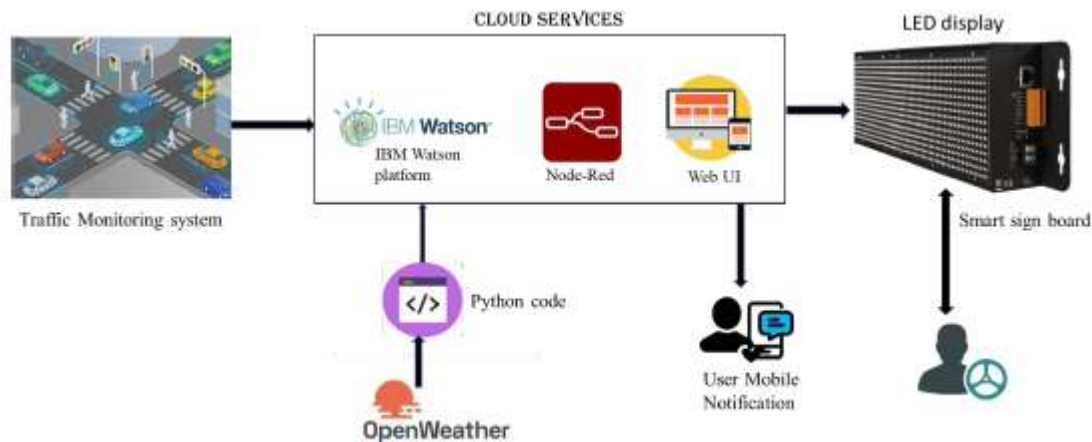
Solution & Technical Architecture:



TEMPLATE:



TECHNOLOGY ARCHITECTURE:



GUIDELINES:

- To replace the static signboards, smart connected signboards are used.
- These smart connected signboards get the speed limitations from a web app using weather API and update automatically.
- Based on the weather change, the speed may increase or decrease.
- Based on the traffic and fatal situation, 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.

Table-1: Components & Technologies:

| S.No | Component | Description | Technology |
|------|---------------------|---|--|
| 1. | User interface | How user interacts with application e.g. Web UI, Mobile App, Chatbot etc. | HTML, CSS, JavaScript/ AngularJs/ ReactJs etc. |
| 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, Configuration etc. | MySQL, NoSQL, etc. |

User stories:

| User Type | Functional Requirement (EPIC) | User Story Number | User Story/Task | Acceptance Criteria | Priority | Release |
|-----------|-------------------------------|-------------------|-----------------|---------------------|----------|---------|
| | | | | | | |

| | | | | | | |
|------------------------------|--------------|-------|--|--|--------|----------|
| Customer (Mobile user) | Registration | USN-1 | I can get my constraint utilizing application | I can get speed restriction | High | Sprint-1 |
| | | USN-2 | As a client entrol for the application by entering ,secret phrase and confirming my secret phrase | I can get my account/da shboard | Medium | Sprint-2 |
| | | USN-3 | As a client ,I can increment or diminishing my speed as indicated by the weather condition changes | I can get increment or decline my speed | High | Sprint-1 |
| | | USN-4 | As a client, | I can get to | Medium | Sprint-1 |

| | | | | | | |
|---------------------|---------------------------------|-------|---|---|--------|----------|
| | | | I could I at any point get my traffic and the lethal circumstances | my traffic ahead in my movement | | |
| | Login | USN-5 | As a client ,I can sign out from the dark climate map by entering email and secret key | I can get to the application through my Gmail login | High | Sprint-2 |
| Customer (web user) | Interface | USN-6 | As a client the connection point ought to be straight forward and effectively open | I can access thepoint of interaction Without any problem | High | Sprint-1 |
| Customer | Data generation | USN-7 | As a client utilize open application to access the information in regards to the weather conditions changes | I can to the information concerning climate through the application | High | Sprint-1 |
| | Problem solving/fault clearance | USN-8 | As an authority charge for | Authentication can screen the | Medium | Sprint-2 |

| | | | | | | |
|--|--|--|---|-------------------------------------|--|--|
| | | | the legitimate working of the signs sheets need to keep up with it occasional observing | sign sheets for legitimate working. | | |
|--|--|--|---|-------------------------------------|--|--|

6. PROJECT PLANNING AND SCHEDULING:

Sprint Planning & Estimation:

| Sprint | Functional Requirement(Epic) | UserStory/Task | StoryPoints | Priority | TeamMembers |
|----------|--------------------------------|--|-------------|----------|---|
| Sprint-1 | ResourcesInitialization | CreateandinitializeaccountsinvariouspublicAPIlikeOpenWeatherMapAPI. | 1 | LOW | Saranya Sandhya Santhiya Sakthikala Kariyaraman |
| Sprint-1 | LocalServer/SoftwareRun | WriteaPythonprogramthatoutputsresultsgiven the inputslikeweatherandlocation. | 1 | MEDIUM | Saranya Sandhya Santhiya Sakthikala Kariyaraman |
| Sprint-2 | Pushtheserver/softwareto cloud | PushthecodefromSprint1tocloudsoitcan be accessedfromanywhere | 2 | MEDIUM | Saranya Sandhya Santhiya Sakthikala Kariyaraman |
| Sprint-3 | Hardwareinitialization | Integratehardwaretoabletoaccess the cloudfunctionsandprovideinputstothesame. | 2 | HIGH | Saranya Sandhya Santhiya Sakthikala Kariyaraman |
| Sprint-4 | UI/UXOptimization& Debugging | Optimizealltheshortcomingsandprovidebetter userexperience. | 2 | LOW | Saranya Sandhya Santhiya Sakthikala |

Sprint Delivery Schedule:

Project Tracker ,Velocity & Burndown chart :(4 marks)

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint EndDate (planned) | Story Points Completed (as on Planned End Date) | Sprint Release Date (Actual) |
|----------|--------------------|----------|-------------------|--------------------------|---|------------------------------|
| Sprint-1 | 20 | 6Days | 24Oct2022 | 29Oct2022 | 20 | 29Oct2022 |
| Sprint-2 | 20 | 6Days | 31 Oct2022 | 05Nov2022 | 20 | 31Nov2022 |
| Sprint-3 | 20 | 6Days | 07Nov2022 | 12Nov2022 | 20 | 07Nov2022 |
| Sprint-4 | 20 | 6Days | 14Nov2022 | 19Nov2022 | 20 | 14Nov2022 |

VELOCITY:

Imagine we have a 10-day sprint duration ,and the velocity of the teams is 20(points per sprint).Let's calculate the team's average velocity(AV) per iteration unit (storypoints per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

Milestone and Activity List:

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|---|-------------------|--|--------------|----------|--|
| Sprint-1 | IDE | USN-1 | Installing all the softwares which is required like python IDE | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |
| Sprint-1 | Checking the simulation with conditions | USN-1 | Simulating the circuits and experimenting | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |

| | | | | | | |
|----------|-------------------------|-------|--|---|------|--|
| Sprint-2 | Software | USN-2 | - IBM Watson IoT - Node Red Integration | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |
| Sprint-2 | Software | USN-2 | Test the device and workflow. | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |
| Sprint-3 | Application Development | USN-3 | Using MIT App Inventor create an App | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |
| Sprint-3 | Testing | USN-3 | Testing the Application. | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |
| Sprint-4 | WEB UI | USN-4 | User Interface with the Software | 2 | High | Saranya Sandhiya Santhiya Sakthikala Kariyaraman |

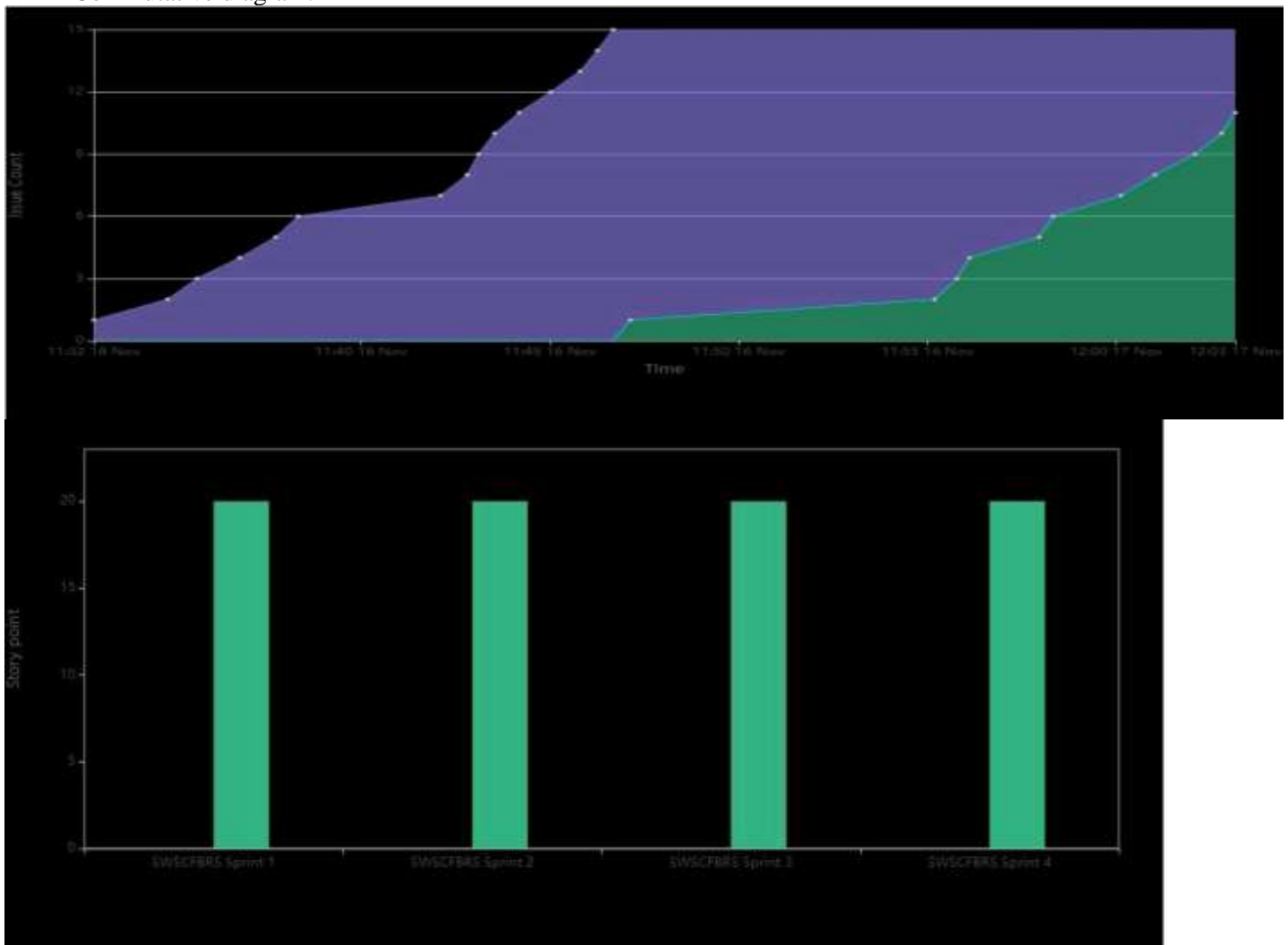
Reports From JIRA:

Burn down chart:

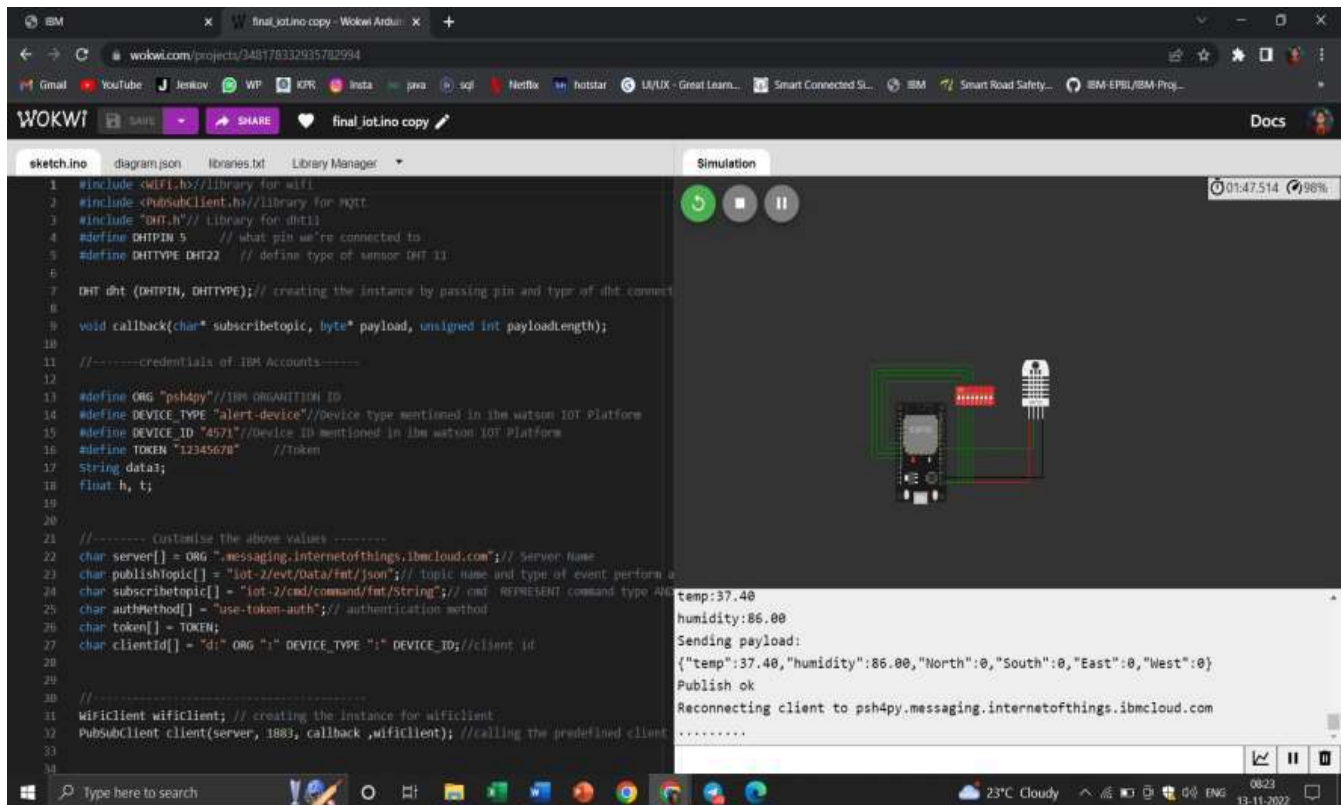


Reports from JIRA regarding sprint deliver

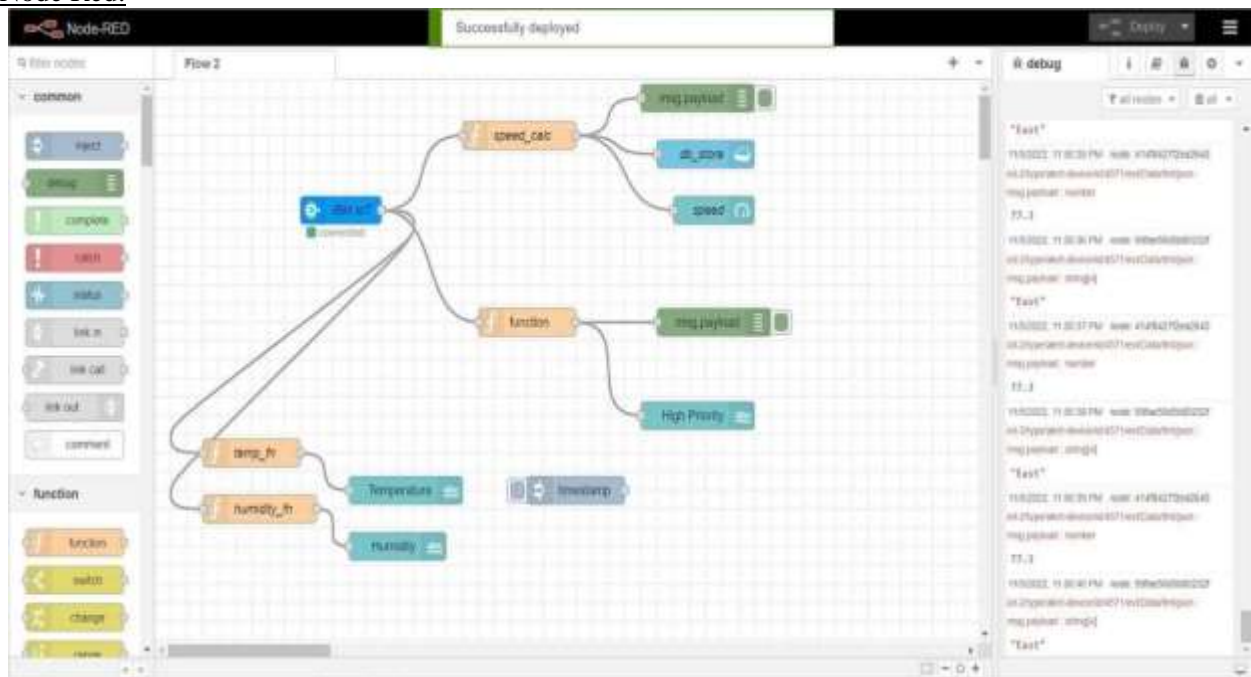
Commutative diagram:



7. CODING AND SOLUTIONING



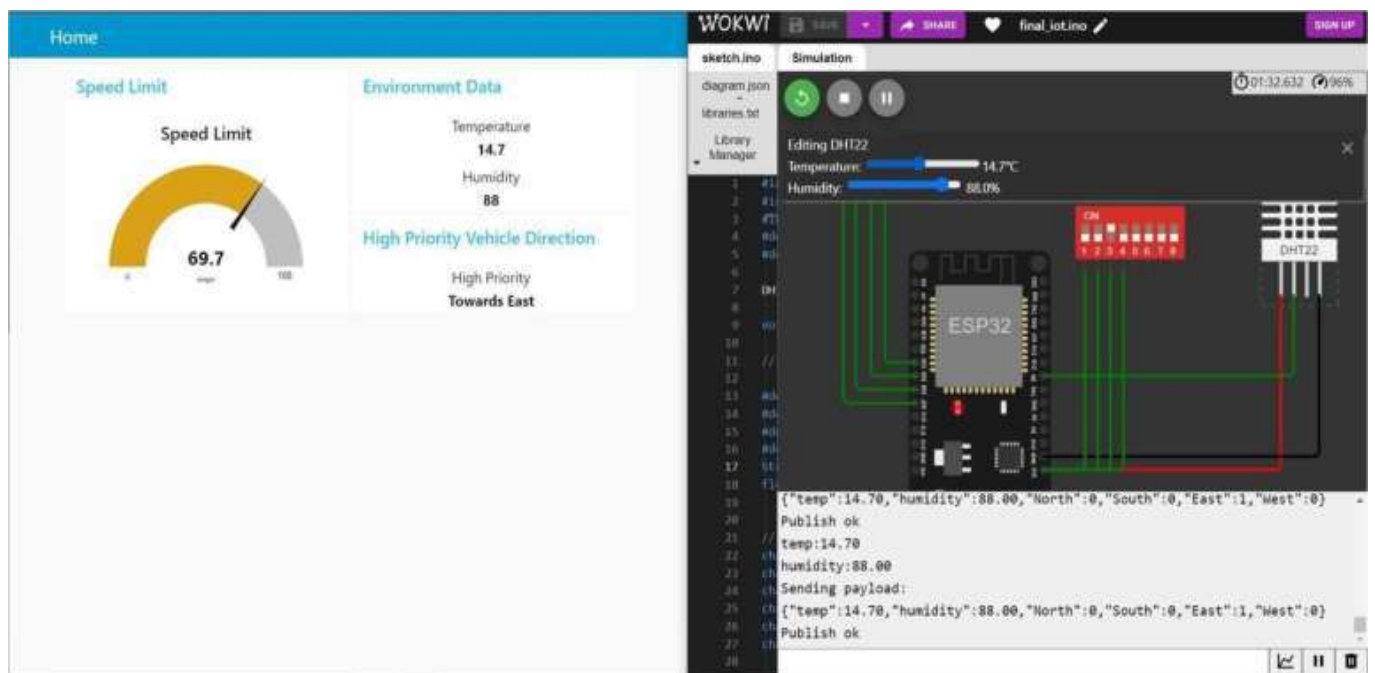
Node Red:



IOT Device-IOT platform:

| 4571 Connected alert-device 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 | |
| Data | ["temp":23.4,"humidity":63,"North":1,"South":0,... | json | a few seconds ago | |
| Data | ["temp":23.4,"humidity":63,"North":1,"South":0,... | json | a few seconds ago | |
| Data | ["temp":23.4,"humidity":63,"North":1,"South":0,... | json | a few seconds ago | |

Node Red Web UI:



Cloudant Database:

| _id | payload |
|---------------------------------|---------|
| 060cc88d44fa11288e9cd7d8a68a | 35 |
| 060cc88d44fa11288e9cd7d904e58 | 60 |
| 060cc88d44fa11288e9cd7d90c3f9 | 43.5 |
| 060cc88d44fa11288e9cd7d92a313 | 60 |
| 2314e7571ab59253a5e082f191b6c9c | 52.5 |
| 26939bf99e5c84ba4f6a20342a22ab2 | 35 |
| 26939bf99e5c84ba4f6a20342a7ccf5 | 44 |
| 3ffa1240575d0cd7f948833802a389 | 55 |
| 48a3abcf5f840464e09ed279d3c3451 | 53 |
| 48a3abcf5f840464e09ed279d3c5b7c | 53 |
| 48a3abcf5f840464e09ed279d3c9545 | 53 |
| 527306572c5f6a2d21f8aaab610dc8 | 55 |

Edit function node

Delete
Cancel
Done

Properties

Name: Shortest Lane Calculation

Setup
On Start
On Message
On Stop

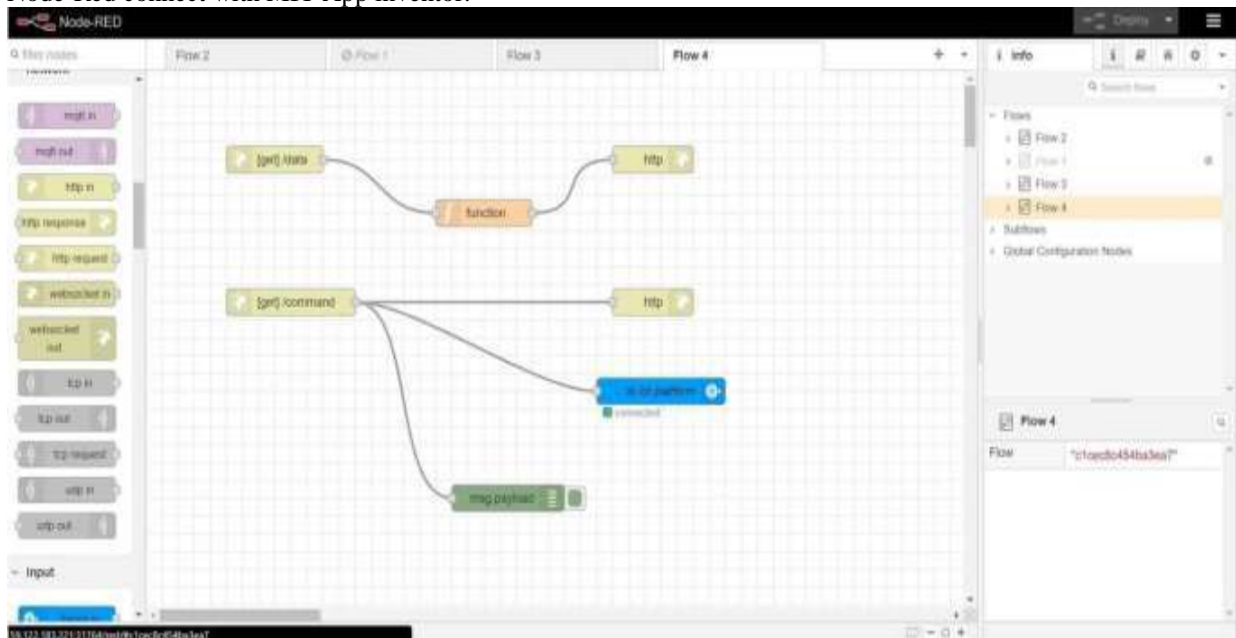
```

1 var l1 = msg.payload.lane_1;
2 var l2 = msg.payload.lane_2;
3 var l3 = msg.payload.lane_3;
4 var l4 = msg.payload.lane_4;
5
6 mini = Math.min(l1,l2,l3,l4);
7
8 res = "-";
9
10 switch(mini) {
11     case l1: res = "Lane 1"; break;
12     case l2: res = "Lane 2"; break;
13     case l3: res = "Lane 3"; break;
14     case l4: res = "Lane 4"; break;
15 }
16
17 msg.payload = res;
18
19 return msg;

```

Feature 2: (Python Output):

Node-Red connect with MIT App inventor:



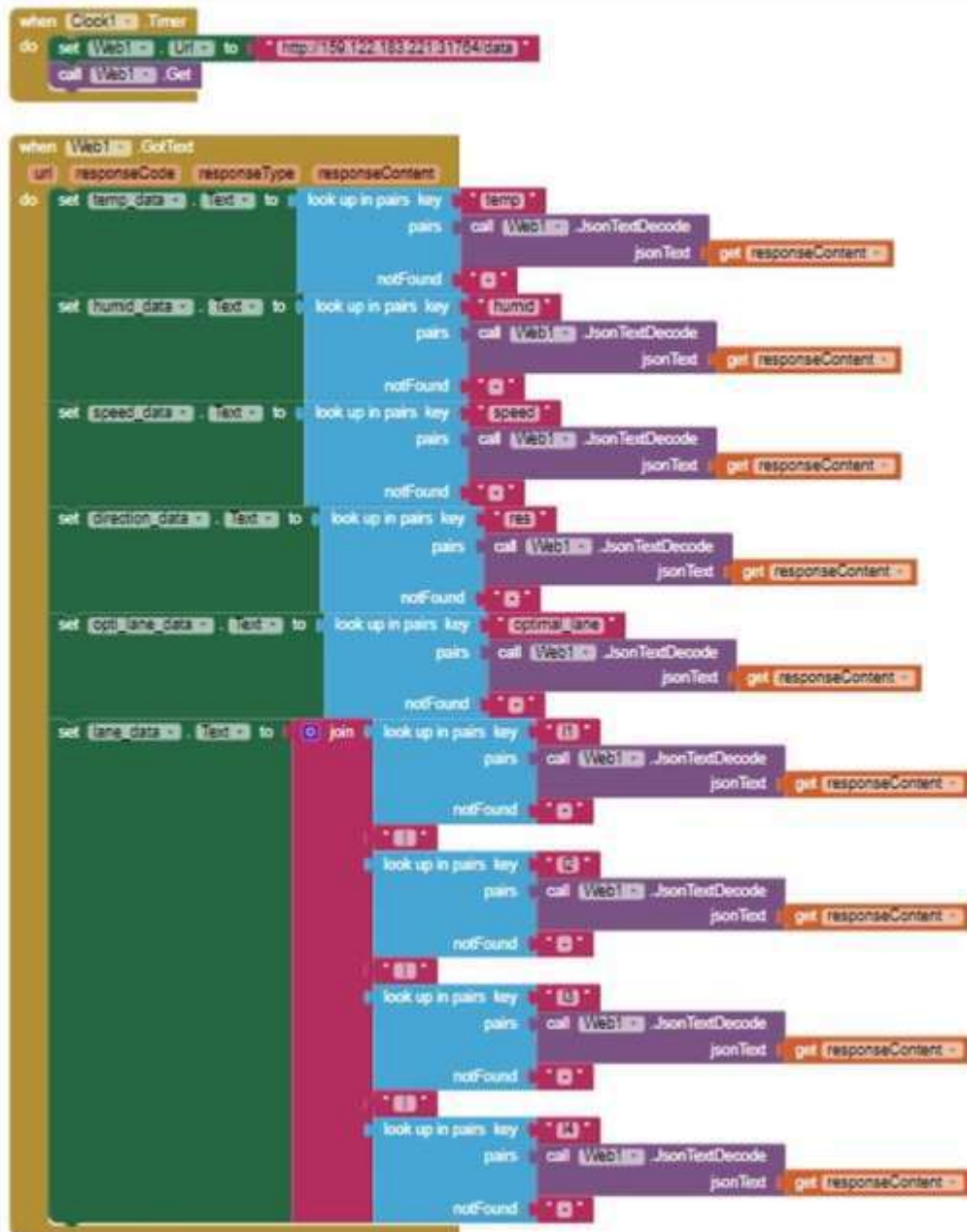
Output for Node Red:



MIT App inventor UI design:

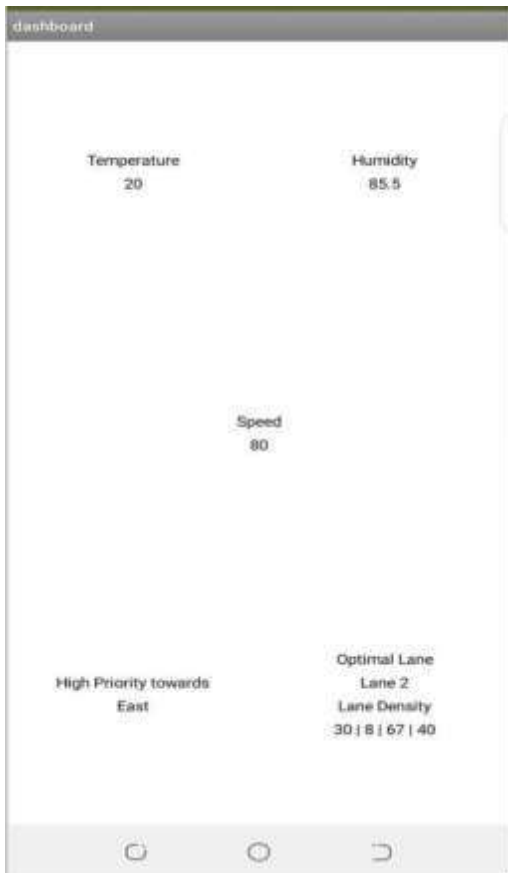


MIT App inventor Backend Design:



Sprint 3 delivery:

OUTPUT: Display for MIT App



Code for print the random temperature, Road signs, Speed limit, Message :
(RandomValues.py)

```
import wiotp.sdk.device
import time
import random
import ibmiotf.application
import ibmiotf.device
import requests, json
myConfig = {
    #Configuration
    "identity": {
        "orgId": "n6rl9n",
        "typeId": "NodeMCU",
        "deviceId": "621319106312"
    },
    #API Key
    "auth": {
        "token": "9876543210"
    }
}
#Receiving callbacks from IBM IOT platform
def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    m=cmd.data['command']
```

```

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
#OpenWeatherMap Credentials
BASE_URL = "https://api.openweathermap.org/data/2.5/weather?"
CITY = "Salem, IN"
URL = BASE_URL + "q=" + CITY + "&units=metric"+"&appid=" + "f58e4720c739a54c439aba9b05176839"
while True:
    response = requests.get(URL)
    if response.status_code == 200:
        data = response.json()
        main = data['main']
        temperature = main['temp']
        humidity = main['humidity']
        pressure = main['pressure']
        report = data['visibility']
        #messge part
        msg=random.randint(0,5)
        if msg==1:
            message="GO SLOW, SCHOOL ZONE AHEAD"
        elif msg==2:
            message="NEED HELP, POLICE STATION AHEAD"
        elif msg==3:
            message="EMERGENCY, HOSPITAL NEARBY"
        elif msg==4:
            message="DINE IN, RESTAURENT AVAILABLE"
        elif msg==5:
            message="PETROL BUNK NEARBY"
        else:
            message=""
        #Speed Limit part
        speed=random.randint(0,150)
        if speed>=100:
            speedMsg=" Limit Exceeded"
        elif speed>=60 and speed<100:
            speedMsg="Moderate"
        else:
            speedMsg="Slow"
        #Diversion part
        sign=random.randint(0,5)
        if sign==1:
            signMsg="Right Diversion"
        elif sign==2:
            signMsg="Speed Breaker"
        elif sign==3:
            signMsg="Left Diversion"
        elif sign==4:
            signmsg="U Turn"
        else:
            signMsg=""
        #Visibility
        if temperature < 24:
            visibility="Fog Ahead, Drive Slow"
        elif temperature < 20:
            visibility="Bad Weather"
        else:
            visibility="Clear Weather"
        else:

```

```

print("Error in the HTTP request")
myData={'Temperature':temperature, 'Message':message, 'Sign':signMsg, 'Speed':speedMsg,
'Visibility':visibility}
client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
#PUBLISHING TO IOT WATSON
print("Published data Successfully: ", myData)
print("
")
client.commandCallback = myCommandCallback
time.sleep(5)
client.disconnect()

```

Python Simulation :

```

import wiotp.sdk.device
import time
import random
import ibmiotf.application
import ibmiotf.device
import requests, json

myConfig = {
    #Configuration
    "identity": {
        "orgid": "n6rt9n",
        "typeid": "NodeMCU",
        "deviceid": "621319106312"
    },
    #API Key
    "auth": {
        "token": "9876543210"
    }
}

#Receiving callbacks from IBM IOT platform
def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data[command])
    m=cmd.data[command]

```

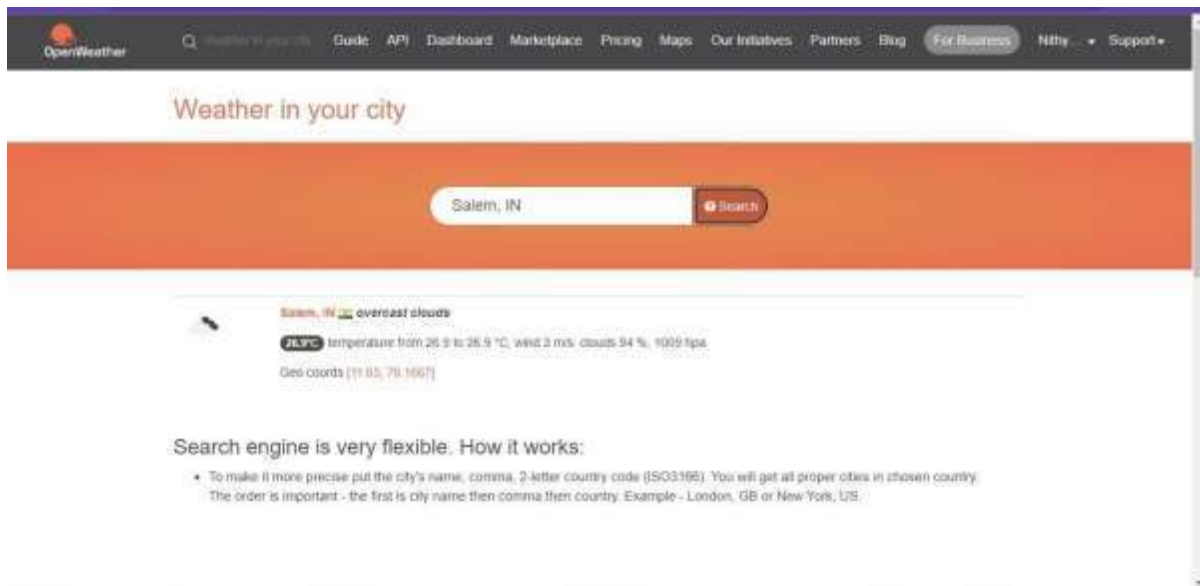
Import wiotp-sdk&ibmiotf:

```

C:\Users\paul\Pycharm> pip install wiotp-sdk
WARNING: pip is being invoked by an old script wrapper. This will fail in a future version of pip.
Please see https://github.com/pypa/pip/issues/5599 for advice on fixing the underlying issue.
To avoid this problem you can invoke Python with '-u pip' instead of running pip directly.
Installing wiotp-sdk
Collecting wiotp-sdk
  Downloading wiotp_sdk-0.1.0-py3-none-any.whl (3.0 kB)
Installing wiotp-sdk
Successfully installed wiotp-sdk-0.1.0
C:\Users\paul\Pycharm> pip install ibmiotf
WARNING: pip is being invoked by an old script wrapper. This will fail in a future version of pip.
Please see https://github.com/pypa/pip/issues/5599 for advice on fixing the underlying issue.
To avoid this problem you can invoke Python with '-u pip' instead of running pip directly.
Installing ibmiotf
Collecting ibmiotf
  Downloading ibmiotf-0.1.0-py3-none-any.whl (3.0 kB)
Installing ibmiotf
Successfully installed ibmiotf-0.1.0

```


OpenWeatherMap - (Ex., Salem, IN) :



Python IDLE Output :



8.TESTING

Test Cases

User Acceptance Testing

9.RESULTS

Performance Metrics

10.ADVANTAGES AND DISADVANTAGES

Advantages

- Monitor the Traffic
- Used to keep in check over speeding drivers
- Helps people to change direction when under a time constraint
- Ensure safety of drivers and passengers
- Helps in finding the number of passengers in a vehicle so as to maintain the convert limitfor passenger
- Helps in supervising the roads and catch criminals

Disadvantages:

- It times of complete shutdown , Inverts cannot be used for every single.
- Sometimes malfunctioning or even hacking can be done

11.CONCLUSION

Static signboards are not very efficient and cannot properly help the driversHence, this leads to accidents ,Time wastage and a lot problems .This project will be very helpful and it is a very necessary project which will reduce a whole lot of accidents and save lines this project can be used by the government to improve road safety

12.FUTURE SCOPE

As we know, the population of the world just become 8 billion so as the population grows the numbers of people in metropolitan cities increase which in turn leads to a lot of people using cars and roads .Hence ,roads should be safe for the people to use .the scope for this project will skyrocket in the coming years this project also is very flexible that is a lot of new ideas can be added to this base idea. This project has also be implemented in some part of India .it is only matter of time it is implemented everywhere.

13.APPENDIX

Source Code:

- [Python Code Final](#)

GitHub and Project Demo Link:

IBM -EPBL/IBM-Prject-41083-1660639241

Project demo link

