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SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY – IOT BASED

IBM NALAIYATHIRAN

Document Title

TITLE	Signs with smart connectivity for better road safety
DOMAIN NAME	INTERNET OF THINGS
TEAM ID	PNT2022TMID41262
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1.INTRODUCTION

1.1 Project Overview

For establishing better road safety the static signs are not sufficient for our current complex system of Road & transport. so these static boards are replaced with smart connected sign boards. these boards. These are capable of displaying speed limitations and other significant signs using Weather API. Instead of the Open-weather API we used the

random value generator in python Script to obtain the latitude and longitude values. The imported values will send to the Watson simulated and displayed in charts. At the end

1.2 Purpose

To provide better road safety and assist the roads and transport system we switched the smart connected sign boards .For establishing Adaptability to several environments such as Hospitals,Schools and other vital areas. Also we added some other displaying capabilities like speed limit for certain Weather and traffic conditions. This project will also improve the significance of the signage system
for the people.

2. LITERATURE SURVEY

2.1 **Existing problem**

paper 1

Internet-of-things-basedsmarttransportationsystemsforsaferroads

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,andairtransportation.Withthedevelopmentoftechnology, intelligenttransportationsystemshavebeenenrichedwithInformationandCommunications Technology(ICT).Nowadays,smart city concept that integratesICT and Internet-of-Things (IoT)have been appeared to optimize the efficiency of city operations and services.Recently, severalIoT-based smart applications for smart cities have been developed.Among these applications,smartservicesfortransportationarehighlyrequiredtoeasetheissuesespecially regardingtoroadsafety.Inthiscontext,thisstudypresentsaliteraturereviewthatelaborates theexistingIoT-basedsmarttransportationsystemsespeciallyintermsofroadsafety.In this way,thecurrentstateofIoT-basedsmarttransportationsystemsforsaferroadsareprovided. Then,thecurrentresearcheffortsundertakenbytheauthorstoprovideanIoT-based safe smart traffic system are briefly introduced.It is emphasized that road safety can be improved usingVehicle-to-Infrastructure(V2I)communicationtechnologiesviathecloud(Infrastructure to-Cloud–I2C).Therefore,itisbelievedthatthisstudyoffersusefulinformationtoresearchers fordevelopingsaferroadsinsmartcities

Paper 2

Improvedroadsafetythroughrapidincidentdetection

The motor way operator, SAPN, operates a 400 km network of inter urban and suburban motor ways in France, carrying traffic levels of up to 120,000 vehicles per day. This paper explores some of the variety of physical improvements and technology that SAPN has used to maximizeroadsafety.SAPNregularlyconductsreviewsofaccidentsandofthesafetyofits infrastructure,a process that has identified three specific situations as particularly problematic:ghost drivers who enter the motor way driving in the wrong direction or drivers who turn around at main line to ll stations in an attempt to avoid paying the to ll charge; spill back of queues at motor way exits onto the main roadway; and stopped vehicles in zones lacking a hard shoulder.The authors describe some of the solutions that SAPN is deploying to address these problems,including infrastructure design,modification of signals,reduction of speed limits,and improved signage.In addition,the SAPN ha implemented a number of measure storeduce the danger of such event s after they occur;these techniques are called FASTALERT,and are characterized by the rapid detection oft he problem and transmission of warning messages to drivers

paper 3

An empirical study of vehicle to infrastructure communications -An intense learning of smart infrastructure for safety and mobility

Vehicle-to-Infrastructure(V2I)communication is a communication framework for wireless sharing of data between vehicles. V2I connectivity is usually used in wireless technology as a bi-directional communication through a system of hardware, software and firm ware to support systems like lane signs,road signs and lighting systems.V2I provides abroad range of protection,mobility and environmental benefits by collecting and sharing so much of the data. Automobile vehicles that have long been a dream come true.It's time to build an effective and

safe autonomous vehicle that allows everyone to take part in this market.In order to make this revolution possible,the automotive eco system also needs to change.This will improve transport safety and quality and will fferi infotainment in new flexible systems.In this chapter,huge potential effort sare made to study the complete intensive in sightsofV2I with the detail of how V2I made a contribution to communication. Intheend, this chapter also highlights applications for V2I-driven wireless technology. The performance of theV2I involved in the study were evaluated by using different measures related to running time, data rate and resourcen management

paper 4

Development and testing of roads signs allot system using a smart mobile phone

Road traffic accident is a major problem world wide resulting insignificant morbidity and mortality.Advanced driver assistance systems are one of the salient features of intelligent systems in transportation.They improve vehicle safety by providin greal-time traffic information to the driver.Roadsign splay 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.However,static road signs are often seen too late for a driver to respond accordingly.In this study,asystem for alerting drivers about roadsigns has been developed and tested using a smartmobile phone.The study was carried out inTanzan ia along an 80km highway stretch from Arushato Moshitown.The Haver sine formula was used to measure and estimate the distance between two pairs of coordinates using the smartphone-based navigation application, GoogleMap.The application provides a voice alert to a needed action that enhances driver's attention.We propose an alternative method that identifies and modifies a specific class of energy in efficiencies. According to the experimental results, the proposed methodology has the benefits of high accuracy with in a user radius of 10 meters,minimum bandwidth,and low-cost application.Further more,the system application was secured by limiting access to the application program inter face key to avoid unauthorized access to sensitive information.

paper 5

Digitization of highways for vulnerable road safety development with intelligent IOT sensors

According to United Nations(UN)2030 agenda,the transportation system needs to be enhanced for the establishment of access to safe,affordable,accessible,and sustainable transport systems along with enhanced road safety.The highway road transport system is one of the transport systems that enables to transits goods and humans from one location to another location.The agenda of UN 2030 for the transport system will be accomplished with the assistance of digital technologies like the internet of things(IoT) and artificial intelligence(AI).The implementation of these digital technologies on highways empowers to provide reliable,smarter,intelligent, and renewable energy sources experience to the users travelling along the highways. This study discusses the significance of the digitization of highways that supporting and realizing a sustainable environment on the highways.To discuss the significance of digitalization,the study has categorized digitalization into five sub

components namely smart highway lighting system,smart traffic and emergency management system,renewable energy sources on highways,smart displayandAIin highways.An architecture-for smart highway lighting,smar traffic,and emergency management are proposed and discussed in the study.The significance of implementing smart display boards and renewable sources with real-time applications is also addressed in this study.Moreover,the integration of AIin highways Is addressed with the perspective of enhancing road safety.The integration of deep learning(DL) in the edge-based vision node for predicting the pattern softraffic flow,highwayroad safety,andmaintenance of quality roads have been addressed in the discussion section.Embedding the deeplearning techniques in the visonnode at the traffic junction and the highway lighting controller is able to deliver an intelligent system that provides sustained experience and management of the highways.Smart reflectors,adoption of renewable energy,developing vehicle-to-vehicle communication in vehicles,and smart lamp post are the few recommendations for the implementation of digitalizing highways .

paper 6

An Intelligent Real Time Road Sign System

This paper presents an intelligent road sign that provides real-time travel time and road conditions.The behavior of US Interstate94 was modelled,where the typical road through put was simulated and published to an MQTT broker for the embedded system to display the expected travel time to AnnArbor,Michigan from the US23 junction.The embedded system additionally sample digital temperature and humidity sensor tonote road conditions,where an external input allowed operators to provide areal time update when anunexpected event cause straffic(i.e.vehicle collision) or when the road has been cleared.System requirements , design, implementation details,and performance evaluation are included.

2.2 Reference

PAPER 1 - AUTHOR:mohammad derawi,yaserdalveren,FAcheikh Publishedon:2020 "Internet-of-things-basedsmarttransportationsystemsforsaferroad"

PAPER 2 -AUTHOR: ferre, Jerome CONFERENCE:50th world congress on intelligent transport system Published on:2008 "Improved road safety through rapid incident detection"

PAPER 3 -AUTHOR:Dhayakanthavel,skvsangeetha,KPKeerthana Publishedon:2021

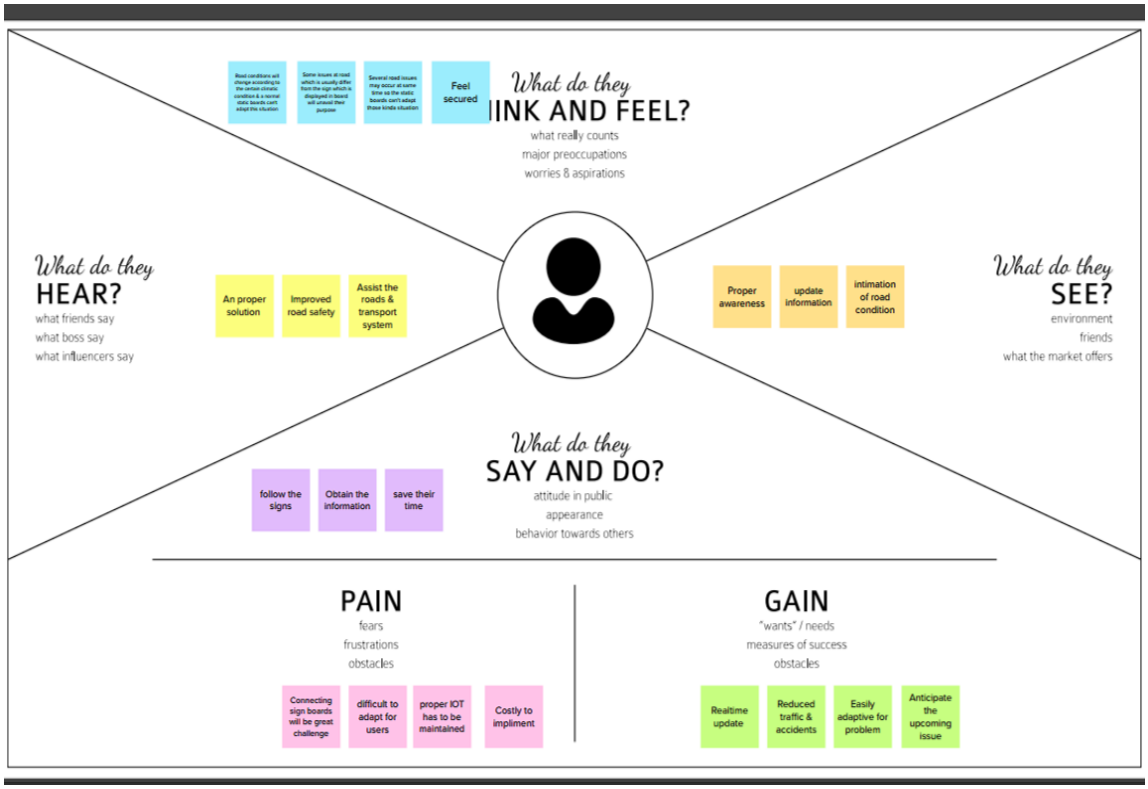
PAPER 4 - AUTHOR:EricM.masatu,ramadhany sinviandAnaelsam Publishedon:21,April,2020
"Anempirical study of vehicle to infrastructure communications-An intense learning of smart infrastructure for safety and mobility"

PAPER 5- AUTHOR:Rajesh Singh,Rohith Sharma,shahith vasheemakkram,PraveenKumar malikanddharambuddhi Published on:July,2021
"Development and testing of roads signs allot systemusingasmart mobile phone"

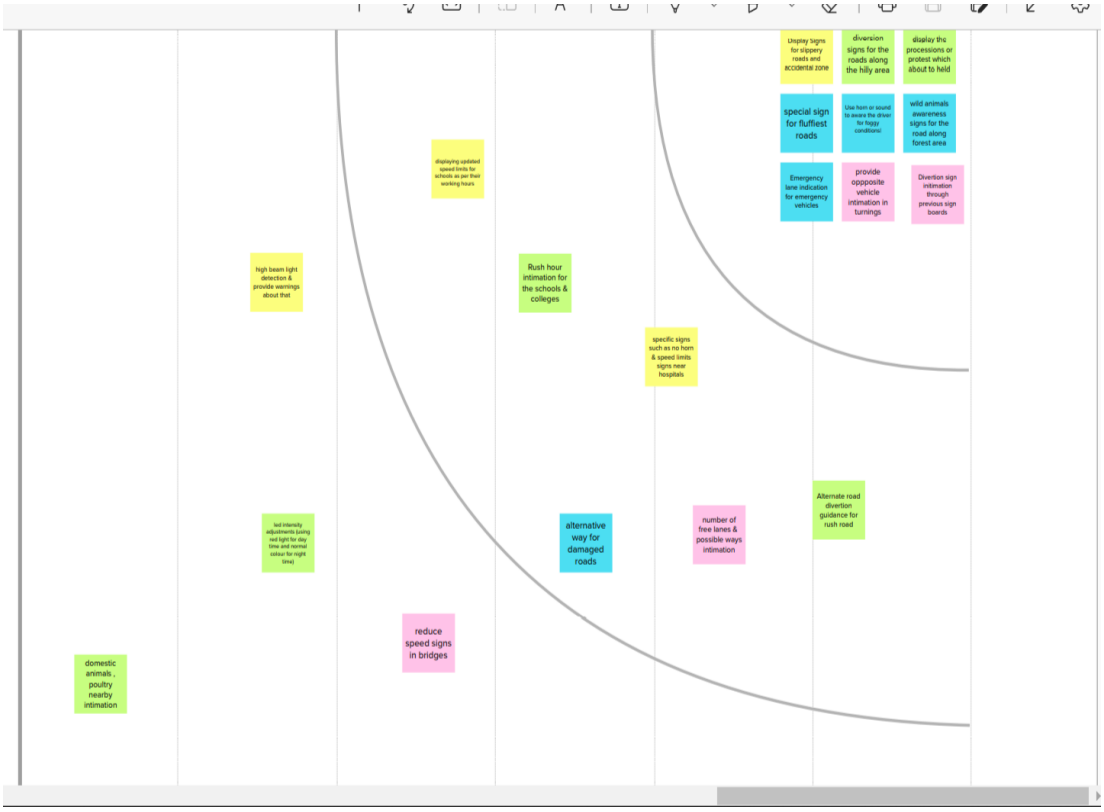
PAPER 6-AUTHOR:AdnanshaoutandAlihassini Publishedon:2019(atIEEE)
"An Intelligent Real Time Road Sign System"

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 IDEATION & BRAINSTORMING



3.3 **Proposed solution**

1.Problem statement(problem to be solved)

As the complexity to establish the road safety were increased so the proper necessary action should be taken to improve the road safety . so the need to switch the current static sign board to smart connected system. here comes the project signs with smart connectivity for better road safety
Signswithsmartconnectivityforbetterroadsafety.
ToreplacethestaticsignboarswithdigitalsmartconnectedsignboardswhichupdatestherealtimesignsfromtheweatherAPIautomatically..

2 Idea/ Solution description

Adaptive signage system as per the current weather and road conditions. This system will display speed limit based on the data provided by the OpenWeather API. Also display diversion signs based present Situation on the hospital and school roads.
Asmartandessentialupdationforstaticsignboardssystemsuchasproviderealtimespeedlimit,hazardsintimationbasedonweatherandcurrentroadconditions.

3 Novelty /Uniqueness

Unlikestaticsignboardsthesehavesomespecificfeaturessuchasdisplayspecialsignssuchasdiversion,highbeamindicationduringnighttime,signsforfluffiestroads&processionsorprotestheldwhichsigns.
Additionalfeaturessuchasgovernmentinformationaboutadds.*Someofsalientfeatureoftheseboardwasitisadaptablebycurrentenvironmentandmodecanbeselectedbyprovidedbuttons.

4 Social Impact /Customer satisfaction

Toimprovethesignificanceofsignboardsystemandcreatebetterawarenessaboutthemamongpeople.
Asthesignsaredisplayedbyrealtimeseriousissuesarereducedmainlyaccidents.

5 Bussiness Model(Revenue Model)

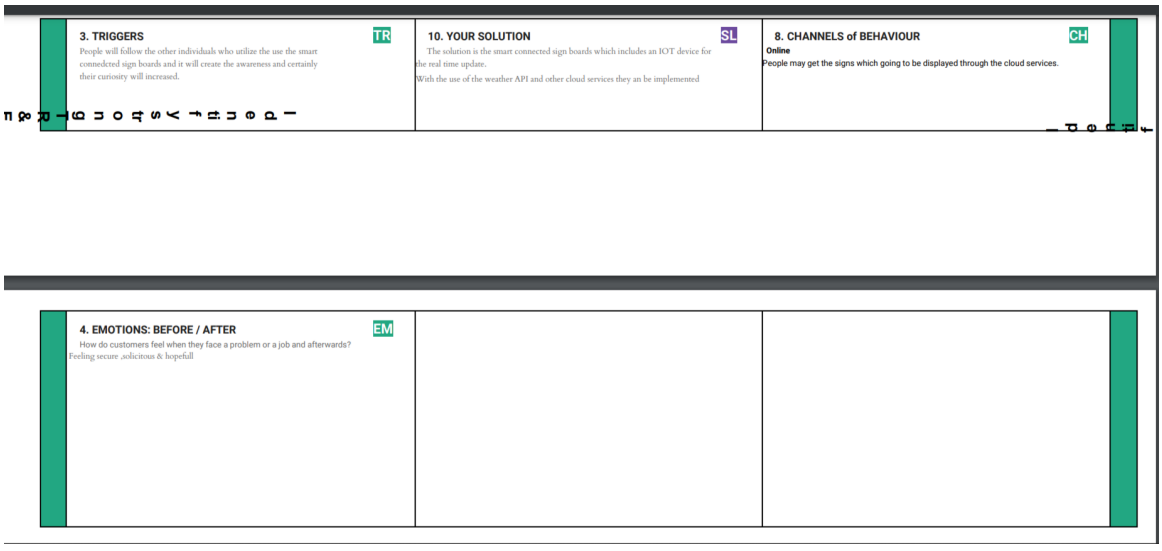
End users:
*NHAI
*Pedestrians
*Traffic police Thegovernmentcontractswiththesesignboardsincreasesthecurrentdemandonthem.

6 ScalabilityoftheSolution

Thesekindaboardsareadaptabletoanysituationandalsotoeveryconditions Implementationofthethesesignboardsleadstostandardizationinthecurrentsignboardssystem

3.4 Problem Solution Fit


Define CS, fit into CC
1. CUSTOMER SEGMENT(S)
NHAI
Pedestrians
Traffic police
Travellers
CS
6. CUSTOMER CONSTRAINTS
Lack of awareness about the signs and their purpose.
Limitations in the current system of sign boards .Some of special features are expectected such as realtime updates, updates as per the current condition of the road & And overall this should Dynamic for the problem statement.
5. AVAILABLE SOLUTIONS
The static sign boards are not enough essential function so we have to replace the current static boards.
In order to provide solution for those boards can be smartly coonected and digitalized.
An IOT device can implemented for the purpose of realtime update and weather update with help of cloud services.
Explore AS, differentia
Focus on J&P, tap into BE, understand RC
2. JOBS-TO-BE-DONE / PROBLEMS
Lack of essential features with the current sign board system.
Major accidents due to not implementing proper signs through sign sign boards.
Have to intimate the current road condition & provide speed limit as by above.
9. PROBLEM ROOT CAUSE
RC
Due to we cannot change the purpose of the static boards once they are implemented.
There are several abrupt road issues will arise & the sign boards should capable of adaptive to them.
7. BEHAVIOUR
BE
What does your customer do to address the problem and get the job done?
They just have to adapt to the updated smart connected boards And follow the rules they display.
The main thing is to done how they take action for the sign intimation.
Focus on J&P, tap into BE, understand RC


3. TRIGGERS
TR
People will follow the other individuals who utilize the use the smart connedcted sign boards and it will create the awareness and certainly their curiosity will increased.
10. YOUR SOLUTION
SL
The solution is the smart connected sign boards which includes an IOT device for the real time update.
With the use of the weather API and other cloud services they an be implemented
8. CHANNELS of BEHAVIOUR
CH
Online
People may get the signs which going to be displayed through the cloud services.
4. EMOTIONS: BEFORE / AFTER
EM
How do customers feel when they face a problem or a job and afterwards?
Feeling secure ,solicitous & hopefull

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution

1. LCD Display

An LCD display minimum size of 80” x 100”(inchesNominal size to current static board)

2. Weather API

Update the weather through the openweatherMap

3.Cloud connection

An proper network & cloud connection to the IOT device should provided from IBM cloud to obtain the information we designed.

4.cloud services

Requires some extra cloud services such as IBM Watson cloud plate form ,node Red and Web UI.

5.standard operators

This system should have the operators to perform this whole system maintenance

6.IOT

An IOT Device should adaptive to change the default sign if any information received from the cloud.

4.2 Non Functional Requirements

Following are the non-functional requirements of the proposed solution

1.Usability

The signs boards should be easier to implement & empathize.

2.Security

All this functions are related to Roads & transport department and so standard procedures are required

3.Reliability

Signs are updated by only real-time & less probability of technical errors.

4.Performance

Start-up time should be meagre (<10 sec)& easily recoverable after abrupt interruption

5.Availability

Capable of display information for the whole time

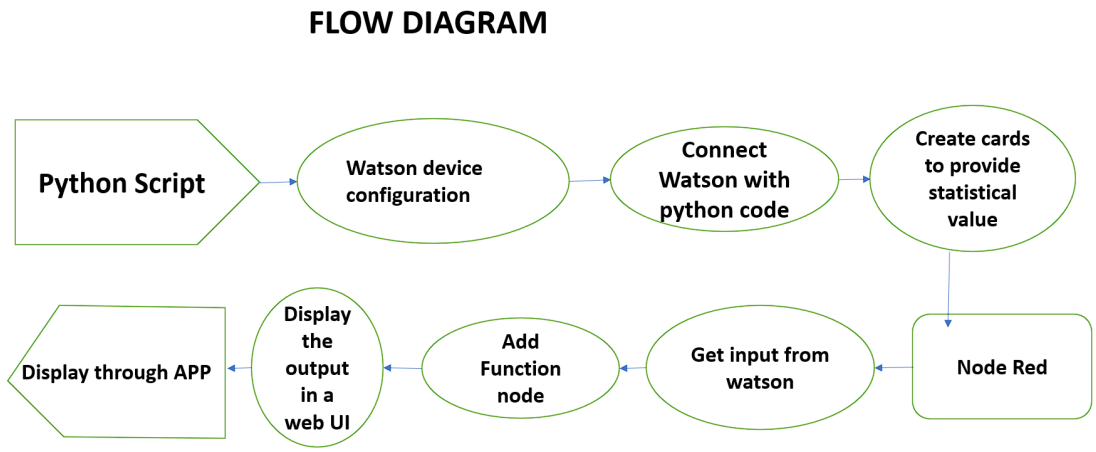
6.Scalability

Able to implement all over the place & must suitable to all kind of road condition

5 . PROJECT DESIGN

5.1 Data Flow Diagram

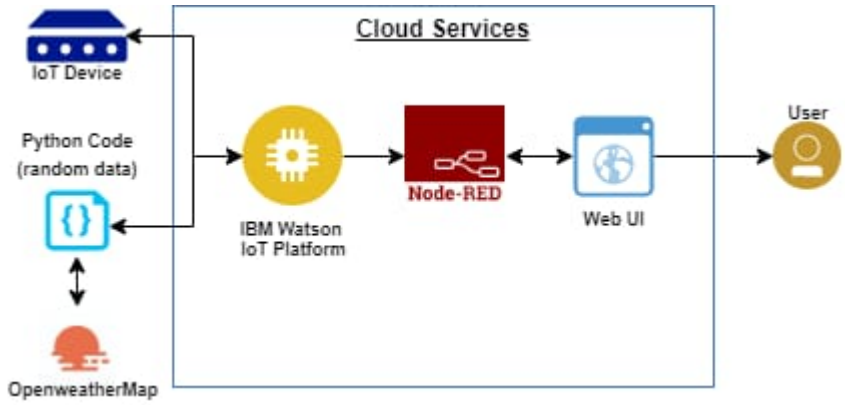
Data flow diagram



Summary

The above flow explains the process of the the project signs with smart connectivity for better road safety. The python code will generate the random values as well as check whether the conditions are true or not . the output of the code will connected and uploaded to the IBM Watson After that values are visualized by the Cards. Node Red is used to get the values from the cloud and required data are filtered using the Fuction Nodes which later can be given to the Web UI. Finally this Web UI URL will be displayed through our "Dynamic board" APP.

Technical Architecture



- The random values are generated by the python code Instead of getting the weather data from the API
- And this will fed into the IBM Watson cloud platform.
- After that the node Red will do some functional filtration the the data we obtain in the injecting Node.
- These values will displayed in the Web UI to the user.

Components and technologies

Table-1 : Components & Technologies:

S. No	Component	Description	Technology
1.	. User Interface	Dynamic board	Python script
2	WeatherAPI	condition for obtained weather	Python
3.	speed control for the vehicle	intimate speed for the specific road	IBM Watson
4.	IOT device	To receive the data	LCD display and sensors(only for mealtime implementation
5.	IBM cloud	To upload data to the cloud	IBM cloud ant
6.	cloud connection	Hardware	ESP32 wifi module or Raspberry pi 3 b(only for real time implementation)

S. no	Characteristics	Description	Technology
1	Security Implementations	For the safe and secure framework	end to end Encryption
2	scalability implementations	python architecture	Web UI,NODE red,IBM Watson and IOT platform
3	availability	Weather information availability	weather API
4	performance	Performance of the application	weather condition and network connectivity

5.3 User stories

User Type	**Functional Requirement (Epic)**	**User Story Number**	**User Story / TasK**	**Acceptance criteria**	**Priority**	**Release**
Customer (heavy truck drivers)	Weather of the area	USN-1	As a user, I want to know about weather	I can drive safely	High	Sprint-1
		USN-2	As a user, I will receive information about weather along the road while traveling	I can control my speed	High	Sprint-1
		USN-3	As a user, inform the weather of environment By dynamic board	I can change my route according to weather	High	Sprint-1
Customer(forest department)	Road condition in forest side	USN-1	As a user ,inform about road condition while Soil erosion	I can travel safely	Medium	Sprint-1

6. Project Planning & scheduling

6.1 Sprint Planning & estimation

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Weather of the area	USN-1	As a user, I want to know about weather	2	High	AjaySekar .C
Sprint-1	Weather of the area	USN-2	As a user, I will receive information about weather along the road while traveling	1	High	Aakash .A
Sprint-2	Weather of the area	USN-3	As a user, inform the weather of environment By dynamic board	2	Low	Dourmilkumar .G
Sprint-1	Road condition in forest sides	USN-4	As a user ,inform about road condition while Soil erosion	2	Medium	Dhivagar .k

6.2 sprint delivery schedule

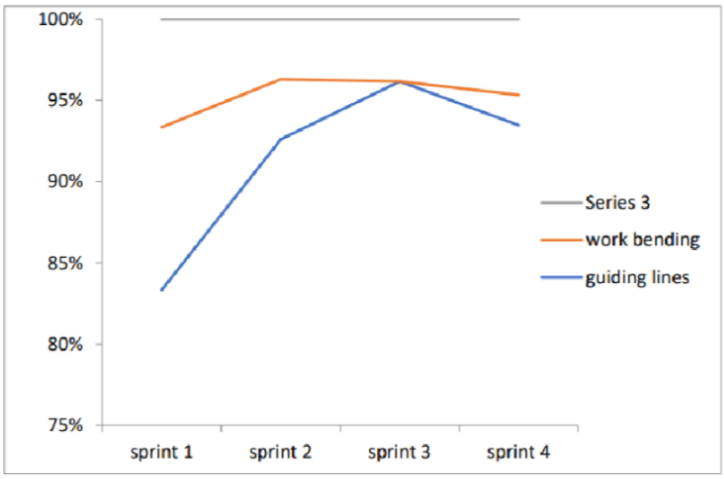
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	30	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	40	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	50	16 Nov 2022

velocity:

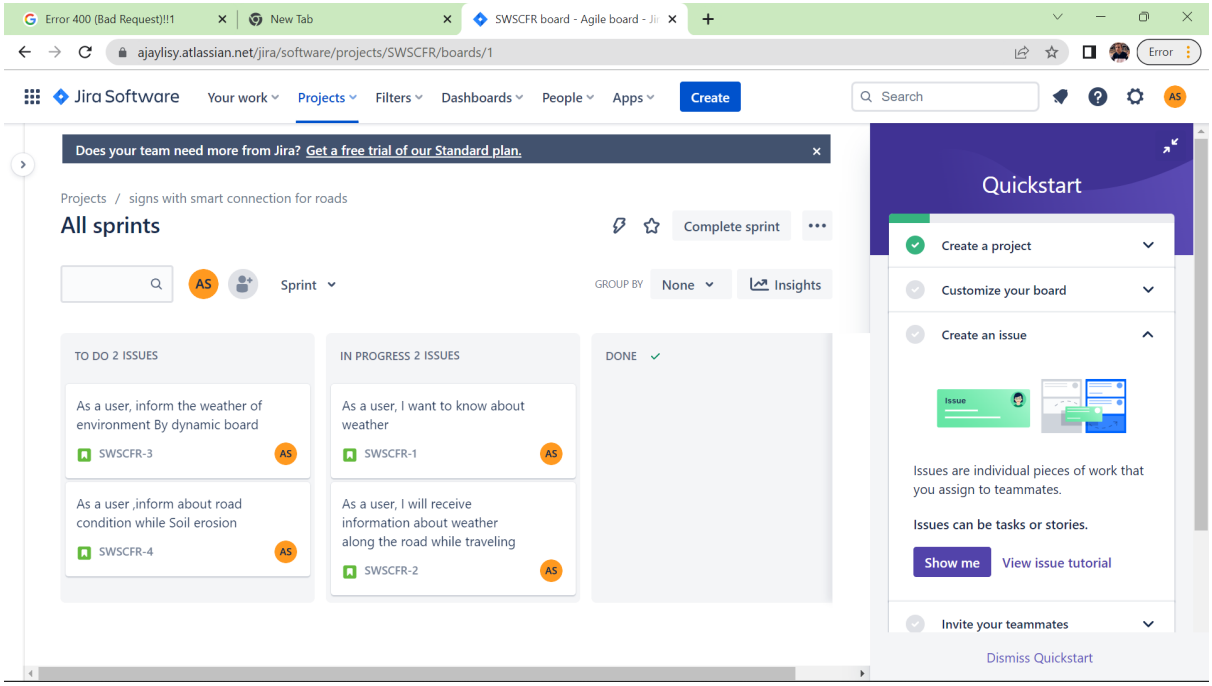
Imagine we have a10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let’s calculate the team’s average velocity (AV) per iteration unit (story points per day)

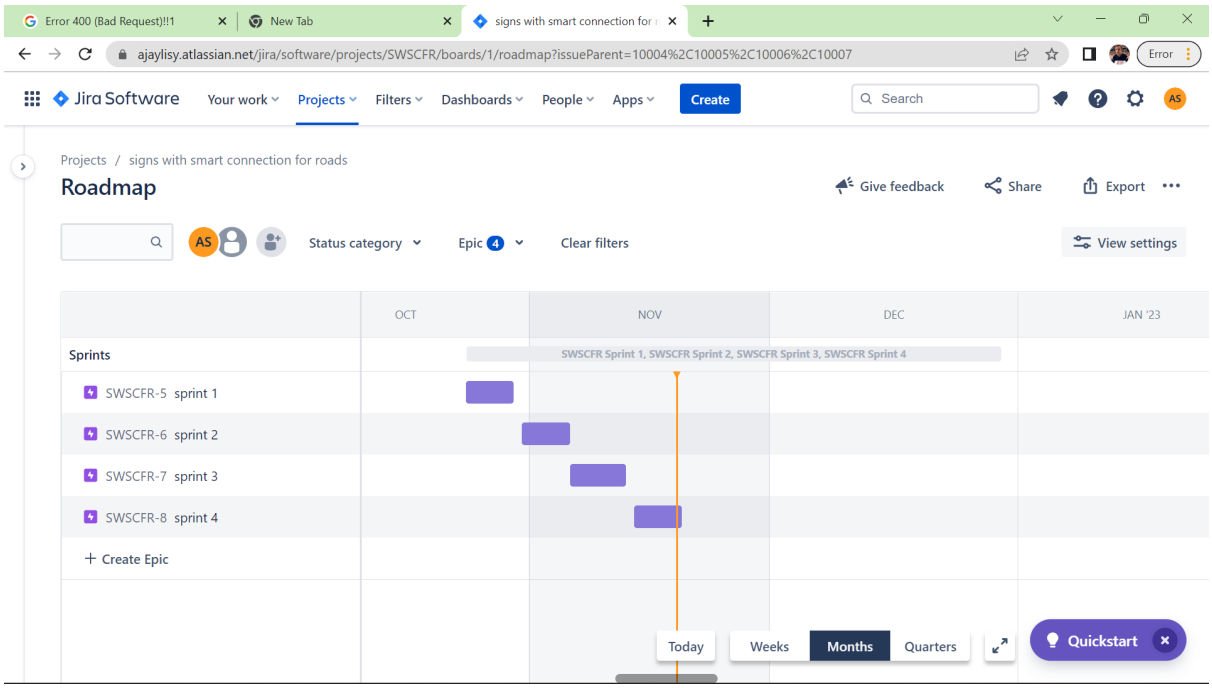
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

BURNDOWN:



6.3 REPORT FROM JIRA





7. CODING & SOLUTIONING

7.1 Feature code:

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "mpt0iq",
        "typeId": "dynamic board",
        "deviceId":"888"
    },
    "auth": {
        "token": "0987654321"

    }
}

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()

while True:
    temperature=random.randint(-20,125)
    vehicles count=random.randint(0,100)
    rest=random.randint(0,100)
    hospital_distance=random.randint(0,500)
    school-time=random.randint(1,24)
    a="Your Preferred Speed"
    b="Speed Limit is 30 km\hr"
    c="Take Diversion"
    d="As Your Wish"
    x={'Condition_for_Speed':a}
    y={'Condition_for_Speed':b}
    k={'Condition_for_Speed_limit_School':a}
    l={'Condition_for_Speed_limit_School':b}
    z={'Condition_for_Direction':c}
    w={'Condition_for_Direction':d}
    p="No Horn"
    q={'caution':p}
    Z={'caution':d}
    distance1={'Distance_for_Hospital':hospital_distance}
    myData1={'Temperature':temperature}
    myData2={'Vehiclescount':vehiclescount}
    myData3={'Restaurant_distance': rest}
    myData5={'Hospital_distance':hospital_distance}
    myData4={'Schooltime':schooltime}
    client.publishEvent(eventId="status",msgFormat="json",data=myData1,qos=0,onPublish=None)
    print("Published:%s",myData1)
    if temperature>=20:

        client.publishEvent(eventId="status", msgFormat="json",data=x,qos=0,onPublish=None)
        print(x)
        print("\n")
    else :
        client.publishEvent(eventId="status", msgFormat="json",data=y,qos=0,onPublish=None)
        print(y)
        print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData2,qos=0,onPublish=None)
```

```
    print("Published:%s",myData2)
    if vehiclescount>=50:
        client.publishEvent(eventId="status",msgFormat="json",data=z,qos=0,onPublish=None)
        print(z)
        print("\n")
    else:
        client.publishEvent(eventId="status",msgFormat="json",data=w,qos=0,onPublish=None)
        print(w)
        print("\n")


    client.publishEvent(eventId="status",msgFormat="json",data=myData4,qos=0,onPublish=None)
    print("Published:%s",myData4)

    if  8<=schooltime and schooltime<=10 or 15<=schooltime and schooltime<=18:
        client.publishEvent(eventId="status",msgFormat="json",data=l,qos=0,onPublish=None)
        print(l)
        print("\n")

    else :
        client.publishEvent(eventId="status",msgFormat="json",data=k,qos=0,onPublish=None)
        print(k)
        print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData5,qos=0,onPublish=None)

    if 0<=hospital_distance and hospital_distance<=200:
        client.publishEvent(eventId="status",msgFormat="json",data=distance1,qos=0,onPublish=None)
        print(distance1)
        client.publishEvent(eventId="status",msgFormat="json",data=q,qos=0,onPublish=None)
        print(q)
        print("\n")
    else:
       client.publishEvent(eventId="status",msgFormat="json",data=distance1,qos=0,onPublish=None)
       print(distance1)
       client.publishEvent(eventId="status",msgFormat="json",data=Z,qos=0,onPublish=None)
       print(Z)
       print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData3,qos=0,onPublish=None)
    print("Published:%s",myData3)
    client.commandCallback=myCommandCallback
    time.sleep(10)
client.disconnect()
```

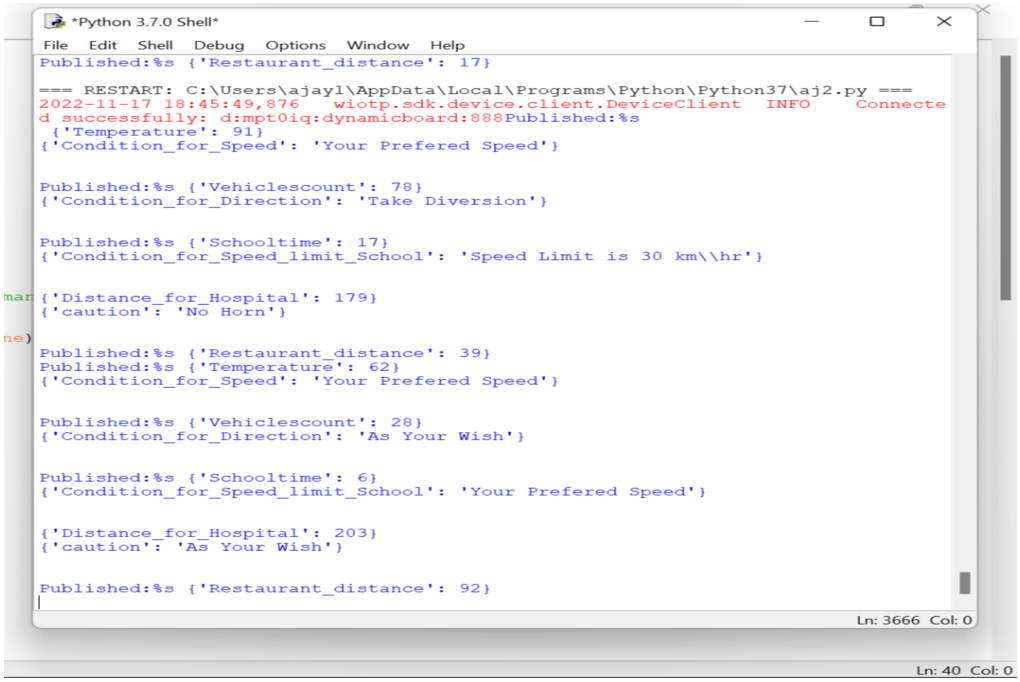
8. TESTING

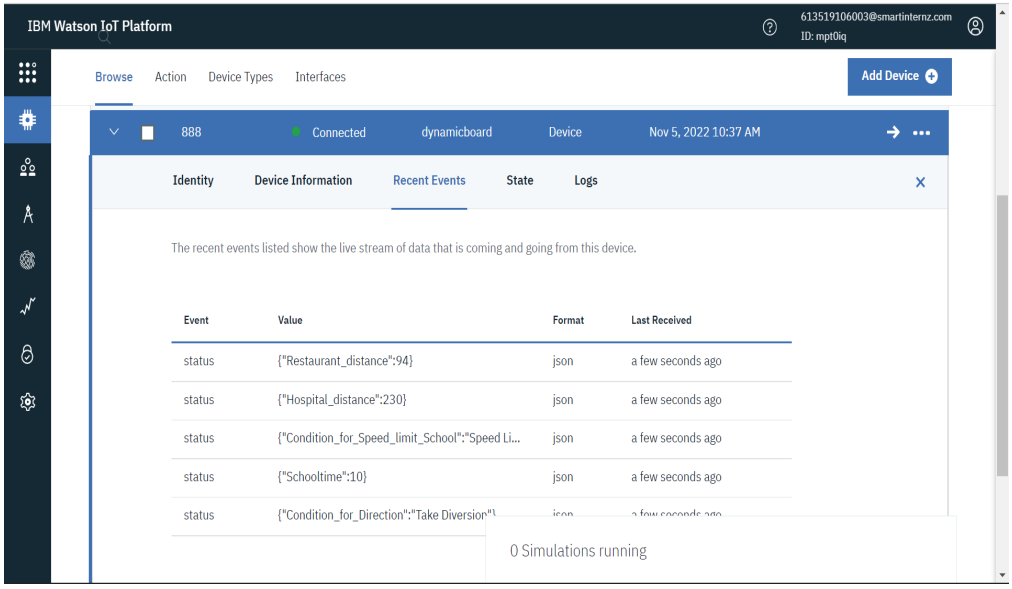
8.1 Test cases

SI.NO	INPUT	OUTPUT	RESULT
01.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
02.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
03.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
04.	Latitude, longitude, Temperature,	Speed limits, no horn, take diversion,	PASSED

	vehicles count	distance	
05.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
06.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
06.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
07.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
08.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
09.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED
10.	Latitude, longitude, Temperature, vehicles count	Speed limits, no horn, take diversion, distance	PASSED

FEATURE CODE:





8.2 User Acceptance Testing

Purpose of Document

This document briefly explain the process of smart connected sign boards and how they're employed in various road conditions.

Defect Analysis

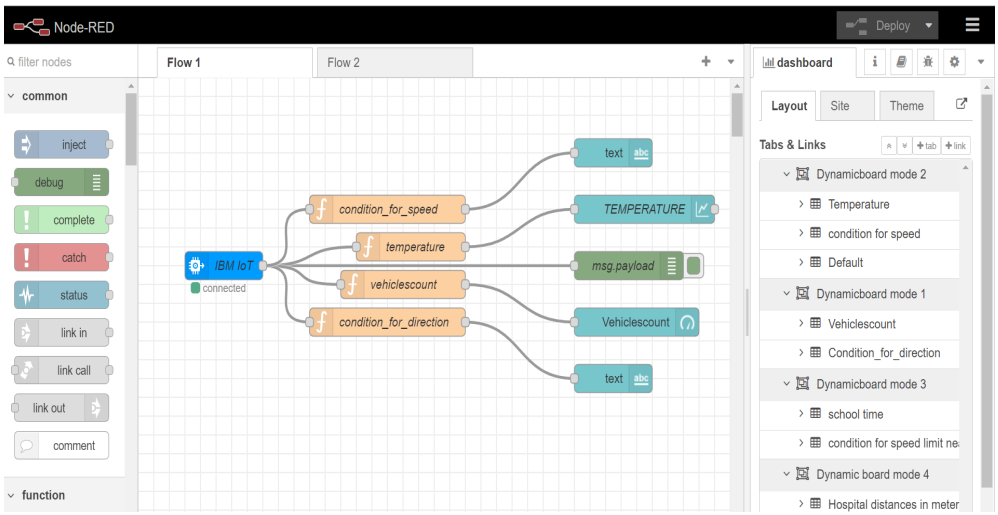
This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

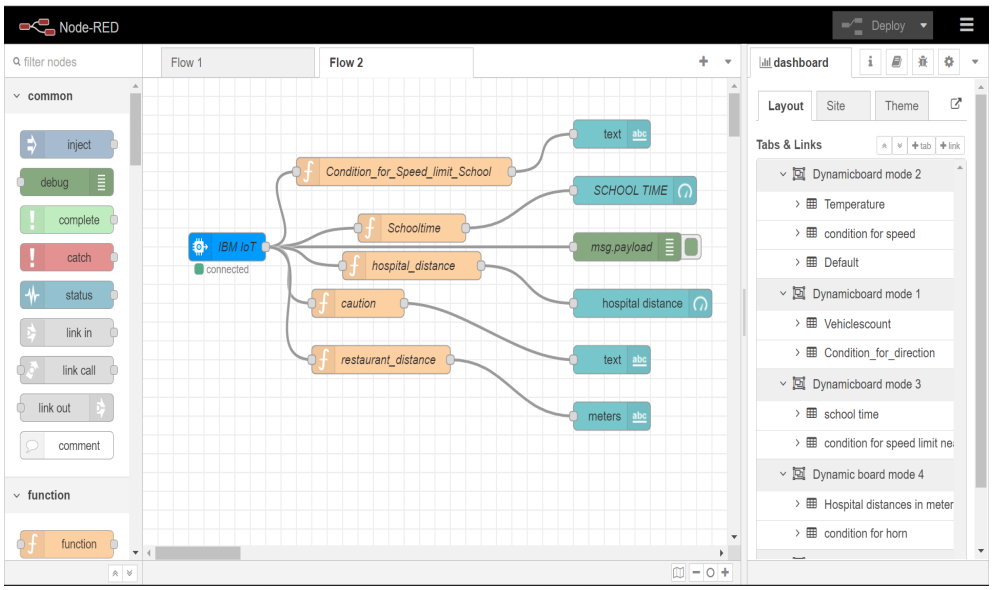
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	3	2	1	3	9
Duplicate	0	0	0	0	0
External	1	2	0	4	7
Fixed	3	3	2	3	11
Not Reproduced	0	0	1	0	1
Skipped	1	2	4	2	1
Won't Fix	0	0	0	0	0
Totals	8	9	8	12	29

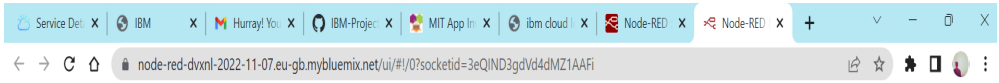
Test Case Analysis

This report shows the number of test cases that have passed, failed, and unteste

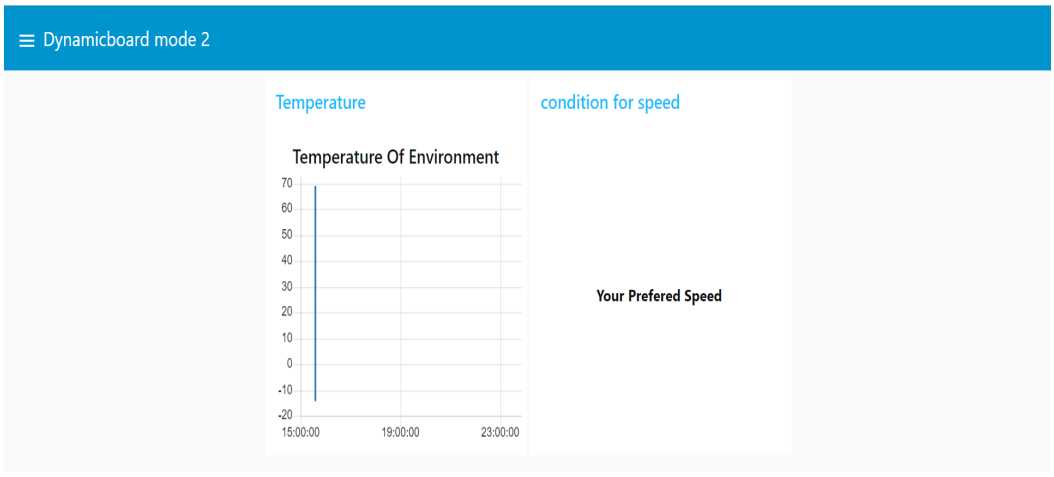
section	total cases	not tested	fail	pass
Print Engine	4	0	0	4
client application	1	0	0	1
security	2	0	0	2
outsource shipping	3	0	0	3
exception reporting	9	0	0	9
final report output	4	0	0	4
vision control	2	0	0	2

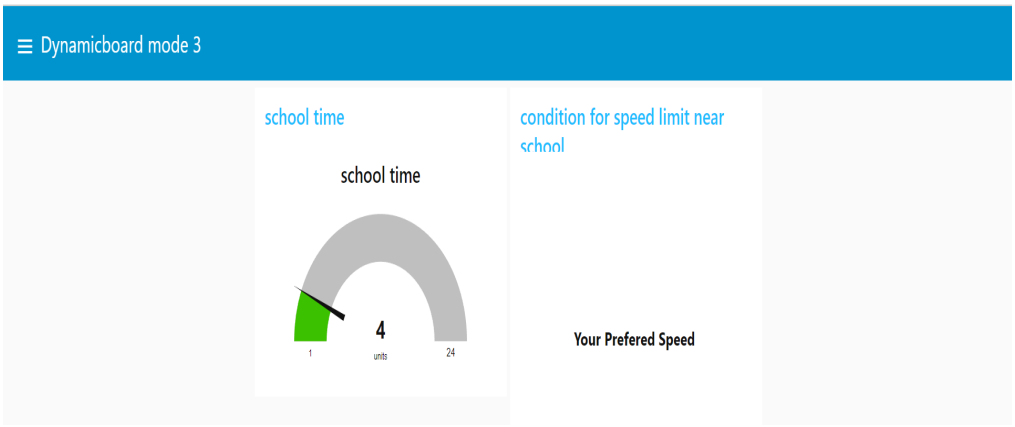

Node-RED
Deploy
filter nodes
Flow 1
Flow 2
dashboard
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
IBM IoT
connected
condition_for_speed
temperature
vehiclescount
condition_for_direction
text
TEMPERATURE
msg.payload
Vehiclescount
text
Layout
Site
Theme
Tabs & Links
Dynamicboard mode 2
Temperature
condition for speed
Default
Dynamicboard mode 1
Vehiclescount
Condition_for_direction
Dynamicboard mode 3
school time
condition for speed limit ne
Dynamic board mode 4
Hospital distances in meter

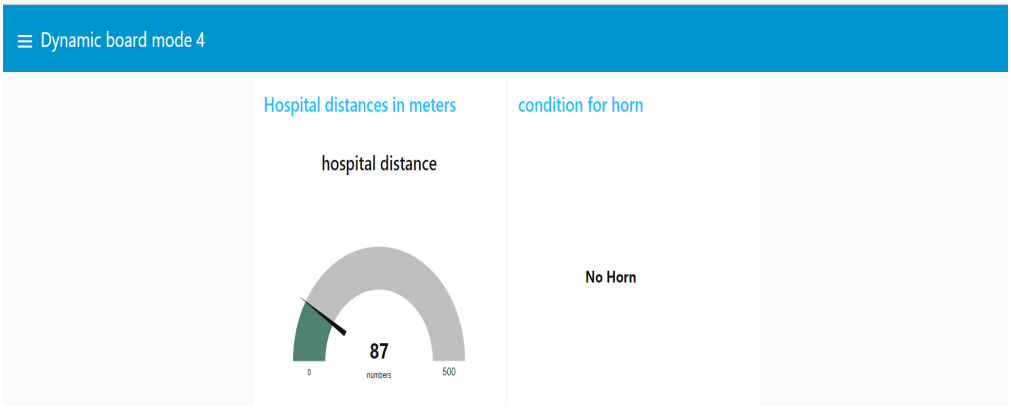

Node-RED
Deploy
filter nodes
Flow 1
Flow 2
dashboard
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
Condition_for_Speed_limit_School
Schooltime
hospital_distance
caution
restaurant_distance
IBM IoT
connected
text
SCHOOL TIME
msg.payload
hospital distance
text
meters
Layout
Site
Theme
Tabs & Links
Dynamicboard mode 2
Temperature
condition for speed
Default
Dynamicboard mode 1
Vehiclescount
Condition_for_direction
Dynamicboard mode 3
school time
condition for speed limit ne
Dynamic board mode 4
Hospital distances in meter
condition for horn

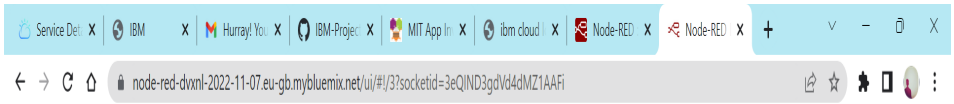

node-red-dvxnl-2022-11-07.eu-gb.mybluemix.net/ui/#!/0?socketid=3eQIND3gdVd4dMZ1AAFi

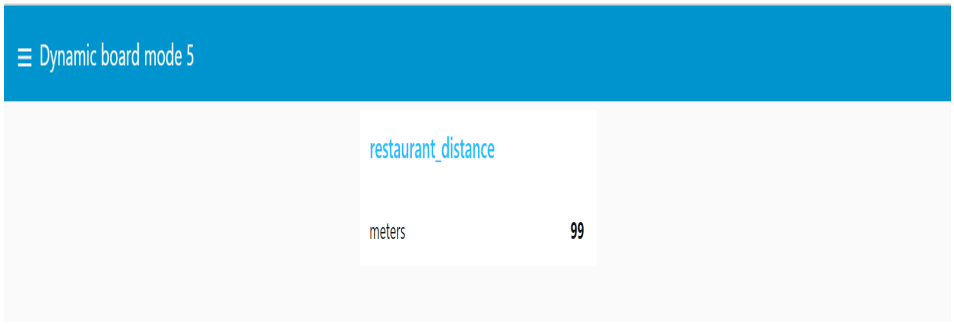

Dynamicboard mode 1
Vehiclescount
Vehiclescount
90
numbers
0
100
Condition_for_direction
As Your Wish


Dynamicboard mode 2
Temperature
Temperature Of Environment
70
60
50
40
30
20
10
0
-10
-20
15:00:00
19:00:00
23:00:00
condition for speed
Your Prefered Speed



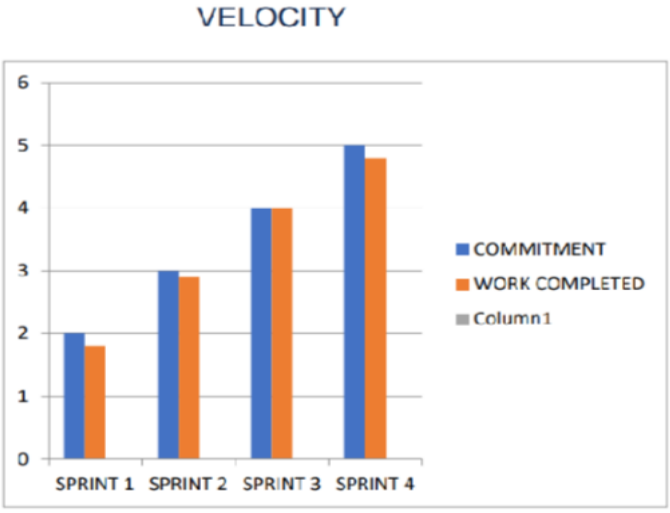






9. RESULTS

9.1 Performance metrics



10. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- Improve the road safety protocols
- It Provides User friendly display
- The significance of the sign boards are greatly improved
- The diversion signs helps people to avoid traffic
- Signs based on the weather and vehicles count are real-time

DISADVANTAGES:

- It seems comparatively high in cost than static boards
- Maintenance and Implementation process are Required compared with normal static boards
- Switching from static board to this board involves complex process
- It requires cloud service

11. CONCLUSION:

There are many end user are available for this project. Rather than using static sign boards it has high adaptability and significant protocols. The random values are used instead of imported from weather API .All other cloud credentials are created and verified with displaying them in Web UI.

This project was completely IOT related and API also required. This improves the road safety even either small or large Transport system. The weather update are received from the wear API these values are imported into the python script . this code will execute the condition we used and sends the data to the cloud .The node rerd deals with filtering the required data from cloud and display them in Web UI. After all these process the Web UI linked with mobile app we created to also display in your mobile . This will helps you to get information even after the boards had any technical issues.

12. FUTURE SCOPE

This project will significantly provides better road safety also reduces the accident rates in many ways.

- the real-time sign upgradation helps people to survive in ubdrup road condition
- It will helps people as well as the roads and transport system with traffic clearance
- The user friendly interface achieved with these signage system
- Due to its Implementation in various region can be achieved faster.

13. Appendix

13.1 Source code

```
#IBM Watson IOT Platform
#pip install wiotp-sdk
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "mpt0iq",
        "typeId": "dynamic board",
        "deviceId":"888"
    },
    "auth": {
        "token": "0987654321"

    }
}

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()

while True:
    temperature=random.randint(-20,125)
    vehicles count=random.randint(0,100)
    rest=random.randint(0,100)
    hospital_distance=random.randint(0,500)
    school-time=random.randint(1,24)
    a="Your Preferred Speed"
    b="Speed Limit is 30 km\hr"
    c="Take Diversion"
    d="As Your Wish"
    x={'Condition_for_Speed':a}
    y={'Condition_for_Speed':b}
    k={'Condition_for_Speed_limit_School':a}
    l={'Condition_for_Speed_limit_School':b}
    z={'Condition_for_Direction':c}
    w={'Condition_for_Direction':d}
    p="No Horn"
    q={'caution':p}
    Z={'caution':d}
    distance1={'Distance_for_Hospital':hospital_distance}
    myData1={'Temperature':temperature}
    myData2={'Vehiclescount':vehiclescount}
    myData3={'Restaurant_distance': rest}
    myData5={'Hospital_distance':hospital_distance}
    myData4={'Schooltime':schooltime}
    client.publishEvent(eventId="status",msgFormat="json",data=myData1,qos=0,onPublish=None)
    print("Published:%s",myData1)
    if temperature>=20:

        client.publishEvent(eventId="status", msgFormat="json",data=x,qos=0,onPublish=None)
        print(x)
        print("\n")
    else :
        client.publishEvent(eventId="status", msgFormat="json",data=y,qos=0,onPublish=None)
        print(y)
        print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData2,qos=0,onPublish=None)
    print("Published:%s",myData2)
    if vehiclescount>=50:
        client.publishEvent(eventId="status",msgFormat="json",data=z,qos=0,onPublish=None)
```

```
        print(z)
        print("\n")
    else:
        client.publishEvent(eventId="status",msgFormat="json",data=w,qos=0,onPublish=None)
        print(w)
        print("\n")


    client.publishEvent(eventId="status",msgFormat="json",data=myData4,qos=0,onPublish=None)
    print("Published:%s",myData4)

    if  8<=schooltime and schooltime<=10 or 15<=schooltime and schooltime<=18:
        client.publishEvent(eventId="status",msgFormat="json",data=l,qos=0,onPublish=None)
        print(l)
        print("\n")

    else :
        client.publishEvent(eventId="status",msgFormat="json",data=k,qos=0,onPublish=None)
        print(k)
        print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData5,qos=0,onPublish=None)

    if 0<=hospital_distance and hospital_distance<=200:
        client.publishEvent(eventId="status",msgFormat="json",data=distance1,qos=0,onPublish=None)
        print(distance1)
        client.publishEvent(eventId="status",msgFormat="json",data=q,qos=0,onPublish=None)
        print(q)
        print("\n")
    else:
       client.publishEvent(eventId="status",msgFormat="json",data=distance1,qos=0,onPublish=None)
       print(distance1)
       client.publishEvent(eventId="status",msgFormat="json",data=Z,qos=0,onPublish=None)
       print(Z)
       print("\n")

    client.publishEvent(eventId="status",msgFormat="json",data=myData3,qos=0,onPublish=None)
    print("Published:%s",myData3)
    client.commandCallback=myCommandCallback
    time.sleep(10)
client.disconnect()
```

13.2 GIT REPO AND DEMO LINK

https://github.com/IBM-EPBL/IBM-Project-35095-1660281458

https://drive.google.com/file/d/1jWgRyhcWxkCL5SeDNaRvafZ3E-f0_kOC/view?usp=drivesdk