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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
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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-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, and 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. Among these applications, smart services for transportation are highly required to ease the issues especially regarding road safety. In this context, this study presents a literature review that elaborates the existing IoT-based smart transportation systems especially in terms of road safety. In this way, the current state of IoT-based smart transportation systems for safer roads are provided. Then, the current research efforts undertaken by the author to provide an IoT-based safe smart traffic system are briefly introduced. It is emphasized that road safety can be improved using Vehicle-to-Infrastructure (V2I) communication technologies via the cloud (Infrastructure to-Cloud-I2C). Therefore, it is believed that this study offers useful information to researchers for developing safer roads in smart cities.

Paper 2

Improved road safety through rapid incident detection

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 maximize road safety. SAPN regularly conducts reviews of accidents and of the safety of its 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 II stations in an attempt to avoid paying the toll 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 has implemented a number of measures to reduce the danger of such events after they occur; these techniques are called FASTALERT, and are characterized by the rapid detection of the 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 firmware to support systems like lane signs, road signs and lighting systems. V2I provides a broad 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 ecosystem also needs to change. This will improve transport safety and quality and will offer entertainment in new flexible systems. In this chapter, huge potential effort was made to study the complete intensive in sight of V2I with the detail of how V2I made a contribution to communication. In the end, this chapter also highlights applications for V2I-driven wireless technology. The performance of the V2I involved in the study were evaluated by using different measures related to running time, data rate and resource management

paper 4

Development and testing of roads signs alert 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 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. However, static road signs are often seen too late for a driver to respond accordingly. In this study, a system for alerting drivers about road signs has been developed and tested using a smart mobile phone. The study was carried out in Tanzania along an 80km highway stretch from Arusha to Moshitown. The Haversine formula was used to measure and estimate the distance between two pairs of coordinates using the smartphone-based navigation application, Google Map. 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 interface 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 transit 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 display and AI in highways. An architecture for smart highway lighting, smart 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 AI in 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 of traffic flow, highway road safety, and maintenance of quality roads have been addressed in the discussion section. Embedding the deep learning techniques in the vision node 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 Interstate 94 was modelled, where the typical road throughput was simulated and published to an MQTT broker for the embedded system to display the expected travel time to Ann Arbor, Michigan from the US 23 junction. The embedded system additionally samples digital temperature and humidity sensors to note road conditions, where an external input allowed operators to provide a real time update when an unexpected event causes traffic (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, yaser dalveren, FAcheikh Published on: 2020
 "Internet-of-things-based smart transportation systems for a safer road"

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, KP Keerthana Published on: 2021

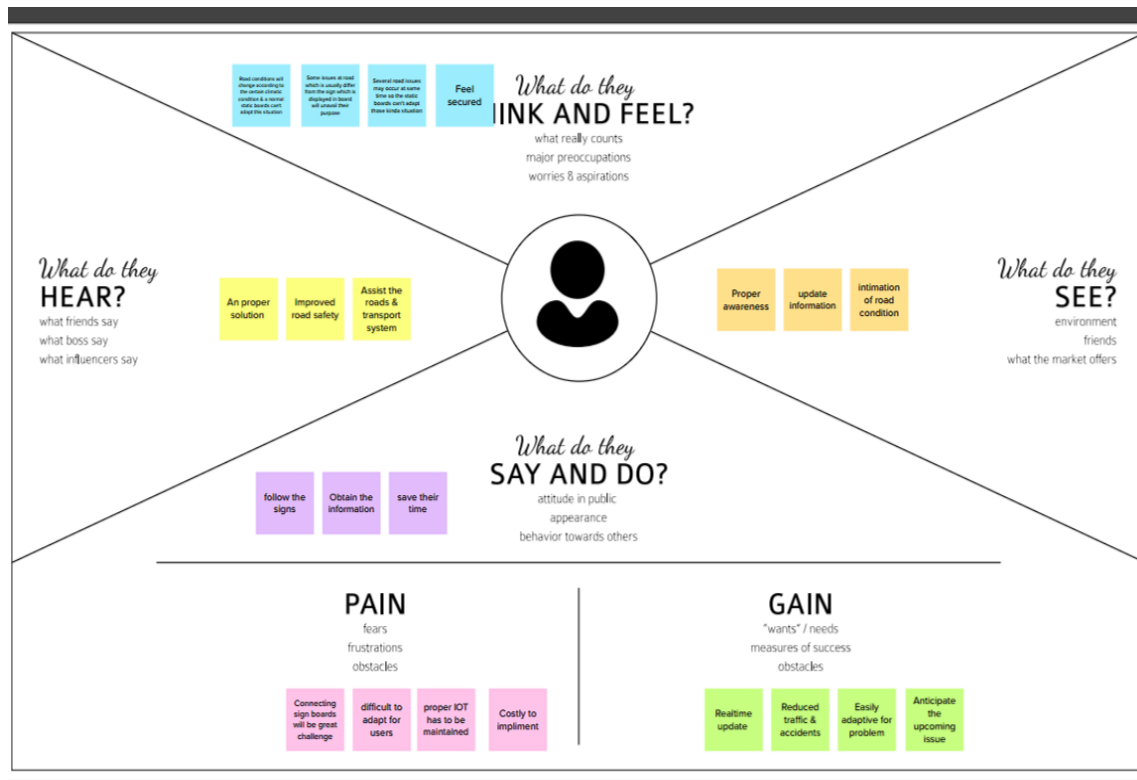
PAPER 4 - AUTHOR:EricM.masatu,ramadhany sinviandAnaelsam Publishedon:21, April,2020
"Anempirical study of vehicle to infrastructure communications-An intense learning of smart infrastructure for safety and mobility"

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"

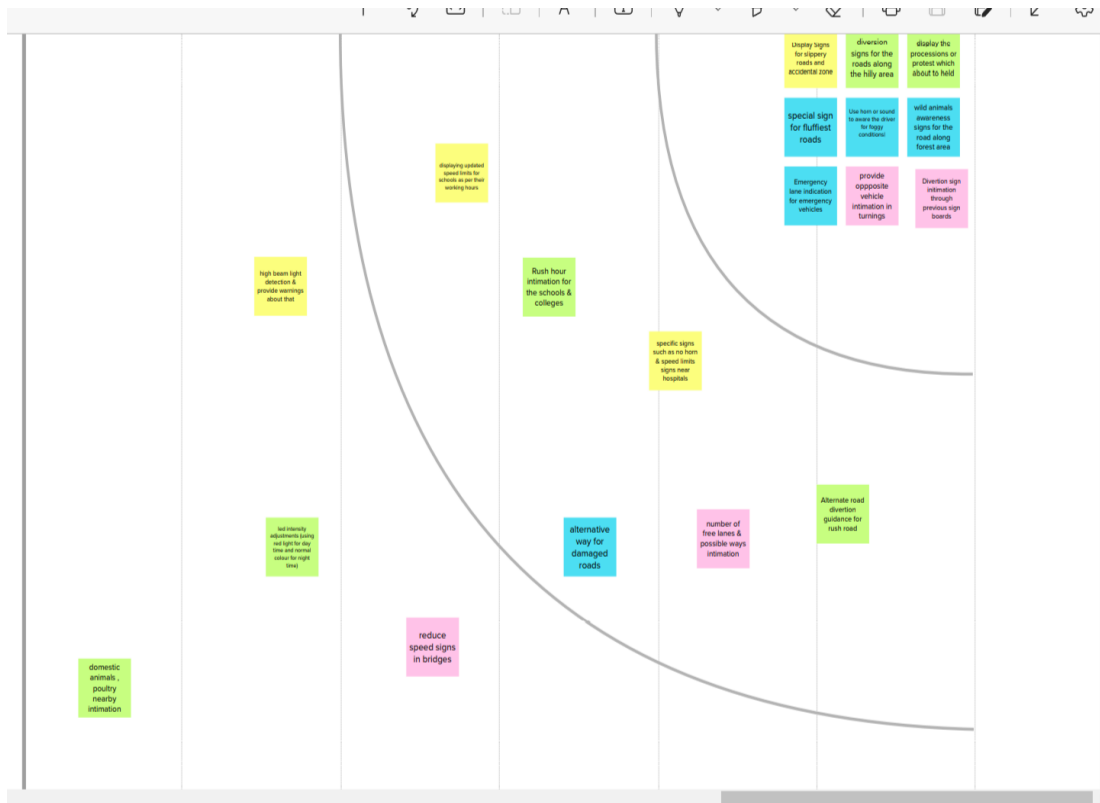
PAPER 6-AUTHOR:AdnanshaoutandAlihassini Publishedon:2019(atIEEE)
"An Intelligent Real Time Road Sign System"

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 Signs with smart connectivity for better road safety.

To replace the static sign boards with digital smart connected sign boards which update the real time signs from the weather API automatically..

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.

A smart and essential updation for static sign board systems such as provide real time speed limit, hazards intimation based on weather and current road conditions.

3 Novelty /Uniqueness

Unlike static sign boards these have some specific features such as display special sign such as diversion, high beam indication during night time, signs for fluffiest roads & processions or protest held which signs.

Additional features such as government information about adds. *Some of salient feature of these board was it is adaptable by current environment and mode can be selected by provided buttons.

4 Social Impact /Customer satisfaction

To improve the significance of sign board system and create better awareness about them among people. As the signs are displayed by real time serious issues are reduced mainly accidents.

5 Bussiness Model(Revenue Model)

End users:

- *NHAI

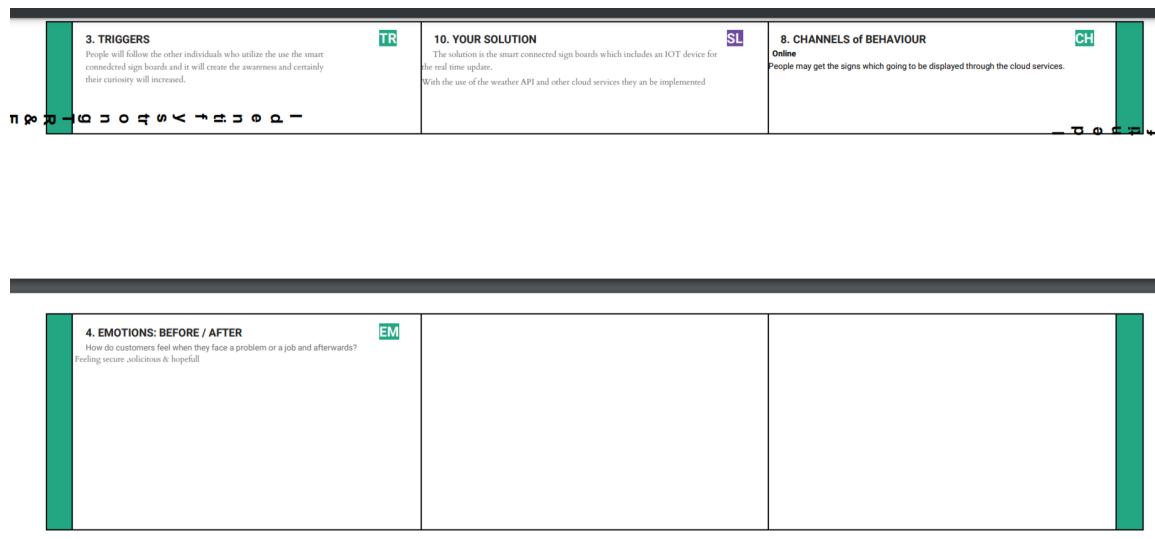
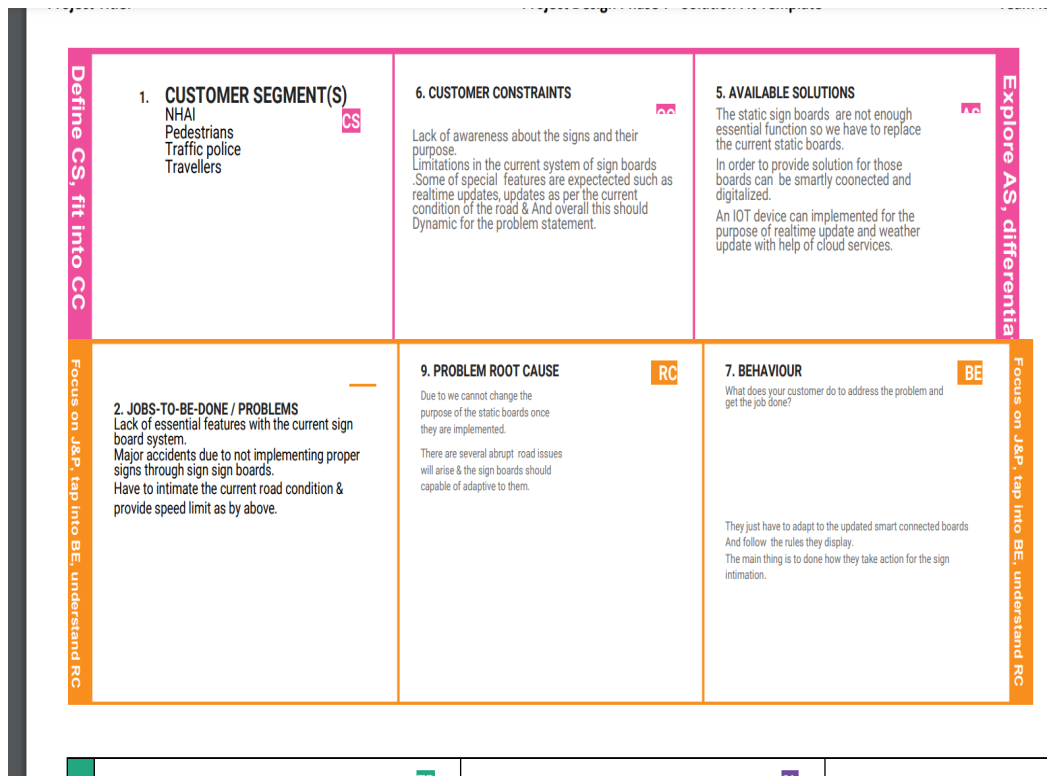
- *Pedestrians

- *Traffic police The government contracts with these sign boards increase the current demand on them.

6 Scalability of the Solution

These kind of boards are adaptable to any situation and also to every conditions Implementation of these sign boards lead to standardization in the current sign board system

3.4 Problem Solution Fit



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

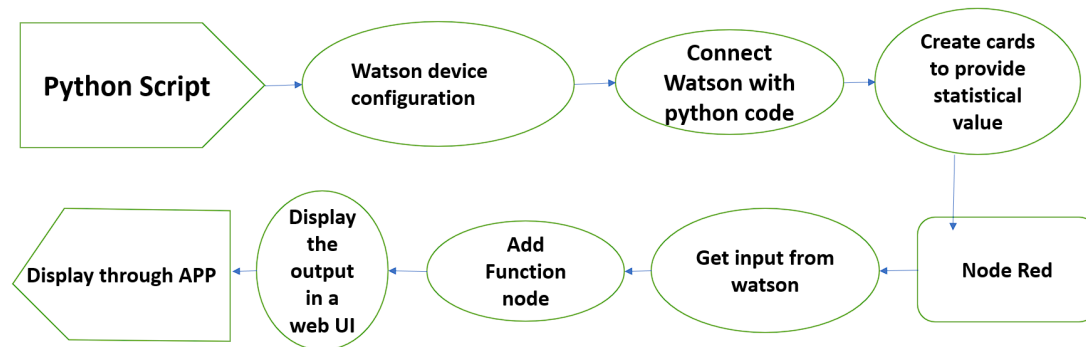
Able to implement all over the place & must suitable to all kind of road condition

5 . PROJECT DESIGN

5.1 Data Flow Diagram

Data flow diagram

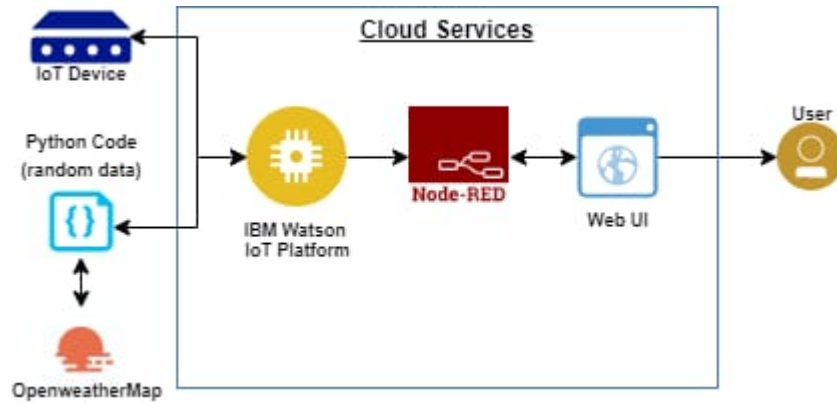
FLOW DIAGRAM



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

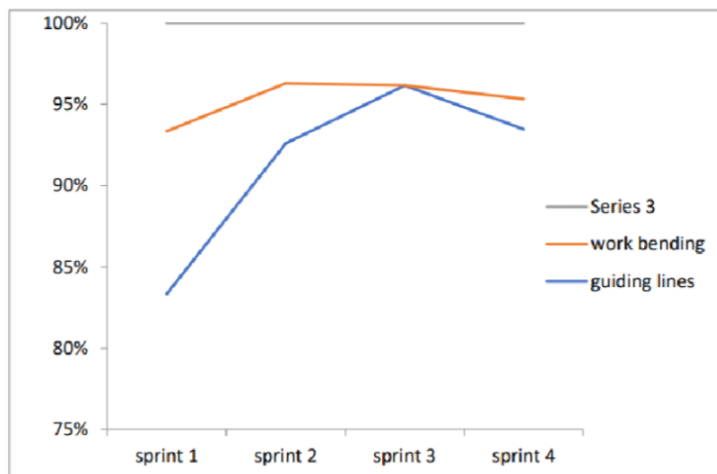
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	30	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	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 a 10-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)

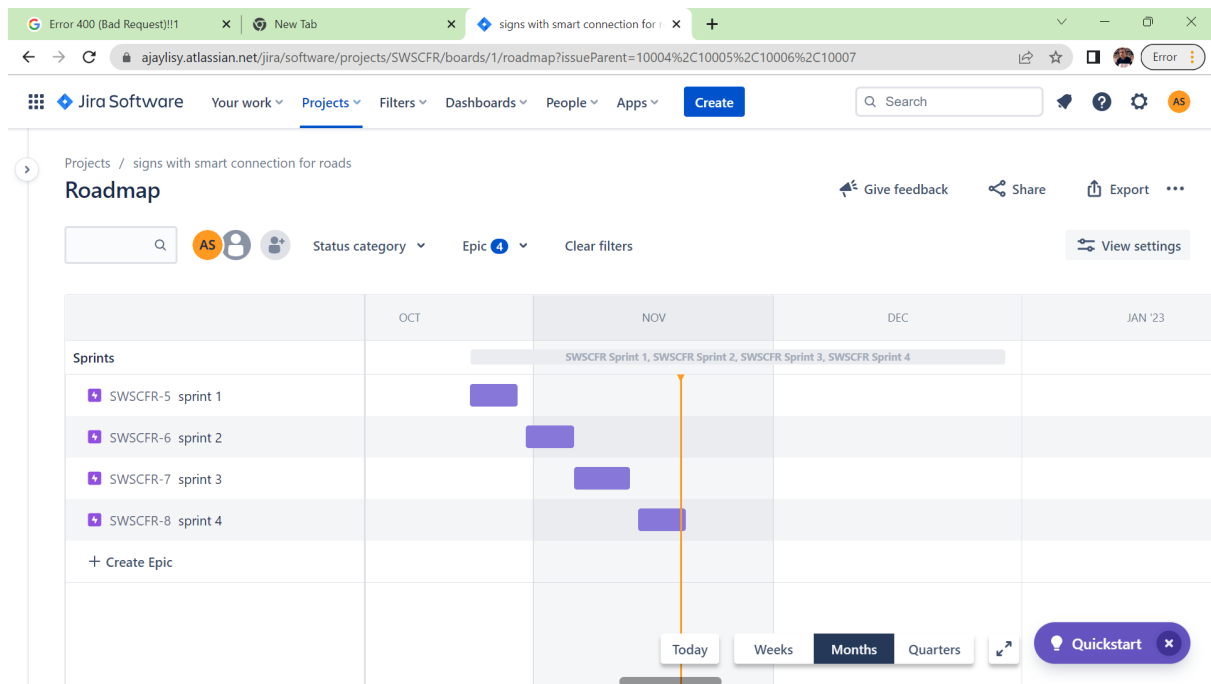
$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

BURNDOWN:



6.3 NJIRA

The screenshot displays the Jira Software interface for a project named 'SWSCFR'. The top navigation bar includes the Jira logo, 'Your work', 'Projects', 'Filters', 'Dashboards', 'People', 'Apps', and a 'Create' button. A search bar is located on the right. Below the navigation bar, a banner asks if the team needs more from Jira. The main content area shows 'All sprints' with a search bar, a 'Sprint' dropdown, and a 'GROUP BY' menu set to 'None'. The board is divided into three columns: 'TO DO 2 ISSUES', 'IN PROGRESS 2 ISSUES', and 'DONE'. The 'TO DO' column contains two issues: 'As a user, inform the weather of environment By dynamic board' (SWSCFR-3) and 'As a user, inform about road condition while Soil erosion' (SWSCFR-4). The 'IN PROGRESS' column contains two issues: 'As a user, I want to know about weather' (SWSCFR-1) and 'As a user, I will receive information about weather along the road while traveling' (SWSCFR-2). The 'DONE' column is empty. On the right side, a 'Quickstart' sidebar is visible, featuring a checklist with items: 'Create a project', 'Customize your board', 'Create an issue', and 'Invite your teammates'. The 'Create an issue' item is expanded, showing a brief explanation of issues and links to 'Show me' and 'View issue tutorial'. A 'Dismiss Quickstart' link is at the bottom of the sidebar.



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 vehiclesscount>=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:

```
*Python 3.7.0 Shell*
File Edit Shell Debug Options Window Help
Published:%s {'Restaurant_distance': 17}

=== RESTART: C:\Users\ajay1\AppData\Local\Programs\Python\Python37\aj2.py ===
2022-11-17 18:45:49,876 wiotp.sdk.device.client.DeviceClient INFO Connecte
d successfully: d:\mpt01q:dynamicboard:888Published:%s
{'Temperature': 91}
{'Condition_for_Speed': 'Your Preferred Speed'}

Published:%s {'Vehiclescount': 78}
{'Condition_for_Direction': 'Take Diversion'}

Published:%s {'Schoolltime': 17}
{'Condition_for_Speed_limit_School': 'Speed Limit is 30 km\\hr'}

mar {'Distance_for_Hospital': 179}
ne) {'caution': 'No Horn'}

Published:%s {'Restaurant_distance': 39}
Published:%s {'Temperature': 62}
{'Condition_for_Speed': 'Your Preferred Speed'}

Published:%s {'Vehiclescount': 28}
{'Condition_for_Direction': 'As Your Wish'}

Published:%s {'Schoolltime': 6}
{'Condition_for_Speed_limit_School': 'Your Preferred Speed'}

{'Distance_for_Hospital': 203}
{'caution': 'As Your Wish'}

Published:%s {'Restaurant_distance': 92}
```

IBM Watson IoT Platform

613519106003@smarintenz.com
ID: mpt01q

Browse Action Device Types Interfaces

Add Device

888 Connected dynamicboard Device Nov 5, 2022 10:37 AM

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
status	["Restaurant_distance":94]	json	a few seconds ago
status	["Hospital_distance":230]	json	a few seconds ago
status	["Condition_for_Speed_limit_School":"Speed Li...	json	a few seconds ago
status	["Schoolltime":10]	json	a few seconds ago
status	["Condition_for_Direction":"Take Diversion"]	json	a few seconds ago

0 Simulations running

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

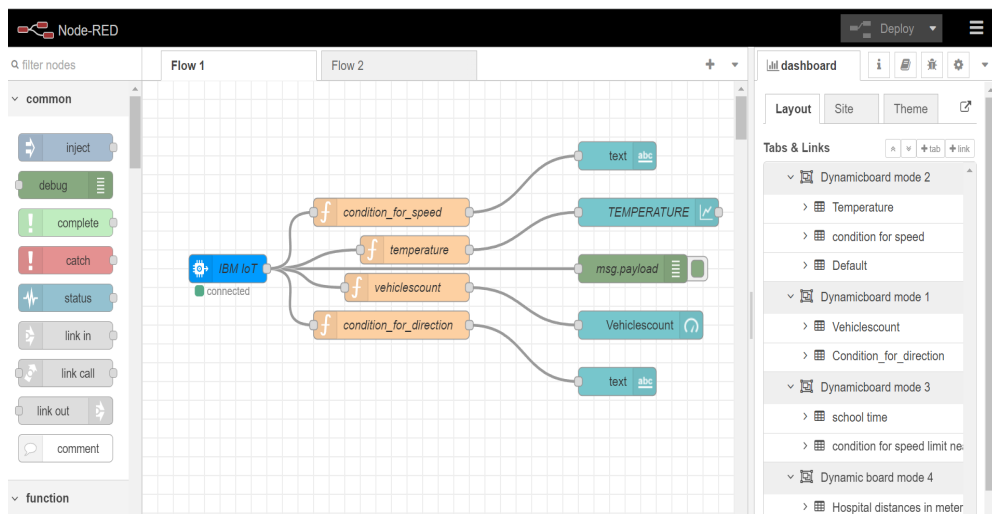
This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

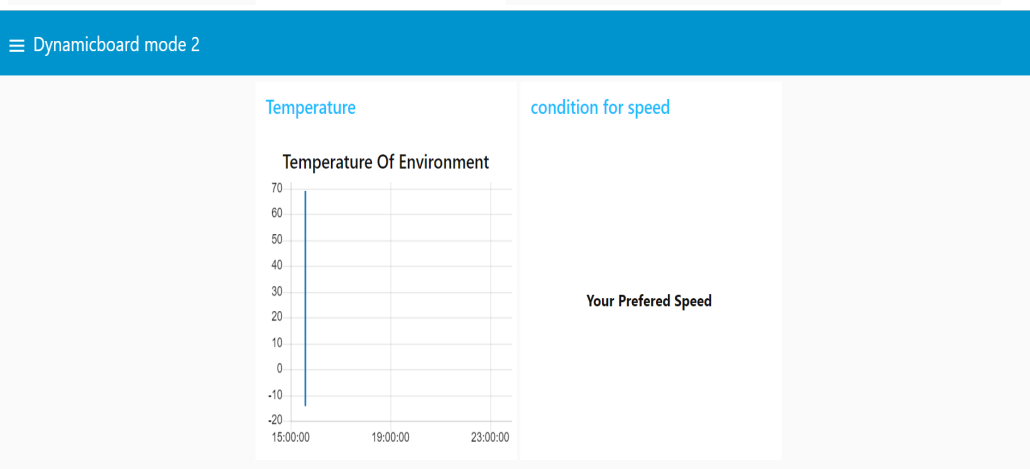
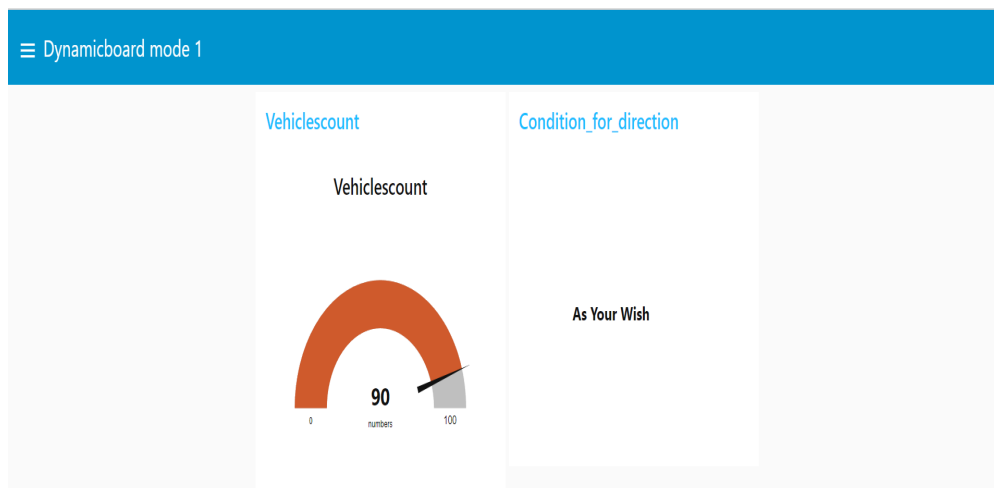
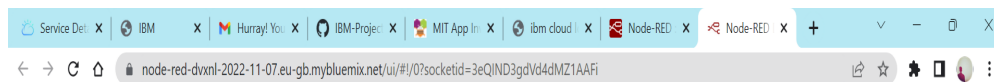
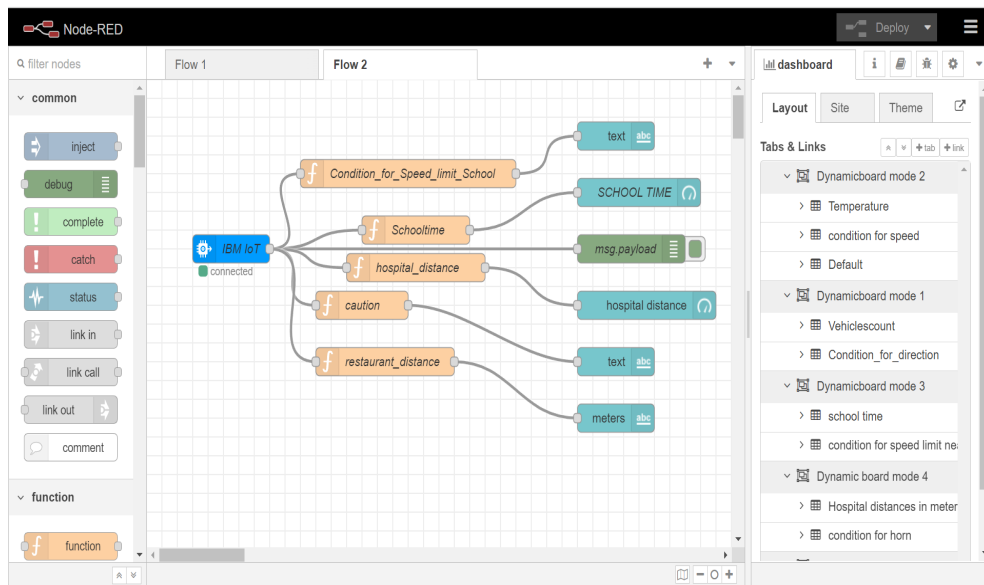
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	3	2	1	3	9
Duplicate	0	0	0	0	0
External	1	2	0	4	7
Fixed	3	3	2	3	11
Not Reproduced	0	0	1	0	1
Skipped	1	2	4	2	1
Won't Fix	0	0	0	0	0
Totals	8	9	8	12	29

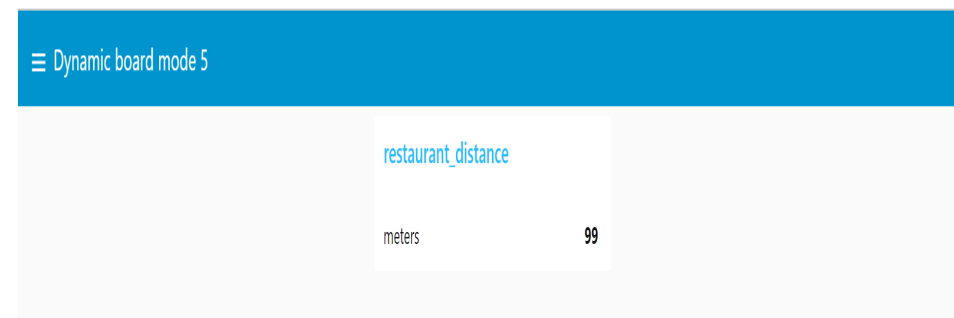
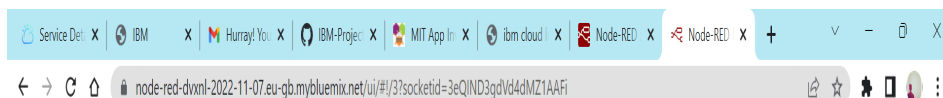
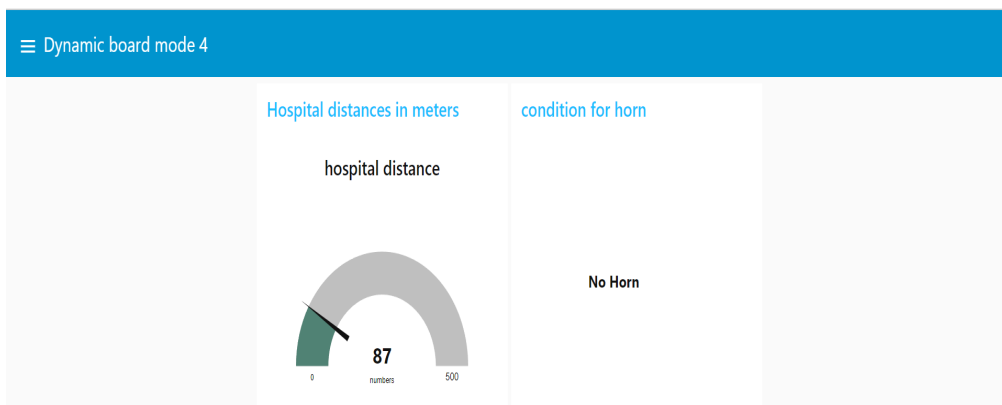
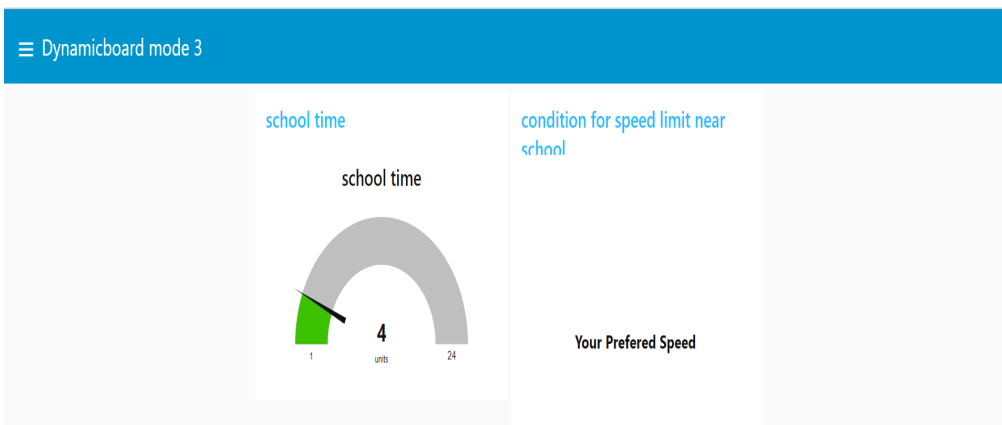
Test Case Analysis

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

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



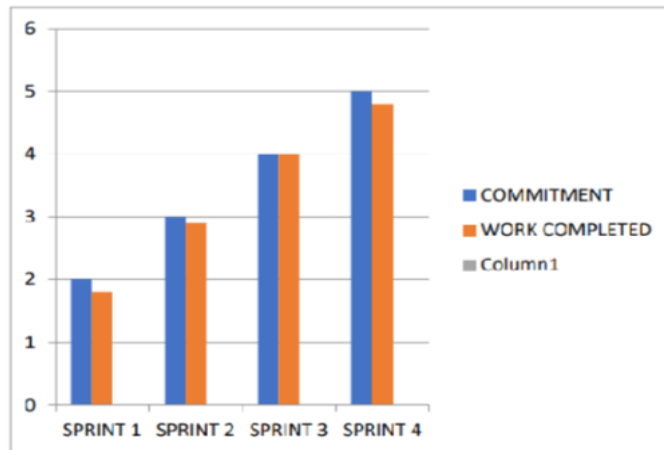




9. RESULTS

9.1 Performance metrics

VELOCITY



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