PROJECT REPORT ON SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

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Team ID	PNT2022TMID31677
Project Name	Signs With Smart Connectivity For Better Road Safety

TEAM MEMBERS:

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1. INTRODUCTION

1.1 Project Overview

The goal of this project is to replace the static signboard with smart connected sign board to get the speed limitations from a web app using weather API and update it automatically based on the weather conditions, set diversions through API And warn drivers for school zones and hospital zone.

1.2 Purpose

To replace the statics signboard, smart connected sign boards are used.

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

- Based on weather changes the speed may decrease or increase.

- Message indicating schools, hospitals, police stations zones are also display.

2. LITERATURE SURVEY

2.1 Existing Problem

- Analysis of crash data has suggested a link between roadside advertising signs and safety

- Research suggests that crash risk increase by approximately 25-29% in the presence of digital roadside advertising signs compared to control areas.

- On the other hand, static roadside advertising signs have not been linked with difference in the crash count.

- The Safe System (SS) approach to transport networks originated with the "Safe Road Transport System" model developed by the Swedish Transport Agency. In its essence, the approach migrates from the view that accidents are largely and automatically the driver's fault to a view that identifies and evaluates the true causes of accidents.

- Through the categorization of safety into the safety of three elements (vehicle, road, and road user), SS minimizes fatalities and injuries by controlling speeds and facilitating prompt emergency response. The model has been widely adopted since its introduction and is currently motivated by the WHO as a basis for road safety planning, policy-making, and enforcement

2.2 References

S.NO	TITLE OF THE PROJECT	ADVANTAGES	DISADVANTAGES	TECHNOLOGY USED
1	An IoT Architecture for Assessing Road Safety in Smart Cities	This system practices Safe system approach. This work offers a comprehensive, IoT-based architecture withthe objective of assessing the safety of the transportation road network.	In the context of raising driver awareness of the road safety conditions during their trips.	Trough the OBD-II, various real-time and diagnostic information can be accessed. Telematics allows for such monitoring within the IoT/ITS context and is facilitated by several option and also by using dedicated sensors.
2	Road Safety Performance Associated with Improved TrafficSignal Design and Increased Signal Conspicuity	C-SVM shows very good performance, but ν-SVM gives better resultsin some case.	There are several opportunities to expand the safety analysis, which will be completed and published at a later date.	Empirical Bayes analysis technique is used to account for the problematic confounding factors associated with road safety evaluation and ensure that the results are reliable.
3	Traffic and Road Sign Recognition	Four colour segmentation algorithms are developed and tested. They are a shadow and highlight invariant, a dynamic threshold, a modification of de la Escalera's algorithm anda Fuzzy colour segmentation algorithm. Approximately 97% successful segmentation rate was achieved.	The performance of the whole system in general and every individual step in particular together with failure analyses. The classifier performance and the parameters which could affect the classification rate.	Classification is undertaken using a Support Vector Machine(SVM) classifier.
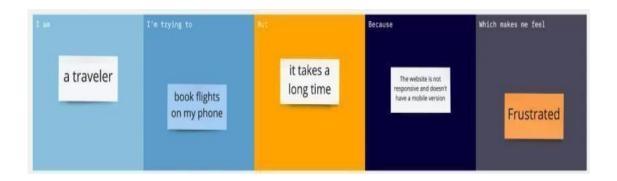
4	Reliable Smart Road Signs	The system provides a randomized detection strategy based on the distance between the decoder output and the received input, i.e., error rate.	It emphasize that sensor fusion where we collect information through several separate sources can lead to more resilient and robust systems. A network of smart vehicles can lead to more reliable traffic networks.	A future trend in intelligent transportation systems is "smart road signs" that incorporate smart codes on their surface to provide more detailed information to smart vehicles.
5	The Role of IoT for Smart Road Traffic Management System	It is a good strategy for overcoming the problem of centralized to a decentralized system. To observe human/driver activities in real-time inside the vehicle.	The DPoS algorithm proves only stake owners can be chosen as block producers, but the actual consensus occurs on the distributed PoA level.	Electronic message service provides up-to-date information about the road ahead to go through.
6	Communication system for Intelligent Road Signs network	The problems of security go way beyond simply determining whether a transponder is fitted to an emergency vehicle.	The disadvantage is that can anyone else who gains access to the network	The way of providing the end user with an accurate data regarding the current road conditions is one of the very important components in the area of Intelligent Transportation Systems (ITS).
7	Traffic Control Systems Used Worldwide	Cost efficient Analyse the problem in each part of the traffic system	Less Efficiency	Adaptive traffic signal controllers as the principles part of intelligent transportation systems have a primary role to effectively reduce traffic congestion by making a real time adaptation in response to the changing traffic network dynamics

8	Development of an IoT based real-time traffic monitoring system for city governance	System helps to resolve the traffic in cities	Energy consumption	The objective is to provide real-time traffic updates on traffic congestion and unusual traffic incidents through roadside message units. The early-warning messages will help citizens to save their time, especially during peak hours.

2.3 Problem Statement Definition

- A problem statement is a concise description of an issue to be addressed or a condition to be improved upoS. NOn. It identifies the gap between the current(problem) state and desired (goal) state of a process or product. Focusing on the facts, the problem statement should be designed to address the Five Ws. The first condition of solving a problem is understanding the problem, which can be done by way of a problem statement

- In present Systems the road signs and the speed limits are Static. But the roadsigns can be changed in some cases. We can consider some cases when thereare road diversions due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalized. This project proposes a system that has digital signboards on which the signs can be changed dynamically. If there is rainfall then the roads will be slippery and

the speed limit would be decreased. There is a web app through which you can enter the data on road diversions, accident prone areas, and informationsign boards can be entered through the web app. This data is retrieved and displayed on the signboards according
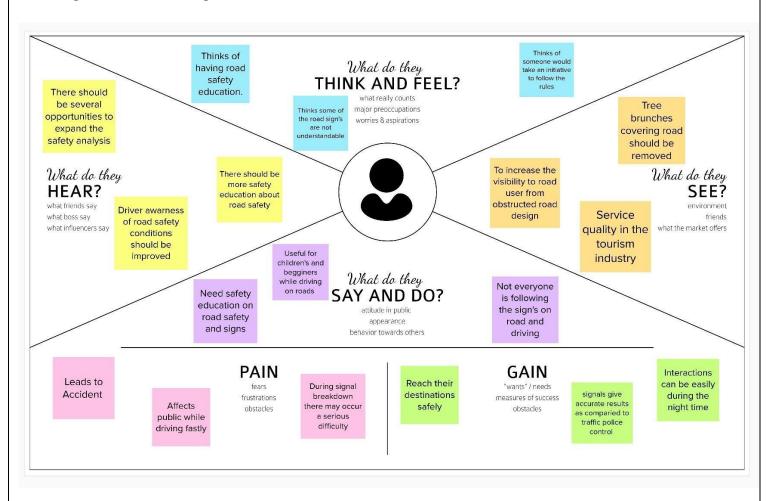
Problem Statement	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS=1	Traffic signals	Direct the people in traffic	Cannot able to instruct the people of time	Instruct them manually, if traffic signs don't work	To teach about road safety
PS-2	Vehicles	Reach my destination safely	There occurs many accident	People are not following traffic rules	Not to travel outside

3. IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas
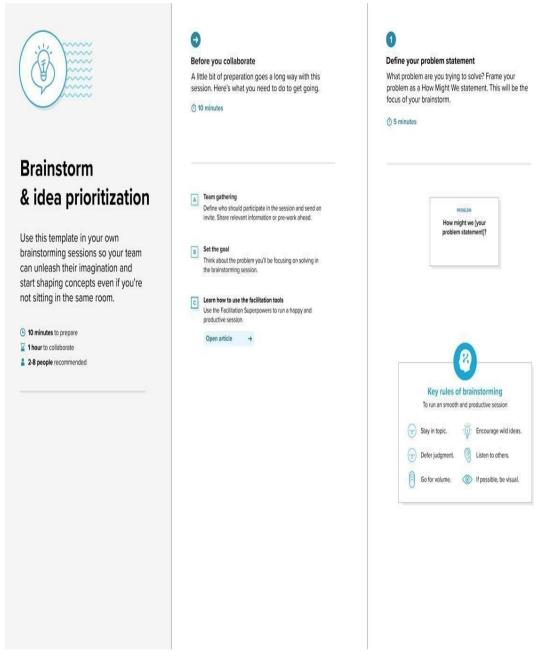
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behavior and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

Thinks of having road safety education.

What do they
THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations

Thinks of someone would take an initiative to follow the rules

There should be several opportunities to expand the safety analysis

Thinks some of the road sign's are not understandable

Tree brunches covering road should be removed

What do they
HEAR?
what friends say
what boss say
what influencers say

There should be more safety education about road safety

To increase the visibility to road user from obstructed road design

What do they
SEE?
environment
friends
what the market offers

Driver awarness of road safety conditions should be improved

Service quality in the tourism industry

Useful for children's and begginers while driving on roads

What do they
SAY AND DO?
attitude in public
appearance
behavior towards others

Not everyone is following the sign's on road and driving

Need safety education on road safety and signs

PAIN
fears
frustrations
obstacles

GAIN
"wants" / needs
measures of success
obstacles

Leads to Accident

Affects public while driving fastly

During signal breakdown there may occur a serious difficulty

Reach their destinations safely

signals give accurate results as comparied to traffic police control

Interactions can be easily during the night time

3.2 Ideation And Brainstorming

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

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

Brainstorm & idea prioritization

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

- ⏱ **10 minutes** to prepare
- ⏳ **1 hour** to collaborate
- 👤 **2-8 people** recommended

Before you collaborate

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

⏱ 10 minutes

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

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

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

Open article →

Define your problem statement

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

⏱ 5 minutes

PROBLEM
How might we [your problem statement]?

Key rules of brainstorming
To run an smooth and productive session

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

Step-2: Brainstorm, Idea Listing and Grouping

Brainstorm

Group ideas

Asis Nova

Identify the criteria in placing the smart sign boards.	Make sure the traffic signs are not clustered.	Make sure that collected weather report is accurate.
Cross check for false data.	Ease of accessibility of data should be maintained throughout.	Eliminate data redundancy.

Rohindh Kishore

Determine the inputs as given by the user.	Display the video tutorial to the public.	Make sure that the smart sign boards are simple and neat.
Design a suitable algorithm for sign boards.	Make sure whether the smart signs are reliable for the public.	Discard the unnecessary data.

Nirmal Raj

Smart signs are displayed through sign boards	Road divers as due to construction and traffic can be avoided.	Based on the weather the speed limit in the sign level may increase or decrease using weather API.
Road safety digitalized and well improved through digital sign boards	Sign boards may not work some times due to solar power and weather conditions.	Traffic signs will change automatically by detecting the moving using PIR sensor or the crossroads.

Gowtham

We can digitalize the boards that can even more clearly visible to drivers.	The sign boards have button is used when there is no network.	Using IOT devices the accidents happened in the road can be alerted to the other drivers.
Traffic signs will change ... toll calls by obtructing the moving using PIR sensor or the crossroads.	... weather ... tourism more and control to the smart signal boards.	Using weather API the weather can be predicted and it's condition will be displayed in the road sign board.

Testing

Make sure that the sign boards are reliable.	Ensure that the efciency is high
Test the model against various data	

Collection of data

Decide upon the user inputs and provide solution	Discard the false data
	Research about all the land scapes available

Designing Algorithm

Design the algorithm for the given problem	Make pseudo codes for the given algorithm
Extend the classification algorithm as and when required	

End of the user

Readability and accessibility to be maintained	Explain about the tutorial videos to the users.
	Make sure the signs are understandable

Step-3: Idea Prioritization

4

Prioritize

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

⏱ 20 minutes

→

After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A Share the mural
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B Export the mural
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

🗩 Share template feedback

Grid items

- Analyse the data and verify the info
- Ensure that the efficiency is high
- Design the algorithms
- Check the algorithm with teens
- Make sure that the sign boards are reliable.
- Deploy classification algorithm when required
- Test the model over various data available
- Ensure that the sign boards are user friendly
- Make pseudo codes for the given algorithm
- Make sure that smart boards are not clumsy
- Display the video tutorial on how the boards work
- Decide upon the user inputs and provide solution
- Research about all the land scapes available

❤ Importance

🚩 Feasibility

TIP

3.3 Proposed Solution

S. No	Parameter	Description
1.	Problem Statement (Problem to resolved)	Sign with Smart connectivity for better road safety provides knowledge about the drivers using IoT who do not have knowledge about traffic sign sand weather indications
2.	Idea / Solution description	Replacing the man-made painted sign into digital which is more visible compared to the current signs and also indicating weather in the same sign boards for drivers.
3.	Novelty / Uniqueness	Weather indication on sign boards should be 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
4.	Social Impact / Customer Satisfaction	It educates the people to know about traffic signs. They don't know about it, then it shows the digital signs and weather indication to avoid the Un necessary accidents.

5.	Business Model (Revenue Model)	This project can make revenue by selling as man equipment to the government sector and private sector
6.	Scalability of the Solution	To prevent and reduce the number of road related accidents and improve road safety.

3.4 Problem Solution fit

A complex process with numerous sub- processes, solution architecture connects business issues with technological solutions. the objectives are to

➢ Find the best technological solution to address current company issues.

➢ Describe to the project & stakeholders the software's & structure, distinction, behavior, and other features.

➢ Define the solution's requirements and concern , development stages, and features.

➢ Specifications on how the solution is defined, maintained, and delivered should be provided.

Project Title: Signs with smart connectivity for Better road safety | Project Design Phase-I - Solution Fit | Team ID: PNT2022TMID31677

Define CS, file into CI

1. CUSTOMER SEGMENT(S) CS
Who is your customer?
➢ Passengers / Public.
➢ Officers who maintain and regulate road safety.

6. CUSTOMER CC
What constraints prevent your customers from taking action or limit their choices of solutions?

➢ People who use automobiles.
➢ The vehicles must have digitally supported sensors which are suitable with sign boards to avoid inadequate post-crash.

5. AVAILABLE SOLUTIONS AS
Which solutions are available to the customers when they face the problem need to get the job done? What have they tried in the past? What pros & cons do these solutions have?
Cautionary Signs and Mandatory Signs painted on walls and roads by the corporation sectors are disappeared in a period of time.

Explore AS, differentiate

Focus on PRR, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P
Which jobs-to-be-done (or problems) do you address for your customers?
➢ Damage of sign boards due to internal or external factors.
➢ Selecting and Positioning the smart sign board.

9. PROBLEM ROOT CAUSE RC
What is the real reason that this problem exists? What is the back story behind the need to do this job?
➢ Some persons may cause issues by unnecessary use of indicators in vechiles.
➢ If there is no internet connection, no sensor data from the weather would cause speed limit to change.

7. BEHAVIOUR BE
What does your customer do to address the problem and get the job done?
➢ Static boards are not dependable to find weather in thedestination.
➢ Iot cloud improves the smart board on the condition of the roads on a regular basis.

Focus on J&P, tap into BE, understand RC

3. TRIGGERS `TR`

What triggers customers to act?

➢ People want to make their travel easier and safer .

➢ People are aware of the surroundings and traffic situations around them.

4. EMOTIONS: BEFORE / AFTER `EM`

How do customers feel when they face a problem or a job and afterwards?
.

➢ People will feel better after selecting a model with the use of smart connectivity and they will follow the instructions on the smart board

10. YOUR SOLUTION `SL`

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits in reality.

If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behavior.

➢ Connect the smart sign boards to access the applications provided by them such as confined speed limitations and weather predictions.

8. CHANNELS of BEHAVIOUR `CH`

8.1 ONLINE

What kind of actions do customers take online?

➢ Video tutorial are used to educate the public about the smart sign board.

➢ The severance can get coordinate emailsand messages from the customers

8.2 OFFLINE

What kind of actions do customers take offline?
Concern Authorities should give awareness programs to the public.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	The registration can be done through a web application
FR-2	User Need	It Must be fixed in where it is needed and less in where it is not needed.
FR-3	User Visibility	Sign boards should be attractive to the drivers so they can't distract to made accidents
FR-4	User Understanding	It should display information with images and texts so that the user can understand the Easily.
FR-5	User Convenience	The display should be clear and visible from far distance.
FR-6	User Requirements	The signboards can be replaced with smart sign boards that has all needs.

4.2 Non-Functional requirements

Following are the non-functional requirements of the proposed solution:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	It should be able to update whenever it required with respect to time
NFR-2	Security	It should be secure enough then only the intended messages will displayed properly
NFR-3	Reliability	It should be able to display the information correctly without making any errors.

NFR-4	Performance	The smart board should provide a better experience and deliver the accuracy output.
NFR-5	Availability	It should be available 24/7 so that it can be very useful to the users.
NFR-6	Scalability	Should be modular and hence able to scale on servers horizontally

5. PROJECT DESIGN

5.1 Data Flow Diagram
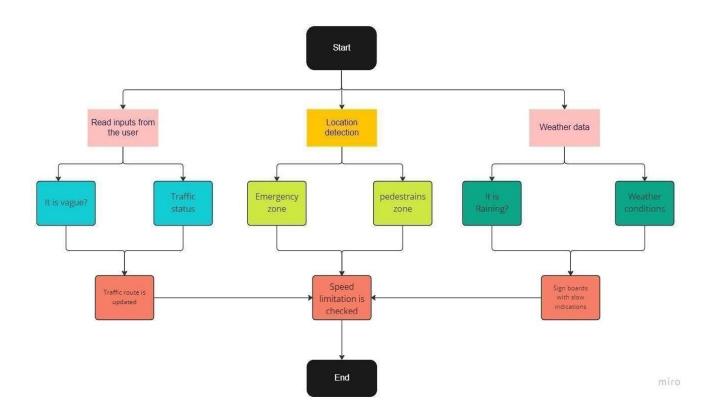
Fig: Data Flow Diagram

5.2 Solution & Technical Architecture

a) Solution Architecture Diagram

Solution architecture is a complex process – with many sub-processes – that bridgesthe gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.

- Describe the structure, characteristics, behavior, and other aspects of thesoftware to project stakeholders.

- Define features, development phases, and solution requirements.

- Provide specifications according to which the solution is defined, managed,and delivered.
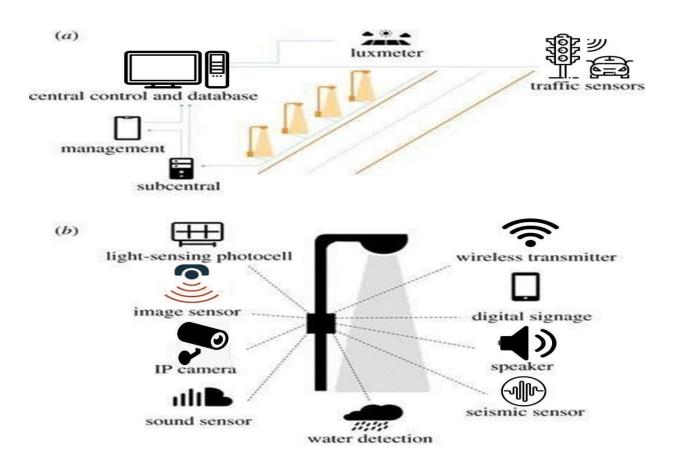
Fig: Architecture and dataflow for better road safety

b) Technical Architecture
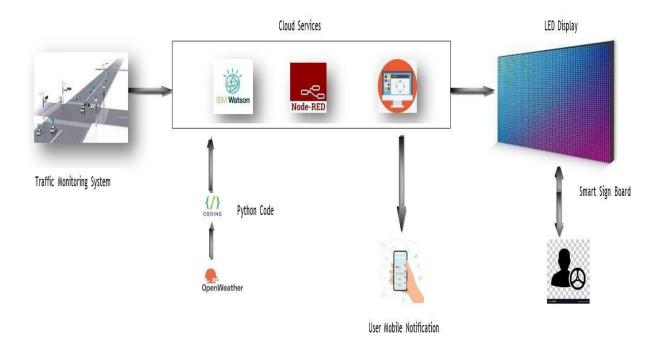
Fig: Technical Architecture

Table 1: Application Characteristics

S.No	Characteristics	Description	Technology
1.	Security Implementations	Strong security system with Firewall, Implementations without login credentials Firebase, cyber and hackers are not allowed to enter the network.	Firewall, Firebase, cyber resiliency strategy
2.	Scalable Architecture	Easy to expand the operating range IoT, internet. Architecture by increasing the bandwidth of the network.	IoT, internet.
3.	Availability	Available anytime and everywhere IBM	IBM Cloud

		Cloud 24/7 as long as the user is signed intothe network.	
4.	Performance	Supports a large number of users to IBM cloud access the technology simultaneously.	IBM Cloud

Table 2: Components and 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 / React Js 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, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.

5.3 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 speed limitation usingweather application .	I can receive speed limitations	High	Sprint-1
IoT devices	Automation	USN-2	As a user, I want to use IoT devices for automation purposes	Get the work done without manual effort	High	Sprint-2
Administrator	Problem solving	USN-3	As an official who is in charge for the proper functioning of the sign boards have to maintain it through periodic monitoring.	Officials can monitorthe sign boards for functioning	Medium	Sprint-2
Weather	Web app	USN-4	As a user, I can increase or decrease my speed according to the weather change	Get the weather of thatlocation	High	Sprint-1
User	Login	USN-5	As a user, I can log into the application by entering email & password	I can access the application	High	Sprint-1
Driver	Traffic status	USN-6	As a user, I can I get my traffic diversion signs depending on the traffic and the fatal situations.	I can access my trafficstatus ahead in my travel	Medium	Sprint-1
Customer (Web user)	Data generation	USN-7	As a user the interface should be simpleand easily accessible	I can access the data regarding the weather through the application	High	Sprint-1

Web UI	Interaction	USN-8	As a user, I want to interact with thedigital products	To interact with theusers	Medium	Sprint-2
Data validation	Checking accuracy	USN-9	As a user, I can check the ability and accuracy of the model in obtaining the required information	Check the capability ofthe model	High	Sprint-2

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning And Estimation
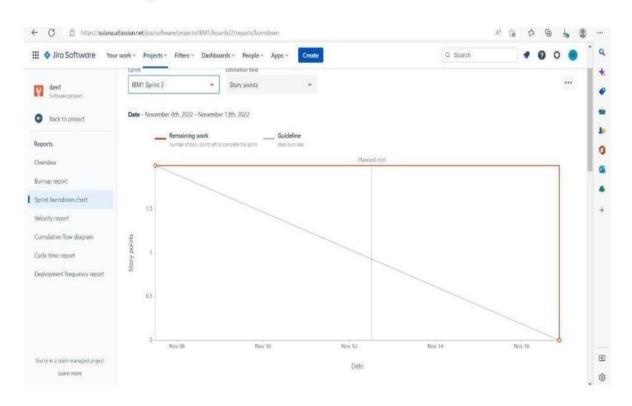
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Team Members
Sprint-1	Initialization and monitoring	USN-1	Initialize and create accounts in API and I log into theprofile and start monitoring the weather updates	Low	Rohindh Kishore Gowtham Nirmal Raj Asis Nova
Sprint-1	Software run	USN-2	Get the information about weather from API and runthe code that results for the inputs given about the weather and location	Medium	Rohindh Kishore Gowtham Nirmal Raj Asis Nova
Sprint-2	Sprint to cloud	USN-3	Update if any changes occurs in the status of signboard and move the code from Sprint1 to cloud	Medium	Rohindh Kishore Gowtham Nirmal Raj Asis Nova
Sprint-3	Initialization of hardware	USN-4	Initialize the hardware to access the functions like to slow down near schools and near hospitals to displayno horn	High	Rohindh Kishore Gowtham Nirmal Raj Asis Nova
Sprint-4	Debugging	USN-5	Debug the code and ensure the accuracy and efficiency to provide better results	Low	Rohindh Kishore Gowtham Nirmal Raj Asis Nova

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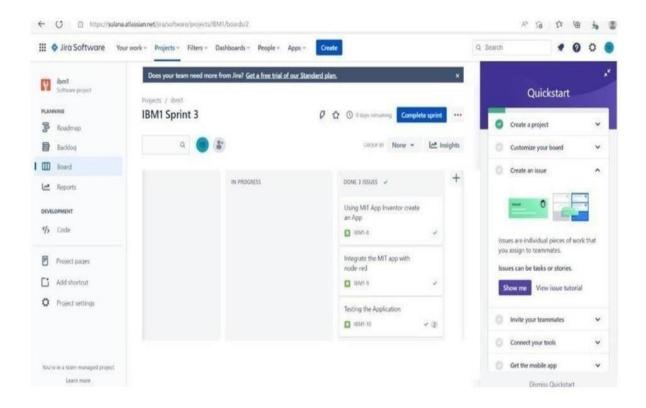
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Sprint Release Date(Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	31 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	07 Oct 2022
Sprint-4	20	6 Days	14 Nov 2022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

6.3 Reports from JIRA
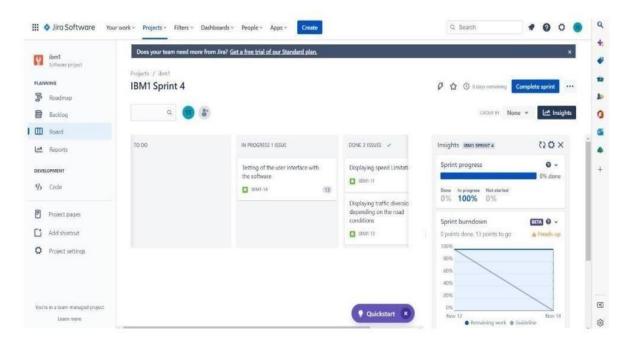
Burndown Chart for Sprint – 3:

Sprint -3 :
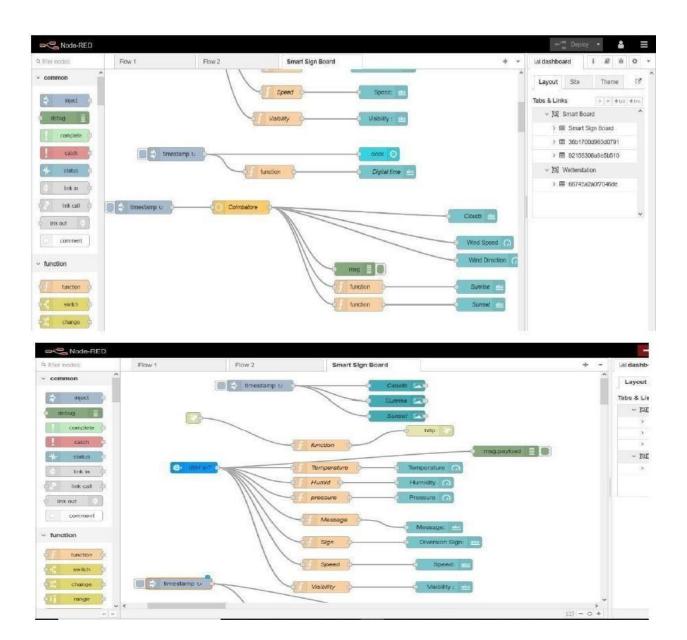
Sprint - 4 :

7. CODING AND SOLUTION

7.1 Feature 1

This part of Node RED flow accepts an http GET end point, from which the location, uid, info are passed. Message parser sets the required API KEY for OpenWeatherAPI for the next block. This data is then passed onto Decision Maker which makes all the decisions regarding the message to be output at the display and sends it as a http response. This data is displayed at the microcontroller. Thus a lot of battery is saved due to lesser processing time.

7.2 Feature 2

GET SPEED LIMITATIONS, MESSAGES, SIGNS

The Node RED flow obtains the data published to the cloud such as speed limitations, messages such as warnings about the zones (schools, hospitals, police stations), signs such as diversions, U- turns etc, and displays them in the dashboard

8. TESTING

8.1 Test Cases

● TEST CASE 1
Temperature': 303.03, 'Humidity': 51, 'Pressure': 1010, 'Message': 'SLOW DOWN , SCHOOL IS NEAR', 'Sign': '', 'Speed': '', 'Visibility': 'Clear Weather'

● TEST CASE 2
Temperature': 303.03, 'Humidity': 51, 'Pressure': 1010, 'Message': '', 'Sign': 'Left Diversion
<-', 'Speed': 'SLOW DOWN , Speed Limit Exceeded', 'Visibility': 'Clear Weather'

● TEST CASE 3
Temperature': 303.03, 'Humidity': 51, 'Pressure': 1010, 'Message': 'SLOW DOWN , HOSPITAL NEARBY', 'Sign': 'Left Diversion <-', 'Speed': '', 'Visibility': 'Clear Weather'

● TEST CASE 4
Temperature': 303.03, 'Humidity': 51, 'Pressure': 1010, 'Message': 'NEED HELP, POLICE STATION NEARBY', 'Sign': 'U Turn', 'Speed': 'Moderate Speed', 'Visibility': 'Clear Weather'.

8.2 User Acceptance Testing

Dynamic speed & diversion variations based on the weather and traffic helps user to avoid traffic and have a safe journey home. The users would welcome this idea to be implemented everywhere.

9. RESULTS

9.1 Performance Metrics

The performance of the website varies based on the software chosen for implementation. Built upon NodeJS, a light and high performance engine, NodeRED is capable of handling upto 10,000 requests per second. Moreover, since the system is horizontally scalable, a even higher demand of customers can be served.

10. ADVANTAGES AND DISADVANTAGES

- **ADVANTAGES**

  - Lower battery consumption since processing is done mostly by Node RED servers in the cloud.

  - Cheaper and low requirement micro controllers can be used since processing requirements are reduced.

  - Longer lasting systems.

  - Dynamic Sign updation.

  - School/Hospital Zone alerts

- **DISADVANTAGES**

  - The size of the display determines the requirement of the micro controller

  - Dependent on OpenWeatherAPI and hence the speed reduction is same for a large area in the scale of cities.

11. CONCLUSION

Our project aims to change the classic static traffic signals into dynamic, which can reduce the occurrence of accidents in many public places. The system is build so as to facilitate the risk of life threatening due to accidents and to discipline the traffic rules.

12. FUTURE SCOPE

- Introduction of intelligent road sign groups in real life scenarios could have great impact on increasing the driving safety by providing the end-user with the most accurate information regarding the current road and traffic conditions.

- Even displaying the information of a suggested driving speed and road surface condition (temperature, icy, wet or dry surface) could result in smoother traffic flows and, what is more important, in increasing a driver's awareness of the road situation.

13. APPENDIX

13.1 Source Code

```
import wiotp.sdk.device
import time
import random
import requests, json
myConfig = {
    "identity": {
    "orgId": "ojfcbe",
    "typeId": "sulan",
    "deviceId":"1234"
},
"auth": {
    "token": "RsCA-twpue)2)c8j&r"

}}
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()
BASE_URL = https://api.openweathermap.org/data/2.5/weather?
CITY = "Coimbatore"
URL=BASE_URL+"q="+"Coimbatore"+"&appid="+"fbcb52a2a6c7bbea1396de2b6b17ea"
```

```python
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']
                repo=random.randint(0,5)
                if repo==1:
                        prt="SLOW DOWN , SCHOOL IS NEAR"
                elif repo==3:
                        prt="SLOW DOWN , HOSPITAL NEARBY"
                elif repo==5:
                        prt="NEED HELP, POLICE STATION NEARBY"
                else:
                        prt=""
                speed=random.randint(0,150)
                if speed>=100:
                        prt3="SLOW DOWN , Speed Limit Exceeded"
                elif speed>=60 and speed<100:
                        prt3="Moderate Speed"
                else:
                        prt3="Usual speed limit"
                sign=random.randint(0,5)
                if sign==1:
                        prt2="Right Diversion ->"
                elif sign==3:
                        prt2="Left Diversion <-"
                elif sign==5:
                        prt2="U Turn"
                else:
                        prt2=""
                if temperature<=50:
```

```
                    prt4="Fog Ahead, Drive Slow"
            else:
                    prt4="Clear Weather"
    else:
        print("Error in the HTTP request")
        myData={
            'Temperature':temperature,
            'Humidity':humidity,
            'Pressure':pressure,
            'Message':prt,
            'Sign':prt2,
            'Speed':prt3,
            'Visibility':prt4
        }
    client.publishEvent(eventId="status",msgFormat="json",data=myData, qos=0,
onPublish=None)
print("Published data Successfully: %s",myData)
client.commandCallback = myCommandCallback time.sleep(5)
client.disconnect()
```

13.2 GitHub And Project Demo Link

a) GitHub

https://github.com/IBM-EPBL/IBM-Project-47119-1660796618

b) Project Demo Link

https://drive.google.com/file/d/1lj7J40dAfTFKhinvhIvtY5mOndAPQmXP/view?usp=drivesdk