SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

IBM PROJECT REPORT

SUBMITTED BY

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NOV 2022

1.INTRODUCTION

1.1.PROJECT OVERVIEW:

The speed limits and road signage in use today are static. However, under specific circumstances, the signs may be modified. Our project focuses on replacing static sign boards with smart digital boards, which automatically update with the latest speed restrictions from a web app using weather API.If the road signs are digitalized, we may take into account situations when there are detours due to traffic congestion or accidents and adjust the signs accordingly.This proposal suggests a system that uses digital sign boards with constantly changing signs. Rainfall causes the roads to become slick, and the speed restriction is lowered.The speed may rise or fall depending on the weather.

Diversion signs are posted based on traffic conditions and potential fatalities.The appropriate guide, warning, and service signs are also posted in hospitals and restaurants.With the use of buttons, many operating modes can be chosen.There is a web application that allows you to enter information about road detours, accident-prone regions, and informational sign boards.The sign boards display this info after it has been retrieved.People need a more effective digital traffic control system that alerts drivers in advance of any accidents so that they can choose an alternative route to their destination.

1.2.PURPOSE:

By giving the driver up-to-date traffic information, they increase vehicle safety. Road signs are crucial to driving safety. Road signs must be readable from a distance that enables drivers to make the appropriate decisions in order to be effective.Transferring road sign values from the Node-RED Web UI to the IBM IoT platform.The web application allows users to view current weather conditions.

- Preventing Wrong-way Crashes

- Better Traffic Management and Safety

2 .LITERATURE SURVEY

2.1.EXISTING PROBLEM :

In today's world road signs are static ,which it cannot be changed.In this system static boards are converted into dynamic smart boards,in which the signs are changed due to weather conditions and also indicates the occurance of accidents and assist the people to take alternative ways to reach the destination.By this system we can safe more time ,money and energy. It is very much useful in hospital and education institutional areas. IoT cloud updates the smart sign boards based on certain conditions. Educate the people , and reduces the accidents

- Internet connectivity leads to delay of informtion about the traffic signs

- Inadequate knowledge about traffic signs leads to road accidents

2.1 REFERENCES:

1.Automatic road traffic signs detection and recognition using 'You Only Look Once' version 4 (YOLOv4)--Publisher IEEE W. H. D. Fernando; S. Sotheeswaran--Date Added to IEEE Xplore: 25 October 2021

- The traffic sign detection and recognition system (TSDR) play an essential role in the intelligent transportation system (ITS). TSDR can be utilized for driver assistance and, eventually, driverless cars to reduce accidents

- TSDR allows drivers to view traffic sign information without having to divert their attention.

- YOLOv4 was evaluated on our dataset, which consisted of manual annotations to identify 43 distinctive traffic signs classes. It was able to achieve an average recognition accuracy of 84.7%. *Overall, the work adds by presenting a basic yet effective model for real-time detection and recognition of traffic signs.

2.An Efficient Real-Time Traffic Sign Recognition System for Intelligent Vehicles with Smart Phones--Publisher: IEEE Ching-Hao Lai; Chia-Chen Yu--Date Added to IEEE Xplore: 20 January 2011

- The traffic sign recognition system is one kind of driving assistance system (DAS) which is used to automatically inform the driver the traffic sign information by a head up display (HUD),monitor, or speaker device.

- The proposed scheme can integrate in-vehicle computing devices and smart phones to construe an in-vehicle traffic sign recognition system.

- This scheme contains four major stages: video frame capturing and transmitting, image preprocess, traffic sign detection, and character/icon extraction and recognition.

- smart phone first captures videos,these extracted frames can be transmitted to an in-vehicle computing device by a wireless network(Bluetooth,WiMAX,Wi-Fietc.)

- Lower computing complexity, however it still can obtain a well accuracy.

3. Wireless digital traffic signs of the future publisher: IET-Chai K. Toh;Juan-Carlos Cano; Carlos Fernandez-Laguia;Pietro Manzoni;Carlos T. Calafate October 2018

- With advancements in wireless communications, embedded electronics, and software, the author worked on the system where it has digital traffic sign posts will be able to wirelessly broadcast traffic sign information to drivers, transforming our roads into intelligent highways where In-vehicle displays will prompt and automatically display signs to warn the driver.

- No longer is it necessary to exercise caution for traffic signs since automatic wireless detection will be used.

- This change will ease the pressure on the drivers, allowing them to concentrate more on the traffic up ahead while they are driving. Additionally, the development of wireless digital sign posts integrate nicely with the idea of future smart cities, where intelligent transportation

4. Automated Real-Time Intelligent Traffic Control System for Smart Cities Using Wireless Sensor Networks Adil Hilmani, Abderrahim Maizate, and Larbi Hassouni

- In recent years, traffic jams have become one of the main challenges for engineers and designers to create an intelligent traffic management system capable of effectively detecting and reducing the overall density of traffic in most urban areas visited by motorists such as offices, downtown, and establishments based on several modern technologies, including wireless sensor networks (WSNs), surveillance camera, and IoT.

- In this article, we propose an intelligent traffic control system based on the design of a wireless sensor network (WSN) in order to collect data on road traffic and also on available parking spaces in a smart city.

- Our system integrates three smart subsystems connected to each other(crossroad management, parking space management, and a mobile application) in order to connect citizens to a smart city
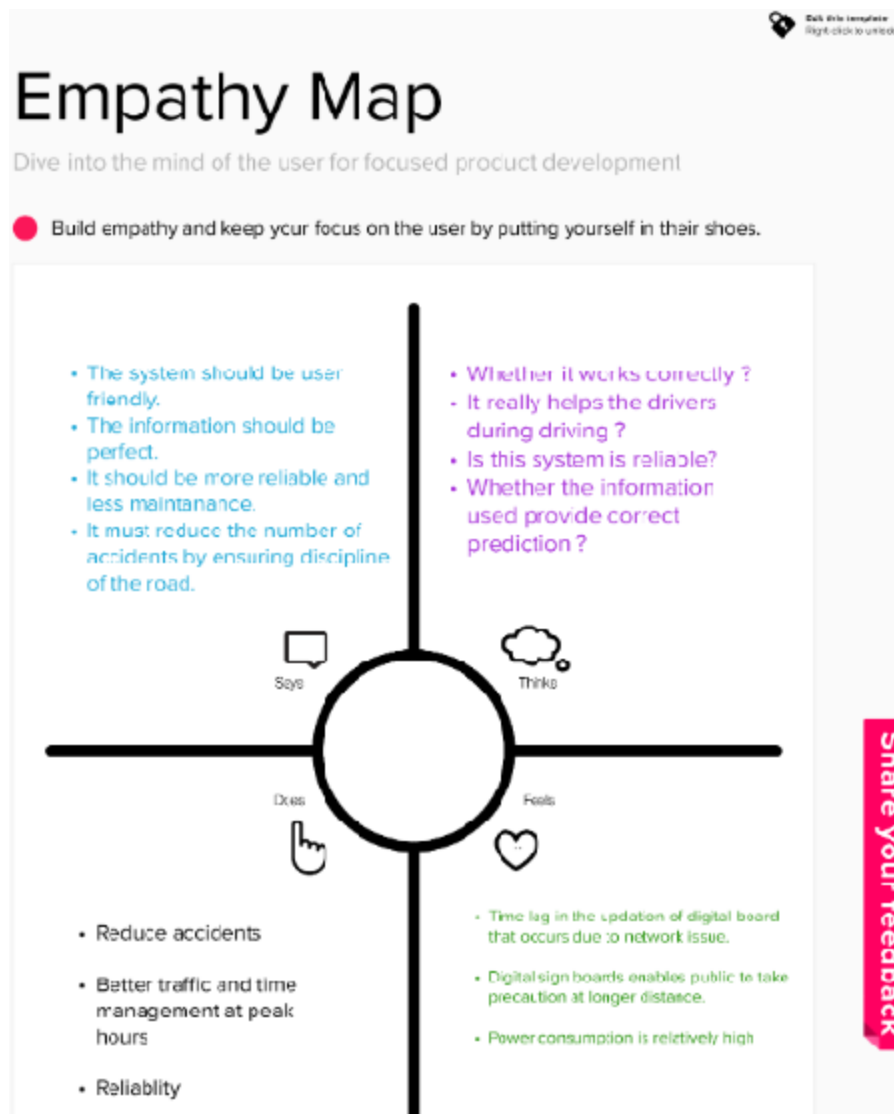
2.3 PROBLEM STATEMENT DEFINITION :

"Replacement of static sign board to smart digital boards and to notify the riders ahead in case of any accidents."

- This system can be implemented by extracting weather data from Open Weather map using API's.

- Through the extracted data from the web app the sign boards get the speed limitations and update automatically.

- In addition to this, due to the occurrence of the sudden accidents people were suffered by heavy traffic congestion and this can be solved by sending the accident that information is reflected through the traffic signals and sign boards.

- This can be done by either the web application or by the buttons that are predefined with separate symbols

3.IDEATION AND PROPOSED SOLUTION

3.1.EMPATHY MAP CANVAS:

Empathy Map

Dive into the mind of the user for focused product development

● Build empathy and keep your focus on the user by putting yourself in their shoes.

- The system should be user friendly.
- The information should be perfect.
- It should be more reliable and less maintanance.
- It must reduce the number of accidents by ensuring discipline of the road.

- Whether it works correctly ?
- It really helps the drivers during driving ?
- Is this system is reliable?
- Whether the information used provide correct prediction ?

Says

Thinks

Does

Feels

- Reduce accidents

- Better traffic and time management at peak hours

- Reliablity

- Time lag in the updation of digital board that occurs due to network issue.

- Digital sign boards enables public to take precaution at longer distance.

- Power consumption is reletively high

Share your feedback

3.2. IDEATION AND BRAINSTORMING:

3.3 PROPOSED SOLUTION:

S.No	Parameter	Description
1	Problem Statement (Problem to be solved)	Replacement of static sign board to smart digital boards and to notify the riders ahead in case of any accidents.
2	Idea / Solution description	• This system can be implemented by extracting weather data from Open Weather map using API's. • Through the extracted data from the web app the sign boards get the speed limitations and update automatically. • In addition to this, due to the occurrence of the sudden accidents people were suffered by heavy traffic congestion and this can be solved by sending

		the accident information to the cloud and that information is reflected through the traffic signals and sign boards.
		● This can be done by either the web application or by the buttons that are predefined with separate symbols.
3	Novelty / Uniqueness	● Digital Sign board for all applications that uses both buttons and web service for updation.
		● It notifies the riders ahead in case of accidents so that people can opt better ways to reach their destination.
4	Social Impact / Customer Satisfaction	● Ambulance with patient, School students and working people can take alternative paths to reach their destination which is entirely time saving.
		● Diversion reasons will be displayed

		through the sign boards and traffic signals
5	Business Model (Revenue Model)	• This product is aimed to be free of cost to the public, but the revenue will be generated by selling this product to the government at a low cost, so there will be less accidents and the public will be aware of the discrepancies or accidents in the particular road.
6	Scalability of the Solution	• Slight modification in the programming of the existing product and website application has to be updated with the additional functionality for further updation . • Easy maintenance and efficient system.

3.4. PROBLEM SOLUTION FIT:

Project Title: Signs with Smart Connectivity for Better Road Safety

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID21781

1. CUSTOMER SEGMENT(S) `CS`

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

- It is useful for drivers in different road structure
- It is very much useful for passengers

6. CUSTOMER CONSTRAINTS `CC`

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

- Customer no need to spend money and power.
- This IoT based system is internet depended so it is available until any fault

5. AVAILABLE SOLUTIONS `AS`

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

Static sign boards are available to the customer. Inadequate knowledge about road signs leads to road accidents .In this project we can make a smart sign boards with accident reduction technique

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

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

- This system educates people about traffic signs
- According to weather condition , respective changes in smart sign board leads to reduction in accidents and also it notifies the rider 500 meter ahead in case of any accident

9. PROBLEM ROOT CAUSE `RC`

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

- Inadequate knowledge about traffic signs
- Back story-people forget to wear seat belt and usage of mobile phones leads to road accidents
- Internet connectivity leads to delay of information

7. BEHAVIOUR `BE`

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

- IoT cloud updates the smart sign boards based on certain conditions.
- Educate the people , and reduces the accidents

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3. TRIGGERS `TR`

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

Educate the people about traffic signs. Vehicles should be moving at threshold speed.

10. YOUR SOLUTION `SL`

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

8. CHANNELS of BEHAVIOUR `CH`

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

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

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4. EMOTIONS: BEFORE / AFTER `EM`

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

Before people have inadequate knowledge about roadsigns and also cannot predict the weather condition ,due to this the road accidents are increased .
After the implementation of this system ,educate the people and indicate the weather condition ,by this we can prevent the road accidents .

In today's world road signs are static ,which it cannot be changed.In this system static boards are converted into dynamic smart boards,in which the signs are changed due to weather conditions and also indicates the occurance of accidents and assist the people to take alternative ways to reach the destination .By this system we can safe more time ,money and energy. It is very much useful in hospital and education institutional areas .

8.1 ONLINE
Customer can address their feedback through emails, apps or messaging to the department to get their job done
8.2 OFFLINE
People can utilize the smartboard signs to check the state of the road , wherever they present .

4.REQUIREMENT ANALYSIS

4.1. FUNCTIONAL REQUIREMENT:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	- Registration through Form - Registration through Gmail - Registration through LinkedIN
FR-2	User Confirmation	- Confirmation via Email - Confirmation via OTP
FR-3	User Visibility	Sign Boards should be made of bright coloured LEDs capable of attracting driver's attention.

FR-4	User Understanding	● Display should be big enough to display all the signs correctly so that it is understandable even to far away drivers.
FR-5	Information delivering time	● The accident information should be delivered before certain distance then only the driver can change the route of destination.

4.2 NON-FUNCTIONAL REQUIREMENTS

FR No	Non-Functional Requirement	Description
NFR-1	Usability	Product that is simple to use. It can be used and understandable by all people without any predefined training.

NFR-2	Security	A robust security system must be used so that no hackers can enter with authorization into the IoT based system.
NFR-3	Reliability	For high reliability correct and authorized signs should be displayed.
NFR-4	Performance	Automatic updation should be done in case of sudden accidents and weather changes.
NFR-5	Availability	Signs boards must work 24/7, so proper power supply or battery should be given to the sign boards.
NFR-6	Scalability	It should be implemented through the entire highway system.

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS
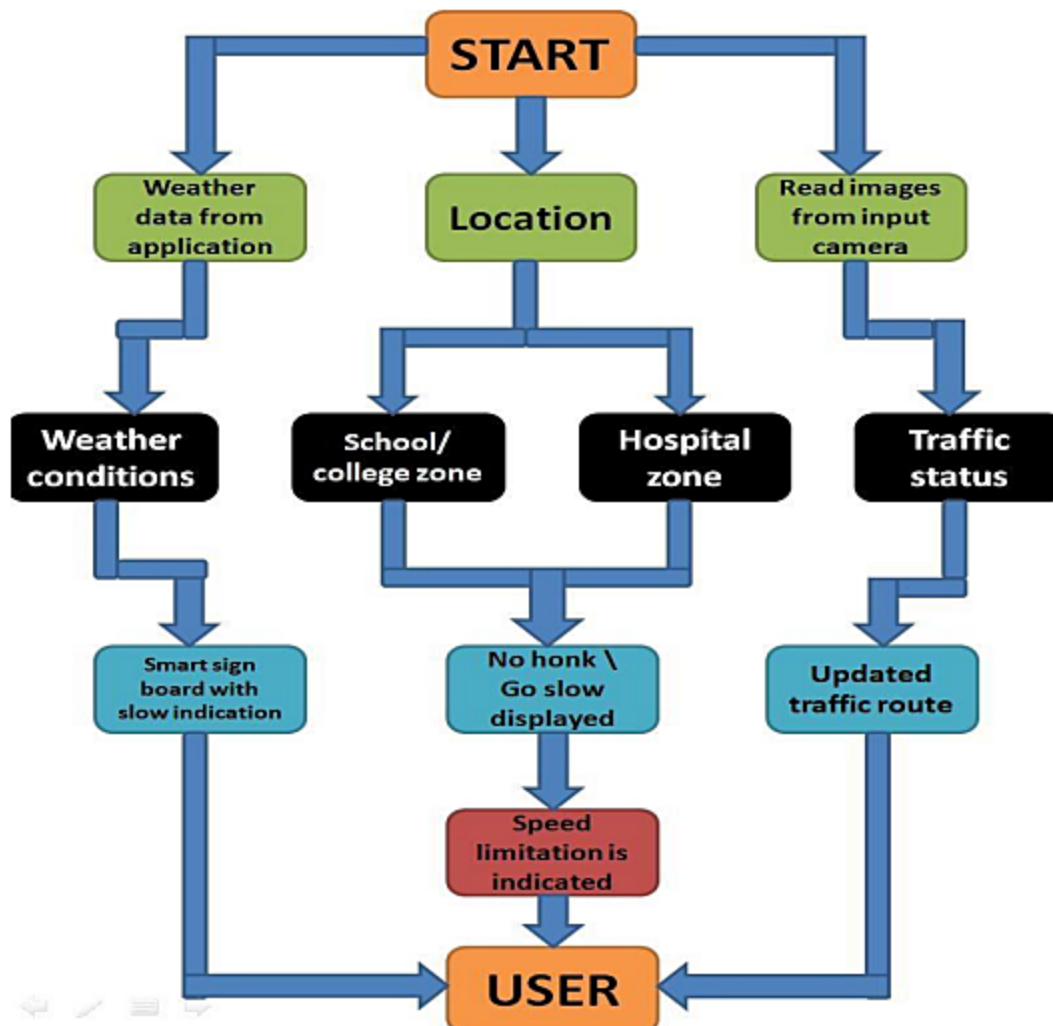
5.2 SOLUTION & TECHNICAL ARCHITECTURE:
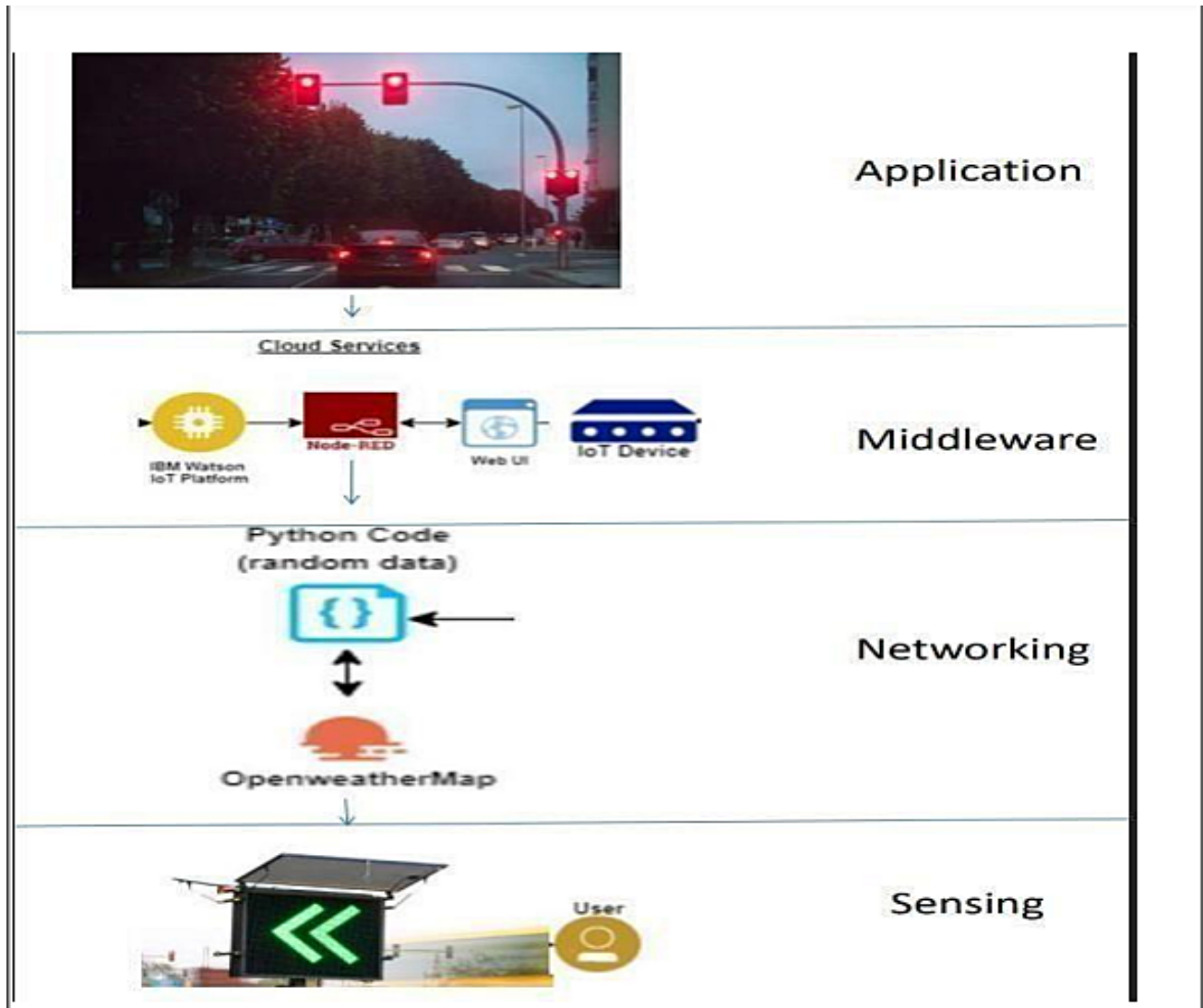
GUIDELINES:

- To replace the static signboards, smart connected sign boards are used.
- These smart connected sign boards get the speed limitations from a web app using weather API and update automatically.
- Based on the weather changes the speed may increase or decrease.
- Based on the traffic and fatal situations the diversion signs are displayed.
- Guide(Schools), Warning and Service(Hospitals, Restaurant) signs are also displayed accordingly.
- 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 of the road diversions, accident prone areas and the information sign boards can be entered through web app. This data is retrieved and displayed on the sign boards accordingly.
- Different modes of operations can be selected with the helpof buttons.

S.No	Component	Description	Technology
1.	User Interface	User can able to access the feature through the digital sign boards placed at fixed distance	IoT,Python
2.	Application Logic-2	IBM Watson is a data analytics processor that uses natural language processing, for processing vast stores of data	IBM Watson
3.	Application Logic-3	A flow based programming tool for wiring togetherhardware devices , api , online services	IBM Node red
4.	Cloud Database	IBM Cloud provides solutions that enable higher levels of compliance, security, and management, with proven architecture patterns and methods for rapid delivery for	IBM Cloud

S.No		Description	
		running mission-critical workloads	
5.	External API-1	The OpenWeatherMap API currently provides a wide variety of weather data including current weather, forecasts, history record	Open weather API

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology
1.	Security Implementations	Has a strong security to the database that cant be accessed without a particular credentials	cyber resiliency strategy
2.	Scalable Architecture	The architecture is connected with the help of Internet .The range of operation can be increased by increasing bandwidth	internet.
3.	Availability	Available anytime and everywhere 24/7 as long as the user is signed into the network.	IBM Cloud
4.	Performance	Supports a large number of users to access the technology simultaneously.	IBM cloud

5.3 USER STORIES :

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 using weather application.	I can receive speed limitations	High	Sprint-1
		USN-2	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account /dashboard	Medium	Sprint-2
		USN-3	As a user, I can increase or decrease my speed according to the weather change	I can increase or decrease my speed	High	Sprint-1
		USN-4	As a user, I can I get my traffic diversion signs depending on the traffic and the fatal situations.	I can access my traffic status ahead in my travel	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the open weather map by entering email & password	I can access the application through my Gmail login	High	Sprint-2
	Interface	USN-6	As a user the interface should be simple and easily accessible	I can access the Interface easily	High	Sprint-1

6. PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND 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	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Ksheeraja Lakshmi Priya
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Ragul,Menaga
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Lakshmi Priya,Ragul
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Menaga,Ksheeraja
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Ksheeraja,Ragul
	Dashboard					

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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		
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	20	6 Days	14 Nov 2022	19 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)

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

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

https://www.visual-paradigm.com/scrum/scrum-burndown-chart/

https://www.atlassian.com/agile/tutorials/burndown-charts

Reference:

https://www.atlassian.com/agile/project-management

https://www.atlassian.com/agile/tutorials/how-to-do-scrum-with-jira-software

https://www.atlassian.com/agile/tutorials/epics

https://www.atlassian.com/agile/tutorials/sprints

https://www.atlassian.com/agile/project-management/estimation

https://www.atlassian.com/agile/tutorials/burndown-charts

6.2 SPRINT DELIVERY SCHEDULING:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-1	Create the IBM Cloud services which are being used in this project.	6	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-1		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	5	Medium	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-2		US-1	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		US-2	Create a Node-RED service.	10	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-3		US-1	Develop a python script to publish random sensor data such as temperature, humidity,rain to the IBM IoT platform	7	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	Medium	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul

Sprint		US-3	Publish Data to The IBM Cloud	8	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-3		US-3	Publish Data to The IBM Cloud	8	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-4		US-1	Create Web UI in Node- Red	10	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul
Sprint-4		US-2	Configure the Node-RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB	10	High	S. Ksheeraja S. Lakshmi Priya B. Menaga V. Ragul

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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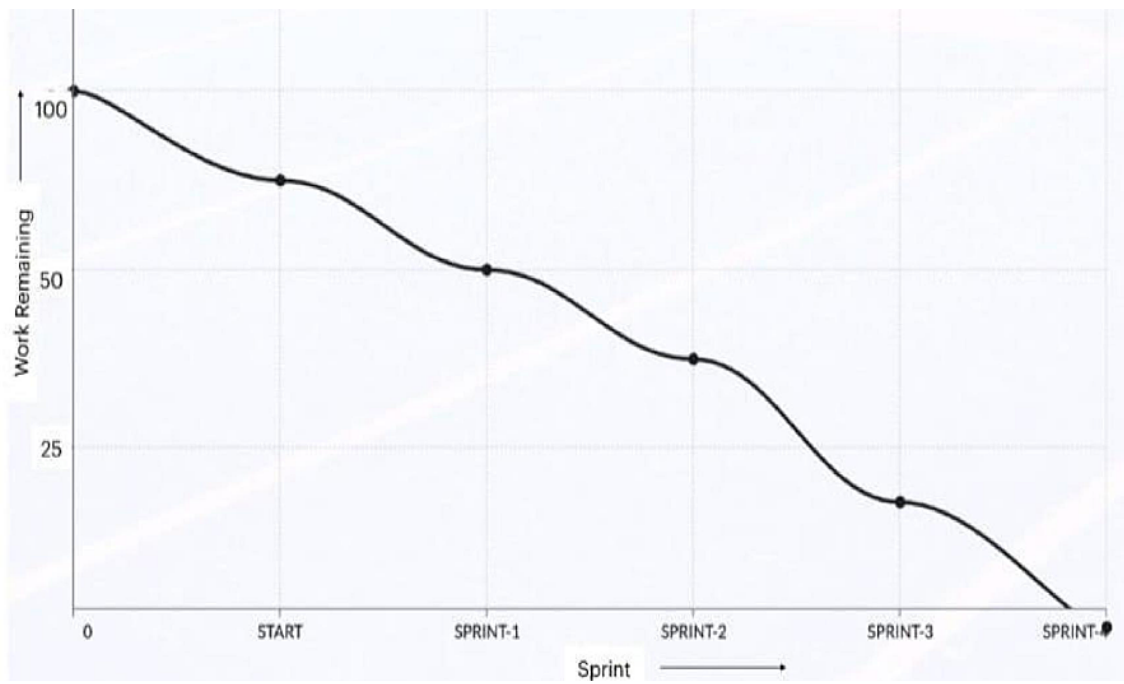
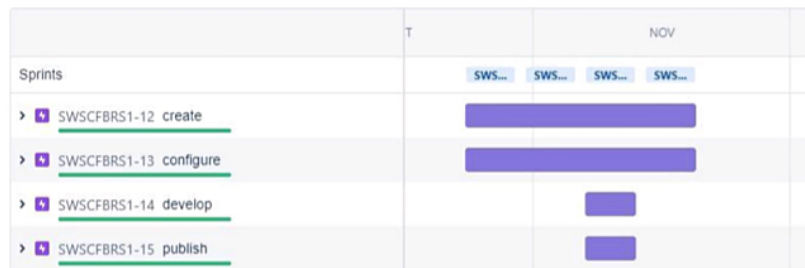$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:

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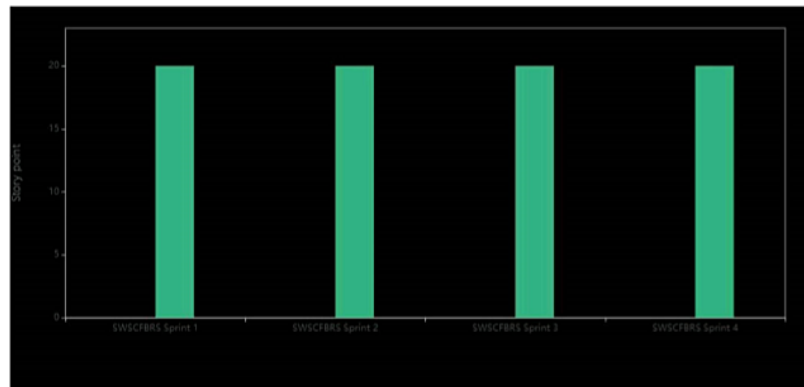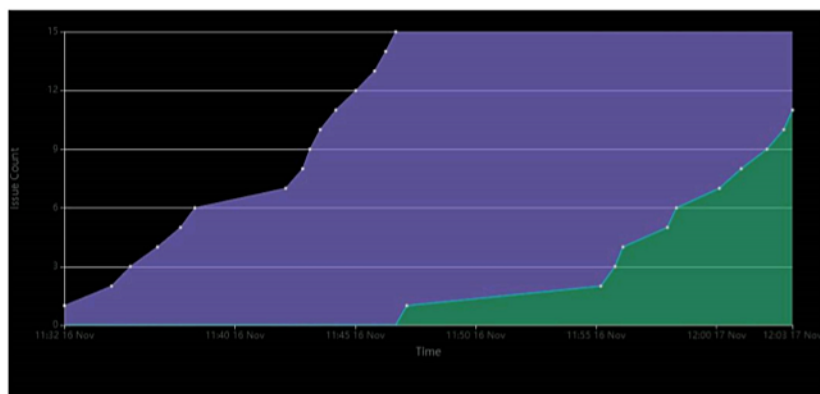
BURNDOWN CHART:

6.3 REPORTS FROM JIRA

	T	NOV
Sprints		SWS... SWS... SWS... SWS...
› SWSCFBRS1-12 create		
› SWSCFBRS1-13 configure		
› SWSCFBRS1-14 develop		
› SWSCFBRS1-15 publish		

Velocity report:

Cummulative flow digram:

7. CODING AND SOLUTIONING:

```python
import time

import sys

import ibmiotf.application

import ibmiotf.device

import random


#Provide your IBM Watson DeviceCredentials
organization = "cbp14d"

deviceType = "PNT2022TMID21782"

deviceId = "PNT2022TMID21782"

authMethod = "token"  authToken = "1234567890"


#Intialize GPIO
def myCommandCallback(cmd):

    print("Command received: %s % cmd.data['command']")

    status=cmd.data['command']

    if status=="lighton":

        print ("led is on")

    else :

        print("led is off")
```

```python
#print(cmd)


 try:

deviceOptions = {"org": organization,"type":
deviceType,"id":deviceId,"authmethod":authMethod,"auth-
token":authToken}

deviceCli = ibmiotf.device.Client(deviceOptions)

#.............................

except Exception as e:

print("Caught exception connecting device: %s" % str(e))

sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as
an event of type "greeting" 10 times

deviceCli.connect()
```
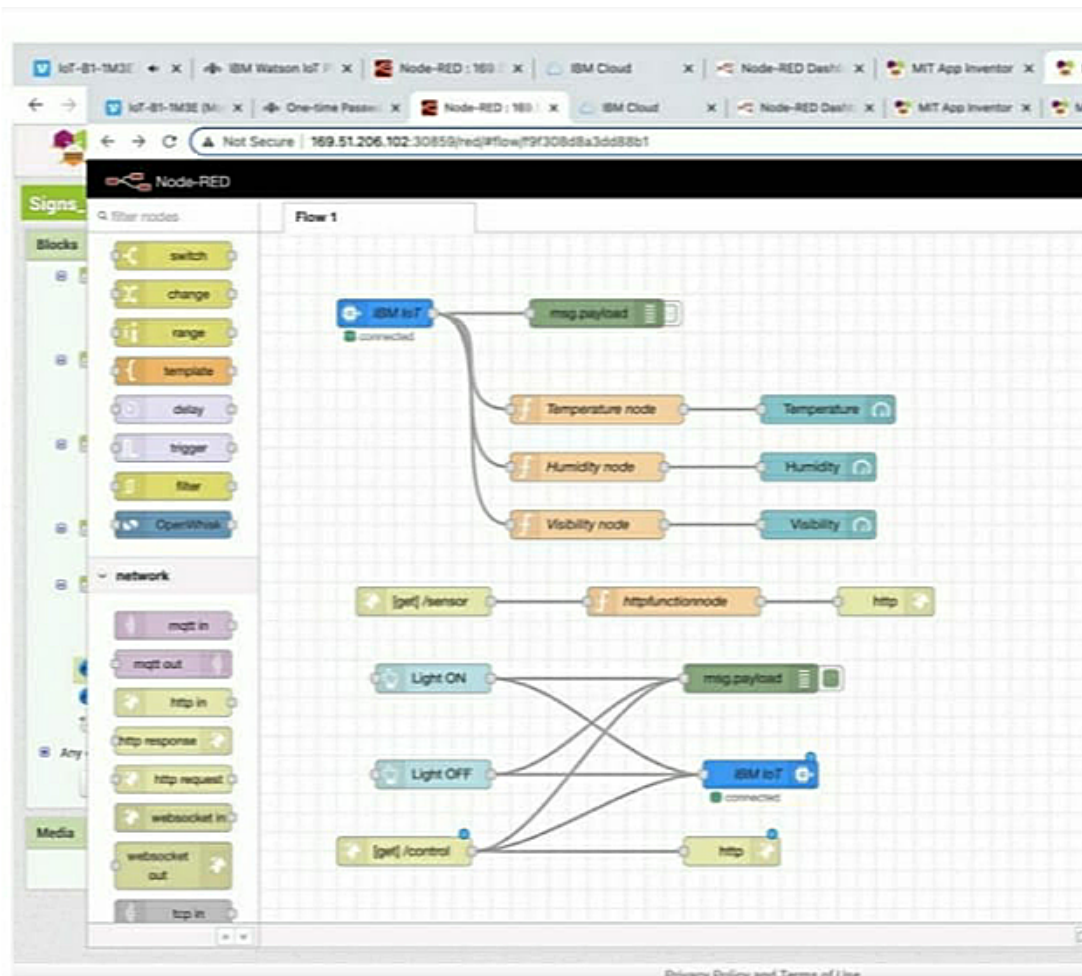
7.1 FEATURE 1 (NODE RED OUTPUT)

7.2 FEATURE 2:

File Edit Shell Debug Options Window Help

```
Published Temperature = 72 C Humidity = 38
Published Temperature = 29 C Humidity = 58
Published Temperature = 71 C Humidity = 14
Published Temperature = 5 C Humidity = 32 %
Published Temperature = 51 C Humidity = 20
Published Temperature = 87 C Humidity = 10
Published Temperature = 35 C Humidity = 14
Published Temperature = 8 C Humidity = 28 %
Published Temperature = 69 C Humidity = 90
Published Temperature = 39 C Humidity = 0 %
Published Temperature = 88 C Humidity = 62
Published Temperature = 76 C Humidity = 89
Published Temperature = 99 C Humidity = 90
Published Temperature = 93 C Humidity = 36
Published Temperature = 98 C Humidity = 23
Published Temperature = 32 C Humidity = 72
Published Temperature = 55 C Humidity = 7 %
Published Temperature = 100 C Humidity = 74
Published Temperature = 64 C Humidity = 86
Published Temperature = 55 C Humidity = 5 %
Published Temperature = 72 C Humidity = 28
Published Temperature = 10 C Humidity = 54
Published Temperature = 30 C Humidity = 82
Published Temperature = 40 C Humidity = 95
Published Temperature = 28 C Humidity = 18 %
Published Temperature = 47 C Humidity = 66 %
Published Temperature = 58 C Humidity = 86 %
Published Temperature = 98 C Humidity = 19 %
Published Temperature = 12 C Humidity = 81 %
Published Temperature = 32 C Humidity = 79 %
Published Temperature = 37 C Humidity = 80 %
Published Temperature = 73 C Humidity = 59 %
Published Temperature = 51 C Humidity = 69 %
Published Temperature = 96 C Humidity = 13 %
Published Temperature = 28 C Humidity = 62 %
Published Temperature = 86 C Humidity = 69 %
Published Temperature = 48 C Humidity = 5 %
Published Temperature = 20 C Humidity = 51 %
```

8. TESTING:

8.1 Test cases

[https://docs.google.com/spreadsheets/d/1HYQNPs_RYxHBSLgY ytEHFCrljVoTMXVs3HotD1HTEso/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1HYQNPs_RYxHBSLgYytEHFCrljVoTMXVs3HotD1HTEso/edit?usp=sharing)

8.2 User Acceptance testing

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	3	4	7	2	16
Duplicate	0	3	0	1	4
External	2	1	0	3	6
Fixed	10	18	3	2	33
Not Reproduced	1	0	0	0	1
Skipped	0	1	0	1	2
Won't Fix	5	0	2	1	8

Totals	24	20	14	12	70

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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

3. 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	3	0	0	3
Client Application	27	0	0	27
Security	12	0	0	12
Outsource Shipping	6	0	0	6
Exception Reporting	7	0	0	7
Final Report Output	3	0	0	3
Version Control	1	0	0	2

9. RESULTS:

9.1 Performance Testing

https://docs.google.com/spreadsheets/d/1Y6dpFaQy4iNwq9ou_2dNYWwnZGXsNX8b/edit?usp=sharing&ouid=116517186514957935098&rtpof=true&sd=true

10. ADVANTAGES AND DISADVANTAGES:

Advantages

● Monitor the Traffic

● Used to keep in check over speeding drivers

● Helps people to change direction when under a time constraint

● Ensure safety of drivers and passengers

● Helps in finding the number of passengers in a vehicle so as to

maintain the convert limit for passenger.

● Helps in supervising the roads and catch criminals

Disadvantages

● It times of complete shutdown , Inverts cannot be used for every single.

● Sometimes malfunctioning or even hacking can be done

11. CONCLUSION

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

12. FUTURE SCOPE

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

13. APPENDIX

SOURCE CODE:

    SOURCE CODE LINK : SOURCE CODE LINK

GITHUB AND PROJECT DEMO LINK:

    GITHUB LINK :GITHUB LINK

    PROJECT DEMO LINK : PROJECT DEMO LINK