



## **IBM PROJECT**

### **Signs with Smart Connectivity for Better Road Safety**

**Batch:** B1-1M3E

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## **1. INTRODUCTION**

### **1.1 Project Overview:**

In present system the road signs and the speed limits are static. But the road signs can be changed in some cases when they are some road division due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalized. This project process a system which has digital sign boards on which the signs can be changed dynamically. If there is a rainfall then the roads will be slippery and the speed limit would be decreased. In project system the road sign and the speed limits are static. But the road signs can be changed in some cases. We can consider some cases when there are some roads diversion due to accident then we can change the road signs accordingly created. There is a web app through which you can enter the data of the road of the road diversion, 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.

### **1.2 Purpose:**

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

## **2. LITERATURE SURVEY**

### **2.1 Existing Problem:**

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

### **2.2 References:**

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

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

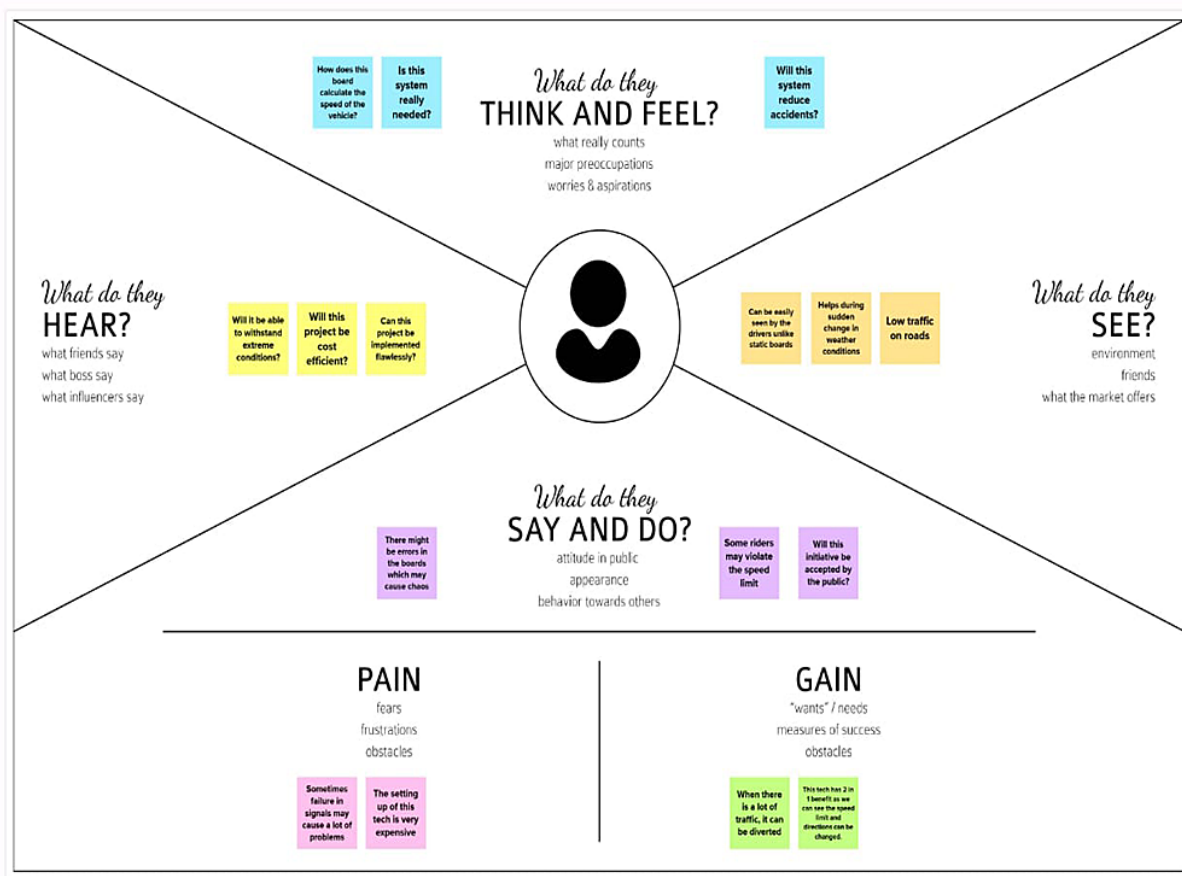
[https://www.researchgate.net/publication/269310261\\_Smart\\_vehicle\\_connectivity\\_for\\_safety\\_applications](https://www.researchgate.net/publication/269310261_Smart_vehicle_connectivity_for_safety_applications)

## 2.3 Problem statement definition:

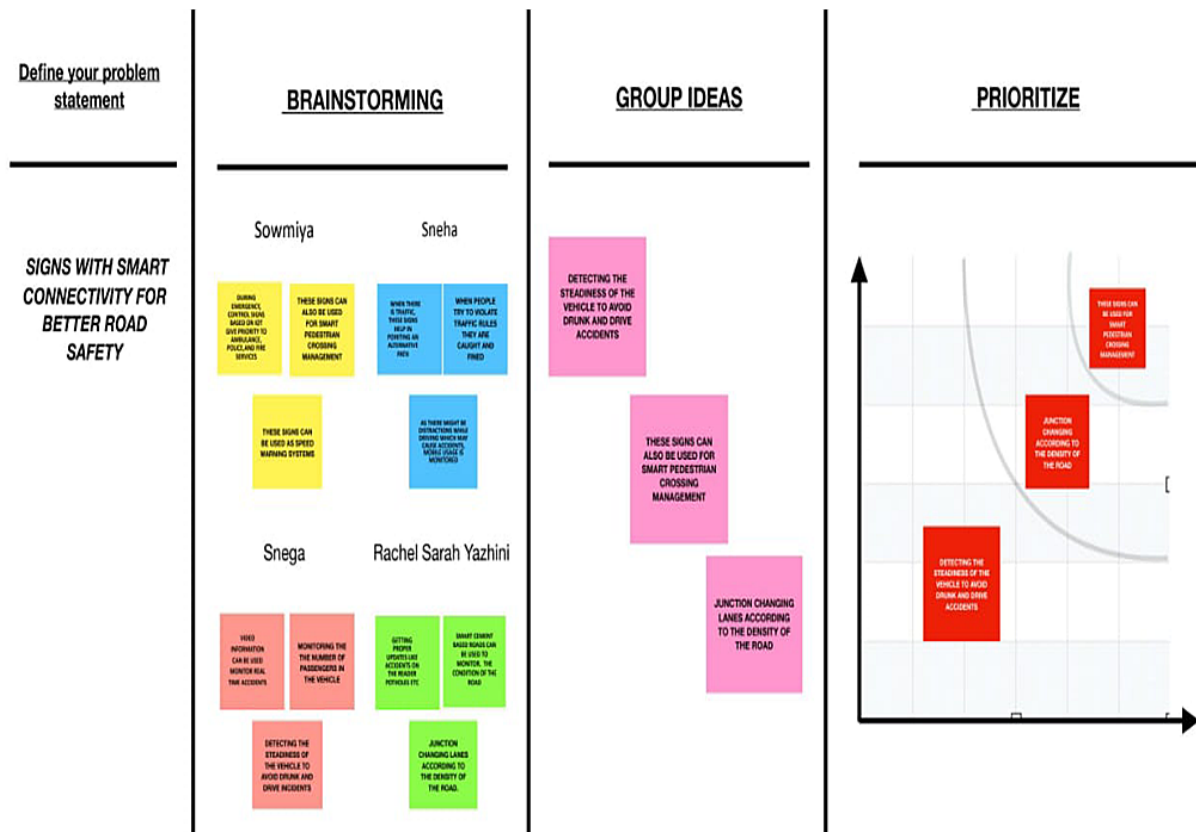
The avenue symptoms and velocity restrict these days are static so occasionally when there is intense weather condition it's miles very taught for the riders to look the speed restriction and instruction .This task may be very beneficial for the riders purpose when there may be excessive site visitor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

## 3. IDEATION & PROPOSED SOLUTION

### 3.1 Empathy Map Canvas:



### 3.2 Ideation & Brainstorming:



### 3.3 Proposed Solution:

S.No.	Parameter	Description
1	Problem Statement	This project helps in providing safety for the passerby. It can be used to change the direction ,speed, give warnings in case emergency etc
2	Idea / Solution description	IOT based application for better road safety.
3	Novelty / Uniqueness	When a vehicle passes the signboard speed of it can also be recorded.
4	Social Impact / Customer Satisfaction	When there is a lot of traffic the signboards are used to show the different direction for the vehicles to go Disaster updates can also be shown on them.
5	Business Model (Revenue Model)	At first signboards can be used for free ,as the demand grows after getting the reviews of the public it can be used commercially.
6	Scalability of the Solution	It save s time for the drivers .When the driver is over speeding the when they their seed on these signboards they mat slow down theirv vehicles this will save their life.

### 3.4 Problem Solution Fit:

Problem-Solution fit canvas 2.0		Purpose / Vision		
<b>Define CS, fit into CC</b>	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> Who is your customer? I.e. working parents of 0-5 y.o. kids  <b>Drivers, Passengers, Motorists</b>	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> 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.  <b>1. Budget problem.</b> <b>2. Pressure of how it will be received by the public.</b>	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> 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  <b>Send a petition to the collector to improve the lighting and rain water draining system for the roads</b>	<b>Explore AS, differentiate</b>
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>J&amp;P</span> Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.  <b>1. When there is high traffic, road diversions can be signalled through these signboards.</b>  <b>2. When the weather condition is extreme i.e heavy rains, typhoon, storms etc. The roads will be slippery so the speed limit can be shown on the signboards</b>	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> 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.  <b>1.(i) Too many vehicles</b> <b>(ii) Roads being narrow.</b> <b>2. (i) No proper draining system on the road.</b> <b>(ii) Less no street lights on the road.</b>	<b>7. BEHAVIOUR</b> <span>BE</span> 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)  <b>Directly related: Tries to find a solution to prevent these problem.</b>  <b>Indirectly related: Tries to go slowly during extreme weather conditions and tries to avoid the road by knowing the accurate time the road will have high traffic.</b>	
<b>Identify strong TR &amp; EM</b>	<b>3. TRIGGERS</b> <span>TR</span> What triggers customers to act? I.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. <b>1. Time is wasted while waiting in traffic.</b> <b>2. A lot of accidents occur cause of the weather condition.</b>	<b>10. YOUR SOLUTION</b> <span>SL</span> If you are working on an existing business, write down your current solution first, 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 limitations, solves a problem and matches customer behaviour.  <b>By making signs with smart connectivity for better road safety using IOT Watson, Node MCU</b>	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span> <b>8.1 ONLINE</b> What kind of actions do customers take online? Extract online channels from #7 <b>People post on social media about the problems they faced while on the road which may lead to it trending and the Government taking action faster</b>  <b>8.2 OFFLINE</b> What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.  <b>Awareness about this issue can be made by giving out fliers, sending petitions, doing rallies etc.</b>	<b>Extract online &amp; offline CH of BE</b>
	<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> 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.  <b>Before: Frustrated cause of traffic.</b> <b>After: Frightened cause of slippery roads.</b>			



Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license  
 Created by Daria Neprikshina / Amaltama.com





#### **4.REQUIREMENT ANALYSIS**

##### **4.1Functional Requirement:**

<b>FR No.</b>	<b>Functional Requirement (Epic)</b>	<b>Sub Requirement (Story / Sub-Task)</b>
FR-1	User Visibility	Signs boards should be made with LED's which are bright colored and are capable of attracting the drivers attention but it should also not be too distracting or blinding cause it may lead to accidents.
FR-2	User Understanding	For better understanding of the driver ,the signs should be big ,clear and legible and it can also include illustration which will make it easily understanding to the drive .
FR-3	User Convenience	The display should be big enough that it should even be visible from far distance clearly.

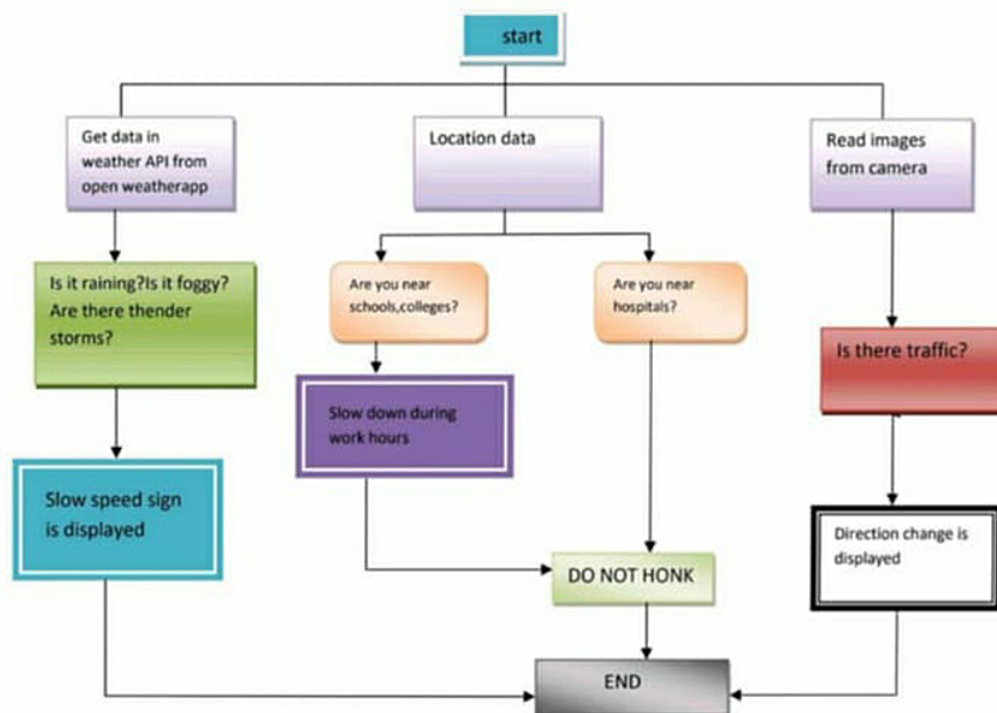
##### **4.2 Non-Functional Requirement:**

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

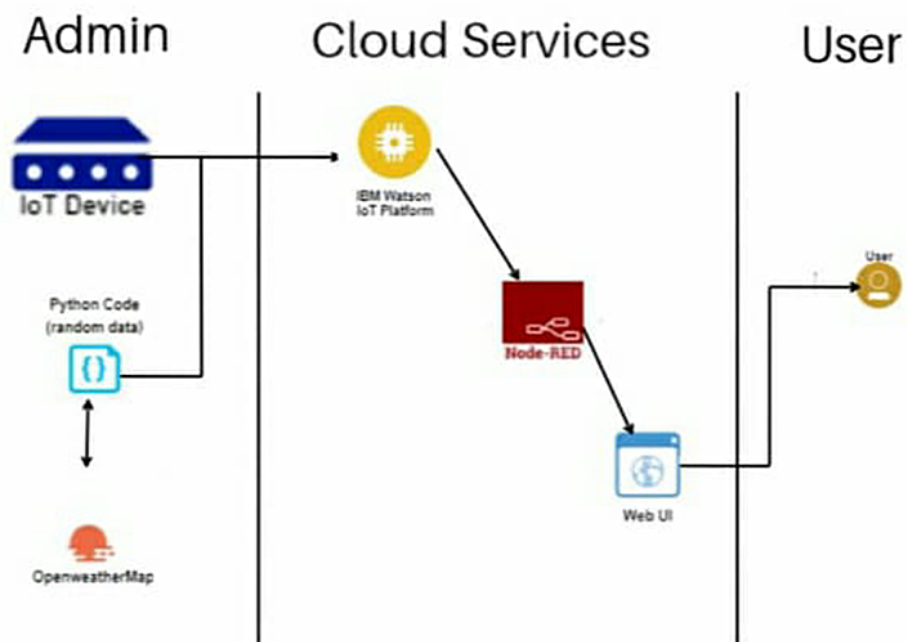
		information correctly and error-free.
NFR-4	Performance	It should be able to automatically update itself when a certain weather or traffic problem occurs.
NFR-5	Availability	It should be available 24/7 so that it can be beneficial to the customer i.e .the driver
NFR-6	Scalability	It should be able to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

## 5.PROJECT DESIGN

### Data Flow Diagram:



### 5.1 Solution & Technical Architecture:



**User Stories:**

User Type	Functional Requirement(EPIC)	User Story Number	User Story/Task	Acceptance Criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	I can get my constraint utilizing application	I can get speed restriction	High	Sprint-1
		USN-2	As a client enrol for the application by entering ,secret phrase and confirming my secret phrase	I can get my account/dashboard	Medium	Sprint-2
		USN-3	As a client ,I can increment or diminishing my speed as indicated by the weather condition changes	I can get increment or decline my speed	High	Sprint-1
		USN-4	As a client,	I can get to	Medium	Sprint-1

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

			the legitimate working of the signs sheets need to keep up with it occasional observing	sign sheets for legitimate working.		
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## **6.PROJECT PLANNING AND SCHEDULING**

### **6.1 Sprint Planning & Estimation:**

<b>Sprint</b>	<b>Functional Requirement(Epic)</b>	<b>User Story Number</b>	<b>User Story/Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1		US-1	Create the IBM Cloud services which are being used in this project	6	High	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project	4	Medium	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-1		US-3	IBM Watson IoT Platform acts as the mediator to connect	5	Medium	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini

			the web application to IoT devices,so create the IBM Watson IoT Platform			
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	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
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	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-2		US-2	Create a Node -Red service	10	High	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini

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	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices	5	Medium	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-3		US-3	Publish data to the IBM cloud	5	High	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-4		US-1	Create web UI in node-red	10	High	R.Snega S.Sneha P.Sowmiya N.Rachel sarah yazhini
Sprint-4		US-2	Configure	10	High	R.Snega



			the node-red flow to receive data from the IBM IoT Platform and also use cloudant DB nodes to store thereceived sensor data in the cloudant DB			S.Sneha P.Sowmiya N.Rachel sarah yazhini
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## **6.2 Sprint Delivery Schedule:**

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

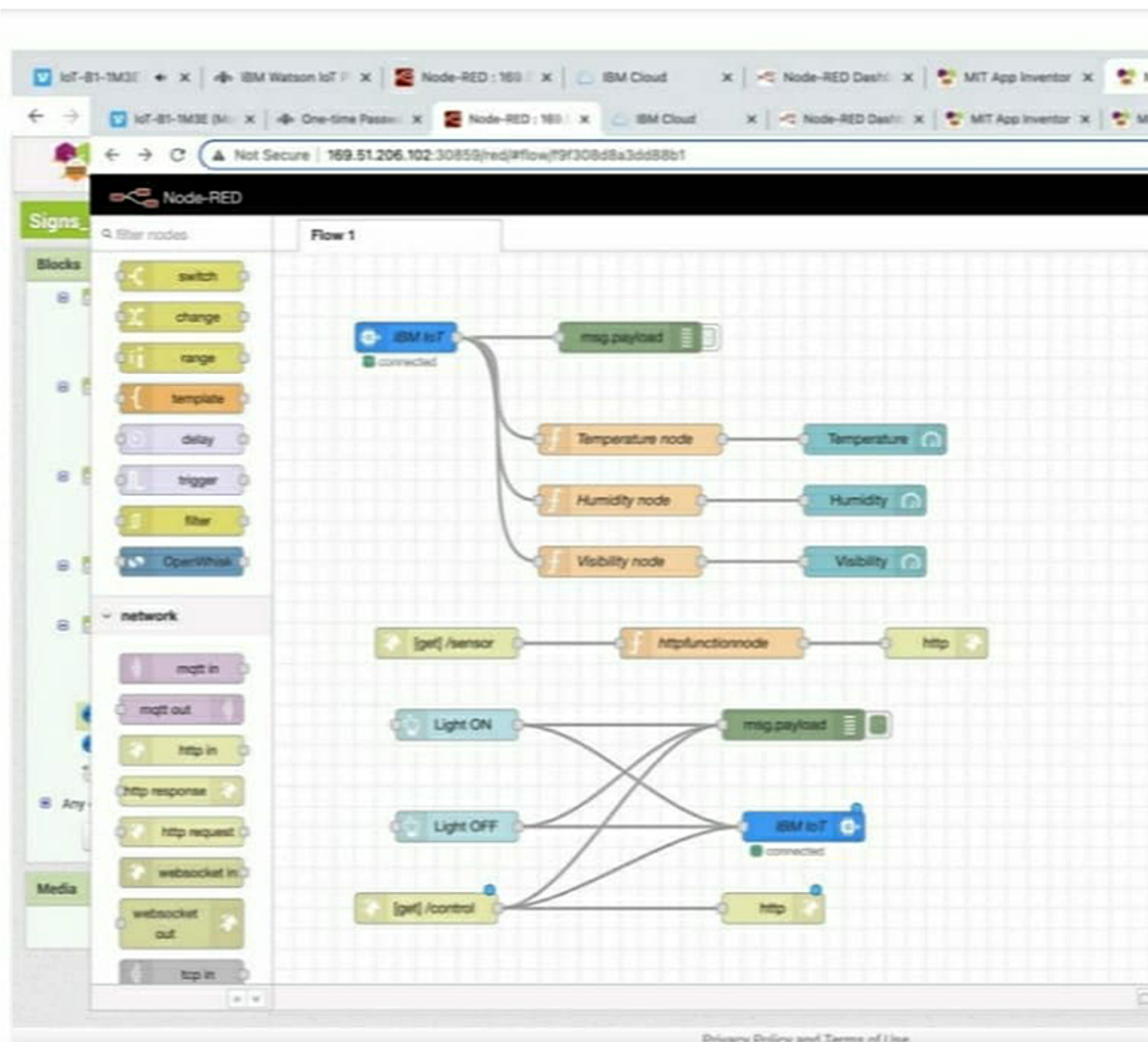
<b>Sprint</b>	<b>Total Story Points</b>	<b>Duration</b>	<b>Sprint Start Date</b>	<b>Sprint End Date (planned)</b>	<b>Story Points Completed (as on Planned End Date)</b>	<b>Sprint Release Date (Actual)</b>
Sprint-1	20	6Days	24Oct2022	29Oct2022	20	29Oct2022
Sprint-2	20	6Days	31 Oct2022	05Nov2022	20	05Nov2022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

## **6.3 Reports From JIRA:**

[Reports from JIRA regarding sprint delivery](#)

## 7.CODING AND SOLUTIONING

### 7.1 Feature 1(Node Red Output)



### 7.2 Feature 2: (Python Output):

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 %
Published Temperature = 60 C Humidity = 2 %
Published Temperature = 42 C Humidity = 86 %
Published Temperature = 95 C Humidity = 47 %
Published Temperature = 49 C Humidity = 16 %
Published Temperature = 59 C Humidity = 25 %
Published Temperature = 85 C Humidity = 100 %
Published Temperature = 65 C Humidity = 73 %
Published Temperature = 48 C Humidity = 38 %
```

## **8. TESTING**

8.1 [Test Cases](#)

8.2 [User Acceptance Testing](#)

## **9.RESULTS**

9.1 [Performance Metrics](#)

## **10. ADVANTAGES AND DISADVANTAGES**

### **Advantages**

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

- [Python Code Final](#)

GitHub and Project Demo Link:

[Git Hub Link](#)

[Project Demo link](#)



