# PROJECT BASED EXPERIENTIAL LEARNING PROGRAM (NALAIYA THIRAN)

**SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY**

**A PROJECT REPORT**

***Submitted by***

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**1.INTRODUCTION :**

Based on current research and development efforts, we can all be fairly certain that [smart road signs](https://worksafetci.com/products/smart-solutions/) will be broadly utilized in the years to come. They serve as one of the major components of an emerging system designed to enhance the current infrastructure. These indicators are useful tools, and they can have a positive impact on all who share the roads. Most importantly, this PtPype of signage has the potential to improve our way of life.

When vehicles approach such a sign on the roadway, vital information is imparted to their drivers via their dashboard or their head-up display. Along with the visual data, voice narration may also be used to indicate changing roadway conditions. Instead of trying to read passing road indicators, drivers are thus better able to pay attention to the road.

The road signage of the future might also be used to transmit [crucial data to driverless cars](https://phys.org/news/2018-10-smart-highway-wrong-way.html). These signs may appear to humans to be [conventional road indicators](https://worksafetci.com/signs/guide-signs-conventional-roads/).

However, the information transmitted from a given sign is “visible” to the vehicle’s infrared light. The sign alerts oncoming cars to slow down due to a change in the roadway. This sort of transmission can even help autonomous vehicles to stay in their lanes.

Smart signs provide :

* Preventing wrong way crashes
* Better traffic management and safety
* Increased cost efficiency
* Combating poor visibility

1.1 PROJECT OVERVIEW :

The primary aim for developing these route placards is to make the roads safer for all of us. The enhanced signage creates a more efficient experience for drivers. It can also complement the system designs of driverless cars and to help people automate the roads by providing them with a Web App through which they can monitor the parameters of the road like temperature, speed limit, and visibility of the road. They also show guides for schools and provide services of displaying hospitals, and restaurant signs accordingly.

1.2 PURPOSE:

Clearly, intelligent roadway smart signs can be a vital part of our driving experience. They enable a better way for drivers to access the information they need in real time on the roads. These signs can increase awareness of upcoming issues, which people might otherwise discover too late.

They may also augment the functionality of driverless vehicles.  
The value of implementing this technology should not be underestimated. Smart roadway indicators have the potential to increase cost-efficiency, which eases the burden on governments and taxpayers. They facilitate a smoother driving process for both human drivers and autonomous vehicles.

The smart signs can be more user-friendly than the analog route signs we currently employ. Above all, they may ultimately lead to a safer network of roads for everyone.

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. Different modes of operation can be selected with the help of buttons.

**2. LITERATURE SURVEY :**

2.1 EXISTING PROBLEM :

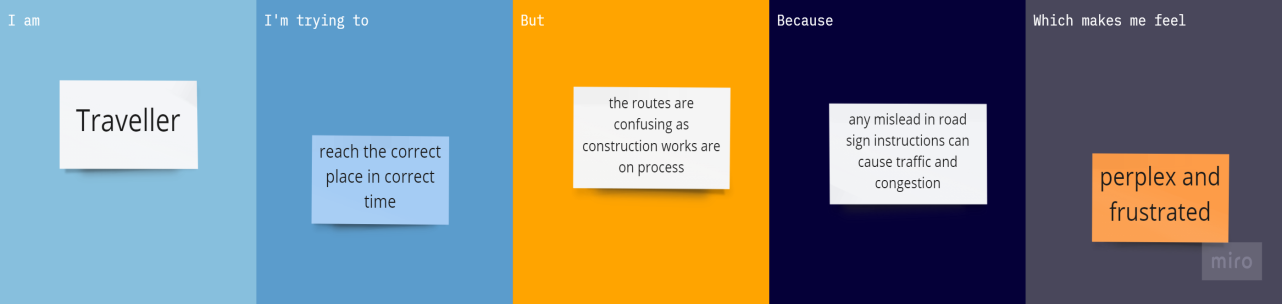
[Static signage](https://www.imagetechnique.co.uk/signage) can be costly in the long term. Once a sign is printed/produced and installed in place, it can't be modified, so any changes you need to make require a new sign. Some signs bypass this difficulty by providing a rotating platform for displays in which you only need to replace the individual posters – although these are being largely superseded on the high street and in-store by digital displays, which are far easier to modify and update.

Certain static designs can go out of fashion or become outdated, which means they’ll get limited attention from potential customers. Additionally, if you’re environment-conscious, you’ll probably have issues with sign waste and the chemicals used in printing.

2.2 REFERENCES:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.NO | PAPER TITLE | JOURNAL | AUTHOR | YEAR | WORK EXPLAIN |
| 1 | Smart Vehicle | IEEE | Usha Devi Gandhi, Arun Singh | 2014 | This Project Focuses on V2V communication, once cars are connected which is able to share data with other cars on the road and which help to reduce Highway accidents. Ultimately vehicles are connect via multiple complementary technologies of vehicle to vehicle (V2V) and vehicle-to-infrastructure(V2I) connectivity based on Wi-Fi, GPS, Dedicated Short Range Communication(DRSC) |
| 2 | An efficient real-time traffic sign recognition system for intelligent vehicles with smart phones. | IEEE | Ching-hao Lai,Chia-chen yu | 2010 | 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. |
| 3 | Automatic road traffic signs detection and recognition using “You only look once” version 4(YOLOv4) | IEEE | W.H.D.Fernando, S.Sotheeswaran | 2021 | This paper presents an approach to detect traffic signs using You Only Look Once version 4(YOLOv4) model. 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. When driving an automobile, the driver’s attention is usually drawn to the road. On the other hand, most traffic signs are situated on the side of the road, which may have contributed to collision |
| 4 | Communication system for intelligent road sign networks | IEEE | Janusz Gozdecki; Krzysztof Łoziak; Andrzej Dziech; Wojciech Chmiel; Joanna Kwiecień; Jan Derkac | 2019 | The most important issue in the process of building the trust between the road signalling infrastructure and the end user is the information significance and its value. The ongoing NCBiR project - InZnak - aims to introduce a new type of the road signalling subsystem which relies on intelligent road signs equipped with variety of sensors and adaptive led displays. Sensors feed the autonomous algorithms with data necessary to take decisions on how to react to current road conditions. |
| 5. | Smart traffic management system | IEEE | Abubakar M.Miyim, Mansur A. Muhammed | 2019 | In this paper, the proposed system serves as an alternative to the existing traffic management system with an intersection control station that communicates with vehicles approaching the intersection through the V2I network |
| 6 | An efficient and safe road condition monitoring authentication scheme based on fog computing | IEEE | Mingming Cui; Dezhi Han; Jun Wang | 2019 | In this paper, a new certificateless aggregate signcryption scheme (CLASC) is proposed by using a fog computing framework that supports mobility, low latency, and location awareness . |

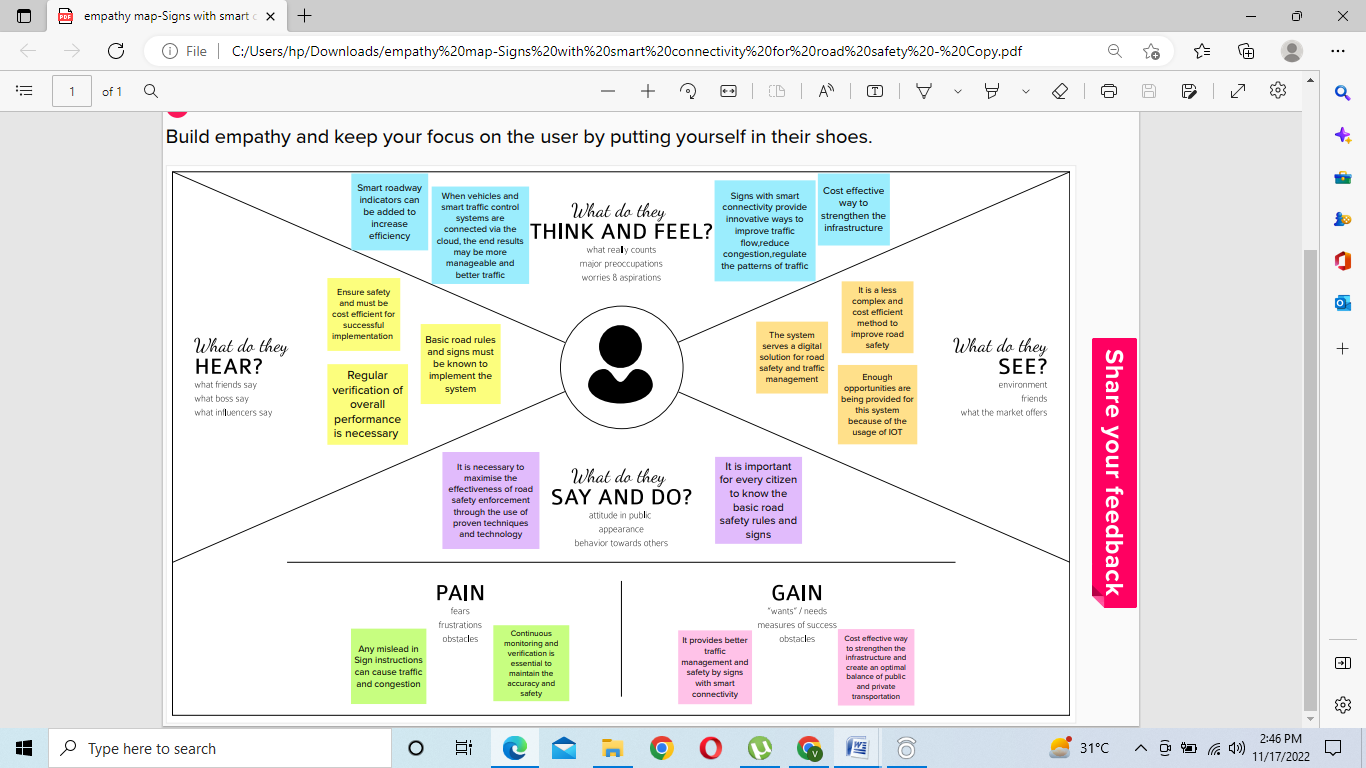
2.3 PROBLEM STATEMENT DEFNITION :

In present Systems the road signs and the speed limits are Static. But the road signs can be changed in some cases. We can consider some cases when there are road diversions due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalized.

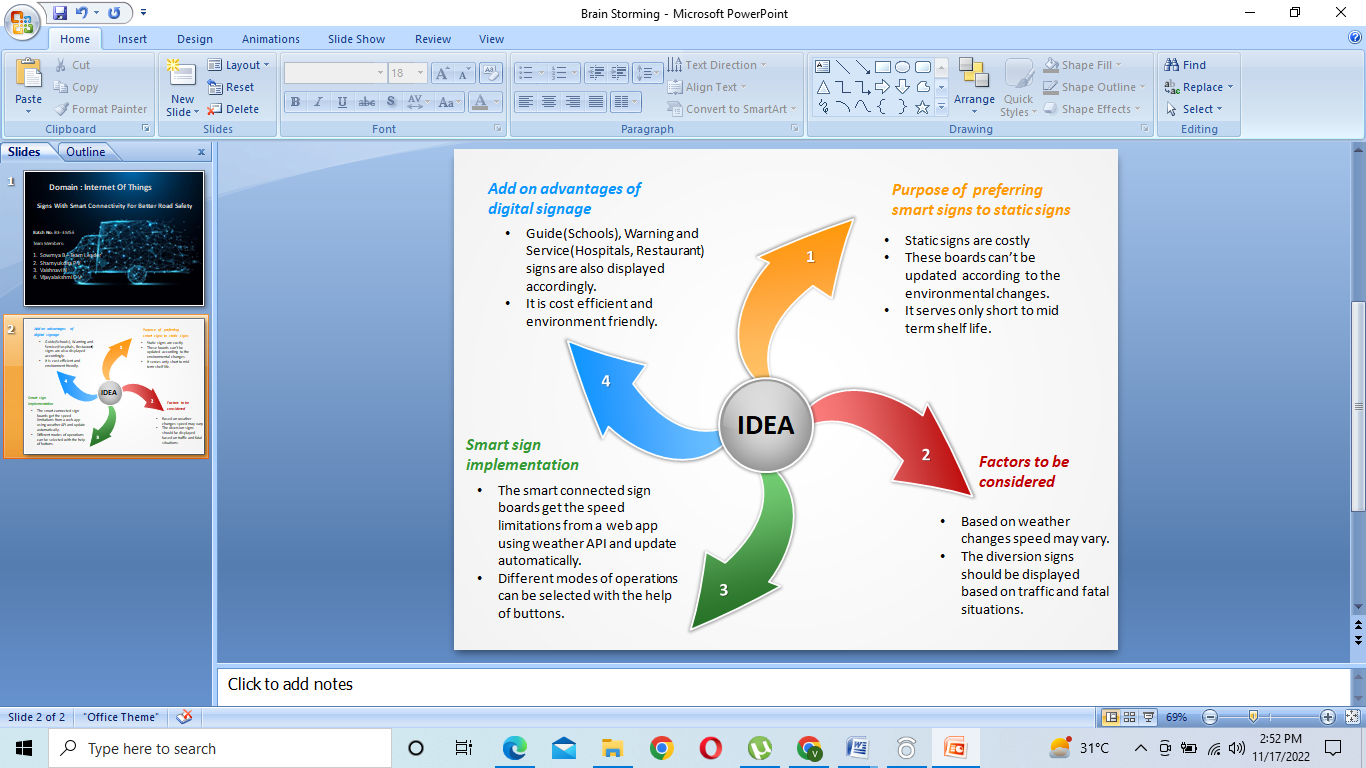
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Problem**  **Statement (PS)** | **I am**  **(Customer)** | **I’m trying to** | **But** | **Because** | **Which makes me feel** |
| PS-1 | Traveller | Reach the correct place in correct time | The routes are confusing as construction works are on process | Any mislead in road sign instructions can cause traffic and congestion | Perplex and frustrated |
| PS-2 | Traveller | Travel in a safer and a faster way | It takes long time | Of weather conditions and environmental changes | Enraged and uncomfortable |

**3.IDEATION & PROPOSED SOLUTION :**

3.1 EMPATHY MAP CANVAS :



3.2 IDEATION AND BRAINSTORMING :

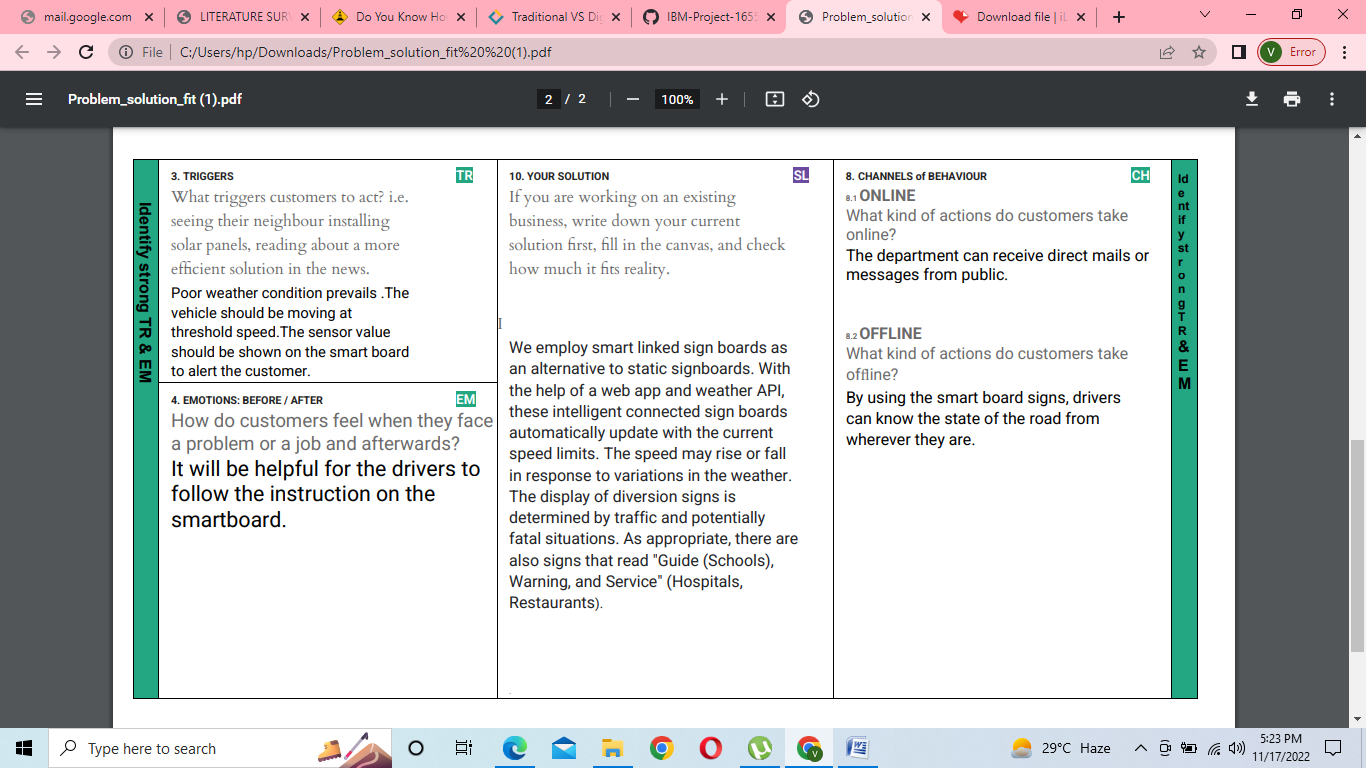
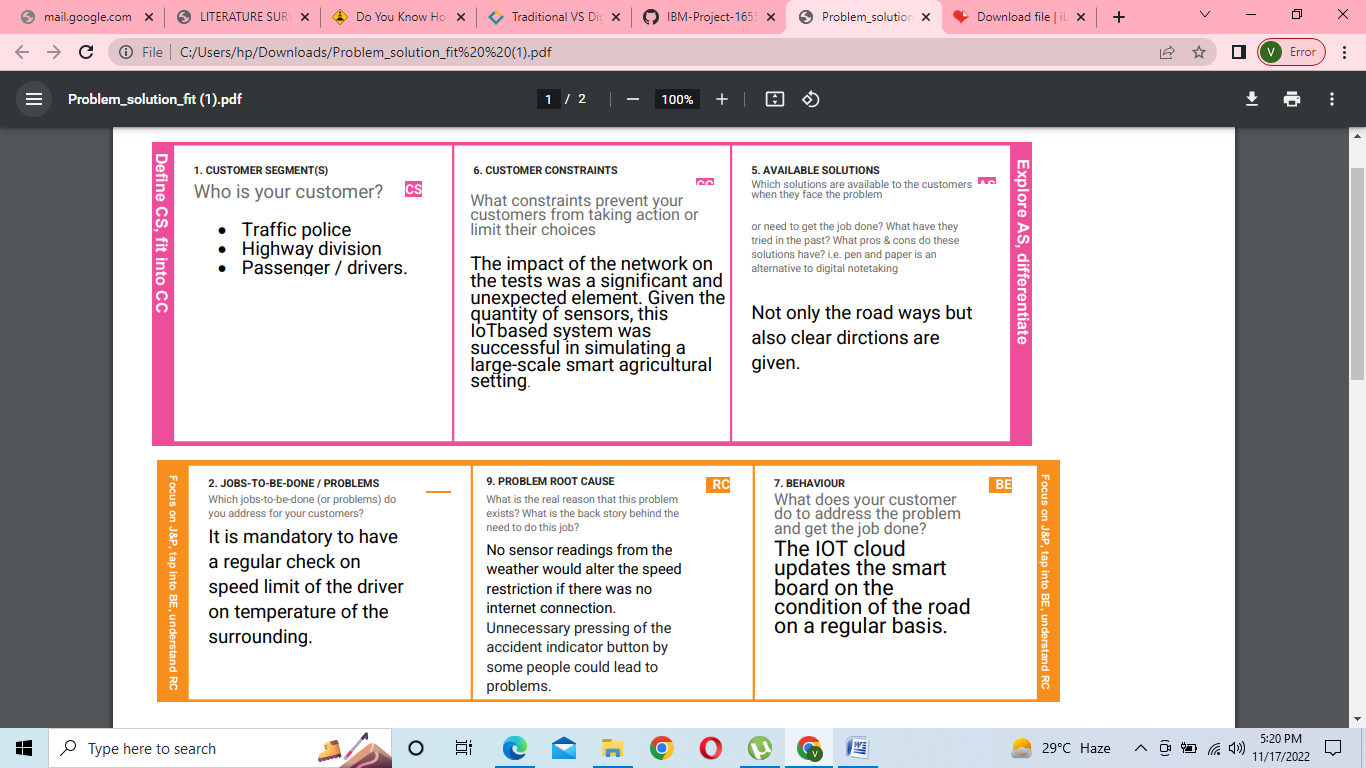


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3.3 PROPOSED SOLUTION :

|  |  |  |
| --- | --- | --- |
| S.NO | PARAMETER | DESCRIPTION |
| 1 | Problem statement | 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. Different modes of operations can be selected with the help of buttons. |
| 2 | Idea description | The weather and temperature details are obtained from the OpenWeatherMap API. Using these details, the speed limit will be updated automatically in accordance with the weather conditions. Also, the details regarding any accidents and traffic congestion faced on the particular road are obtained .Based on this,the traffic is diverted followed by a change in map path and the traffic is cleared. So in the traffic sign board , some buttons will be placed which will be used to make it generic; where each button will be given a functionality such as changing the warning signs, which are predefined and separate signs will be present for both school and hospital zones.By activating this button, either through the web application or the physical buttons, sign of the board can be changed accordingly, and the speed limit will also be set depending upon the zones. Also, the pedestrians are given an option to change the traffic signs if they want to cross the road. If the pedestrian presses the button that is present on the post at the end of the road, then the traffic will be analyzed immediately. Accordingly, the sign of the traffic signal will be changed. This inturn reduces the frequent changing of the traffic signs even if the pedestrians are not present. |
| 3 | Novelty | Generic Sign board for all applications that uses both buttons and web service for updation Pedestrians are given the access to request the sign change of the signal to cross the road |
| 4 | Customer satisfaction | Diversion reasons will be displayed If there is no traffic, pedestrians can cross the street without waiting. Customer can reach the destination before the expected time |
| 5 | Business model | Since APIs are used to actively monitor the customer's environment, this project employs a business strategy in which revenue will be generated on the basis of the length of time in which the customers actively interact with the product. 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. The public will also gain all the information about the road, even if they are checking for an alternate path because of some mishaps that happen on the roads and these functionalities will increase the value of the product in the global market |
| 6 | Scalability of the solution | In the future, if any update is required either on the hardware or software side, it can be easily implemented. The hardware components can be directly interfaced with the microcontroller and small modifications can be made in the programming of the existing product. In case of the software, the website application has to be updated with the additional functionality by creating a new section for the updated hardware. So this will not affect the existing functionality of the product and new functionality can be easily integrated. In addition, a separate circuit will be kept along with the hardware to detect any problem which informs the web application. Also a notification will be sent to the product service department |

3.4.PROBLEM SOLUTION FIT:



**4. REQUIREMENT ANALYSIS:**

4.1. FUNCTIONAL REQUIREMENT:

Following are the functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **FR No.** | **Non Functional Requirement (Epic)** | **Sub Requirement (Story/Sub-Task)** |
| FR-1 | User Registration | Static signboards will be replaced with smart linked sign boards that meet all criteria |
| FR-2 | User Confirmation | hone Confirmation Email confirmation OTP authentication |
| FR-3 | User Registration | User Registration can be done through a Website or Gmail |
| FR-4 | Payments Options | Bank transfer  Paytm  Netbaking |
| FR-5 | Product Delivery and installation | The installation fee will be depend upon the length of the road |
| FR-6 | Product Feedback | Will be shared through a website via Gmail |

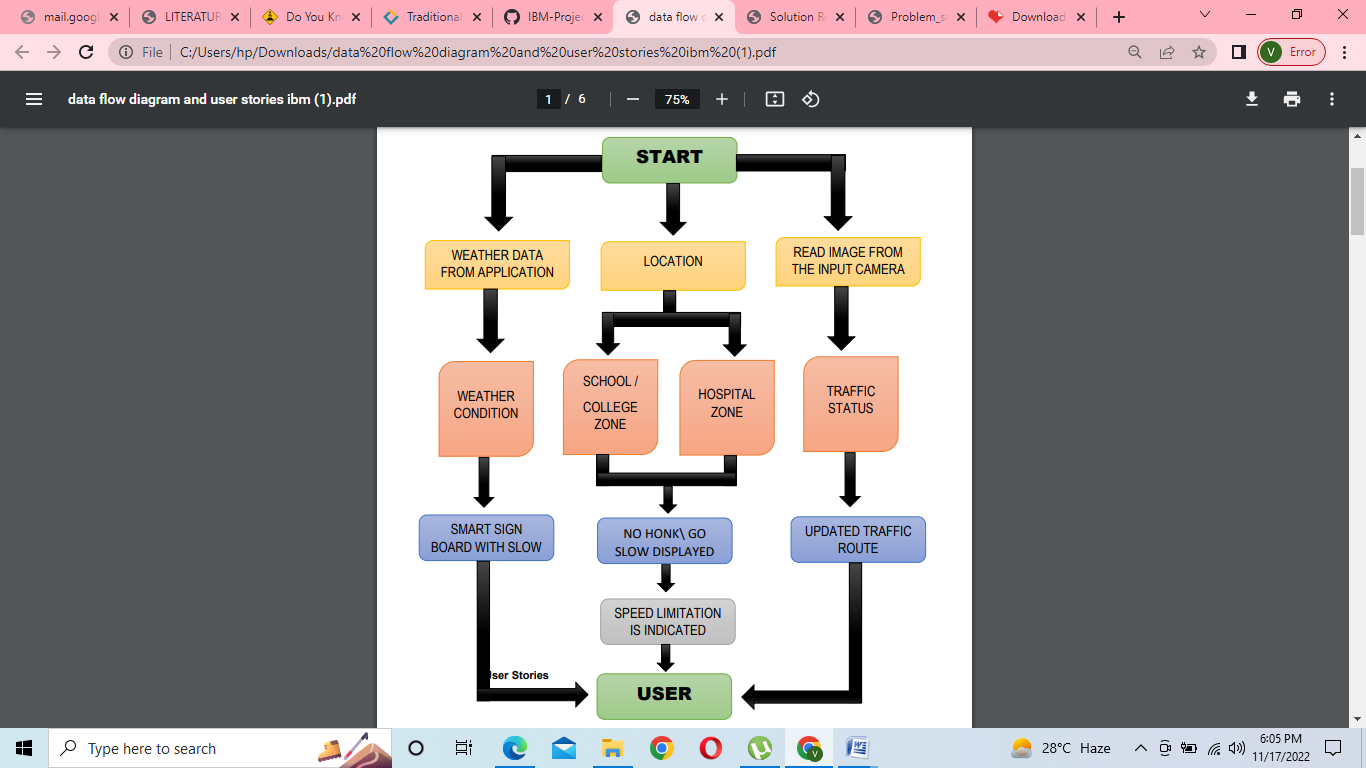
4.2.NON–FUNCTIONAL REQUIREMENTS:

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

|  |  |  |
| --- | --- | --- |
| **NFR No.** | **Non Functional Requirement** | **Description** |
| NFR-1 | Usability | Will provide the clear product instructions and a self -explanatory product which is simple to use. |
| NFR-2 | Security | Cloud data must be contained within the network, collapsing to be the real-time avoidance should be avoided and the board will be monitored constantly. |
| NFR-3 | Reliability | Hardware will be frequently used |
| NFR-4 | Performance | The smart board must provide a better user experience and deliver the accuracy output. |
| NFR-5 | Availability | All of the functions and the user demands will be provided, depend upon the customer needs |
| NFR-6 | Scalability | The product is based on road safety and should cover the entire highway system. |

**5.PROJECT DESIGN**

5.1. DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored. 

5.2 SOLUTION AND TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE:

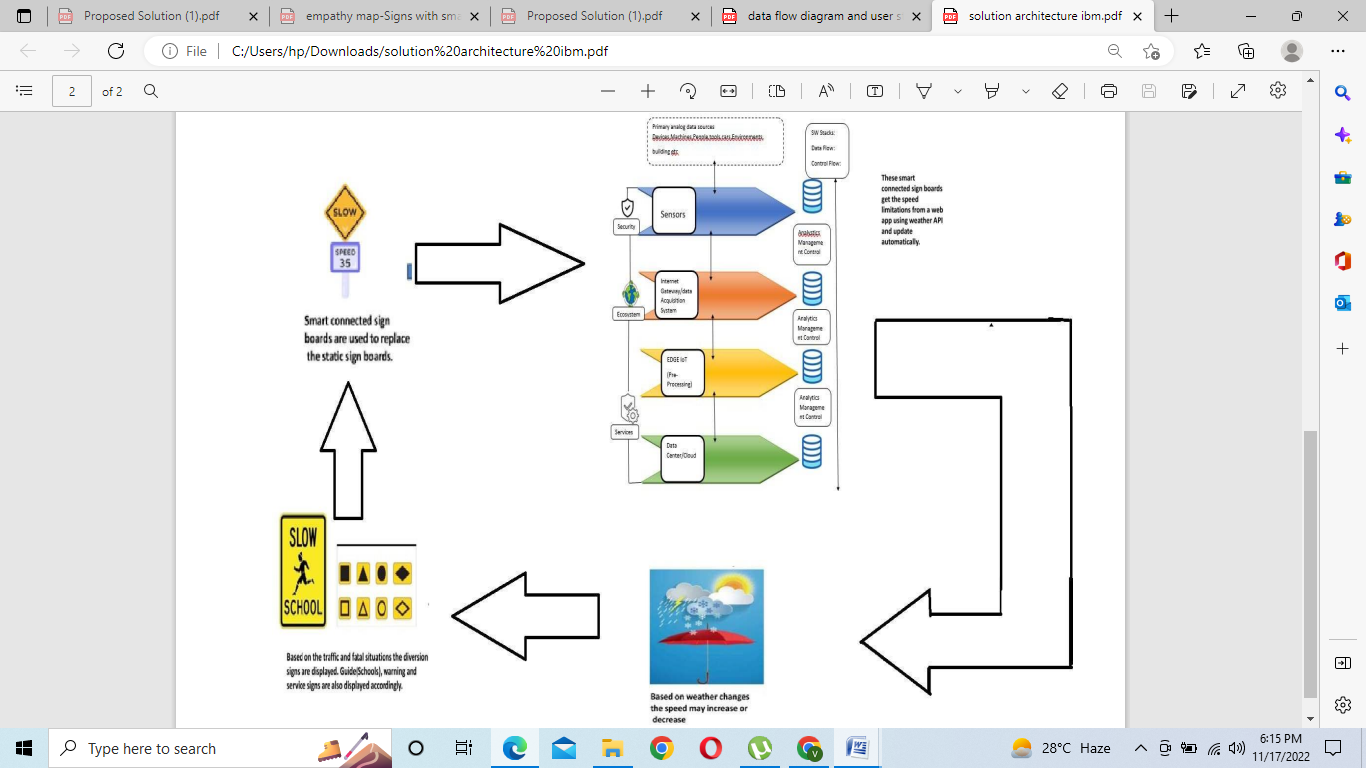
Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions.

Its goals are to:

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

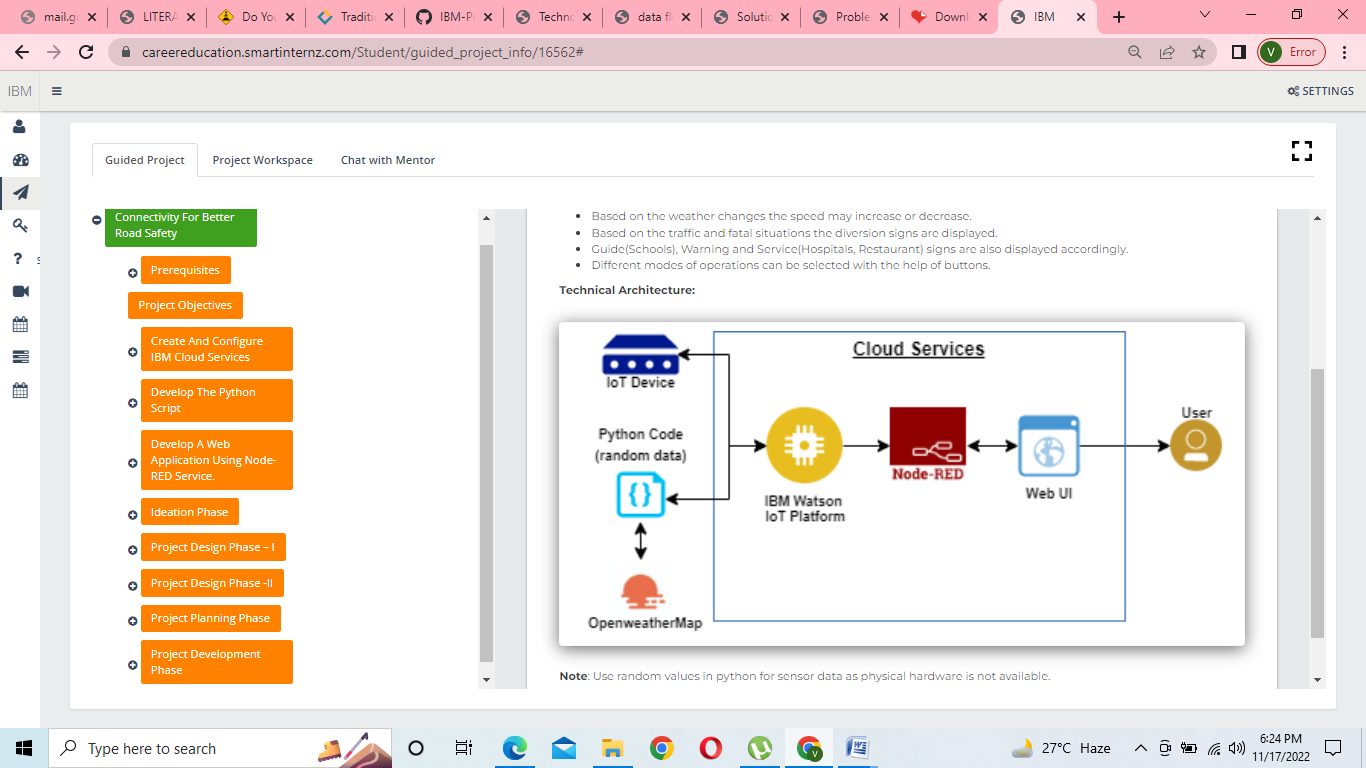
• Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.

• Define features, development phases, and solution requirements.

• Provide specifications according to which the solution is defined, managed, and delivered. 

TECHNICAL ARCHITECTURE:







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 / Angular Js / React Js etc. |
| 2. | Application Logic-2 | Logic for a process in the application | IBM Watson STT service |
| 3. | Application Logic-3 | Logic for a process in the application | IBM Watson Assistant |
| 4. | Cloud Database | Database Service on Cloud | IBM DB2, IBM Cloudant etc. |
| 5. | External API-1 | Purpose of External API used in the application | IBM Weather API, etc |

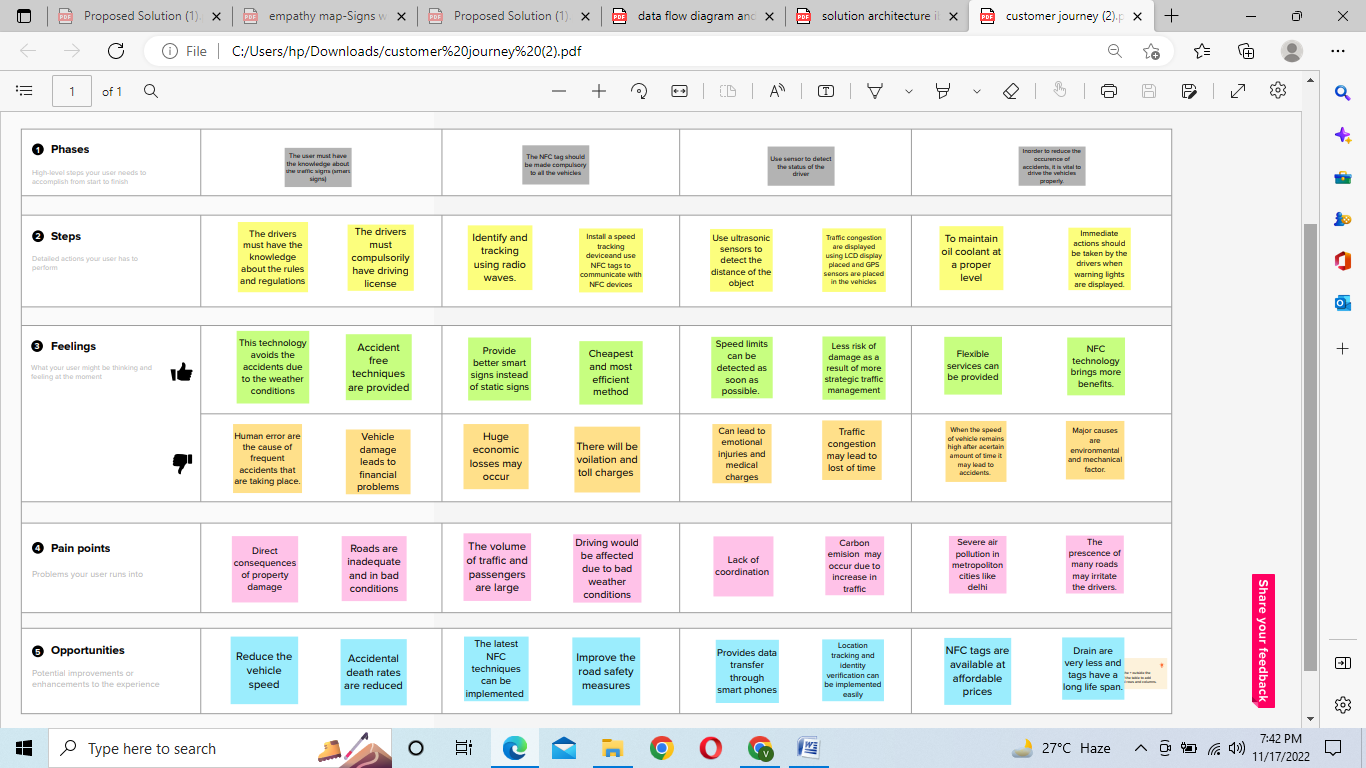
APPLICATION CHARACTERISTICS:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Characteristics** | **Description** | **Technology** |
| 1. | Security Implementations | Strong security system that anyone without login credentials and hackers are not allowed to enter the network. | Firewall, Firebase, cyber resiliency strategy |
| 2. | Scalable Architecture | Easy to expand the operating range by increasing the bandwidth of the network. | IoT, 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 Type** | **Functional Requirement (Epic)** | **User story No.** | **User**  **Story** | **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. As a user | 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 fatal stn. | 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 |
| Customer(Webuser) | Data generation | USN-7 | As a user I use open weather application to access the data regarding the weather changes | I can access the data regarding the weather through the application | High | Sprint-1 |
| Administration (officials) | Problem solving/ Fault clearance | USN-8 | As an official who is in charge for the proper functioning of the sign boards have to maintain it through periodic monitoring. | Officials can monitor the sign boards for proper functioning. | Medium | Sprint-2 |

CUSTOMER JOURNEY:



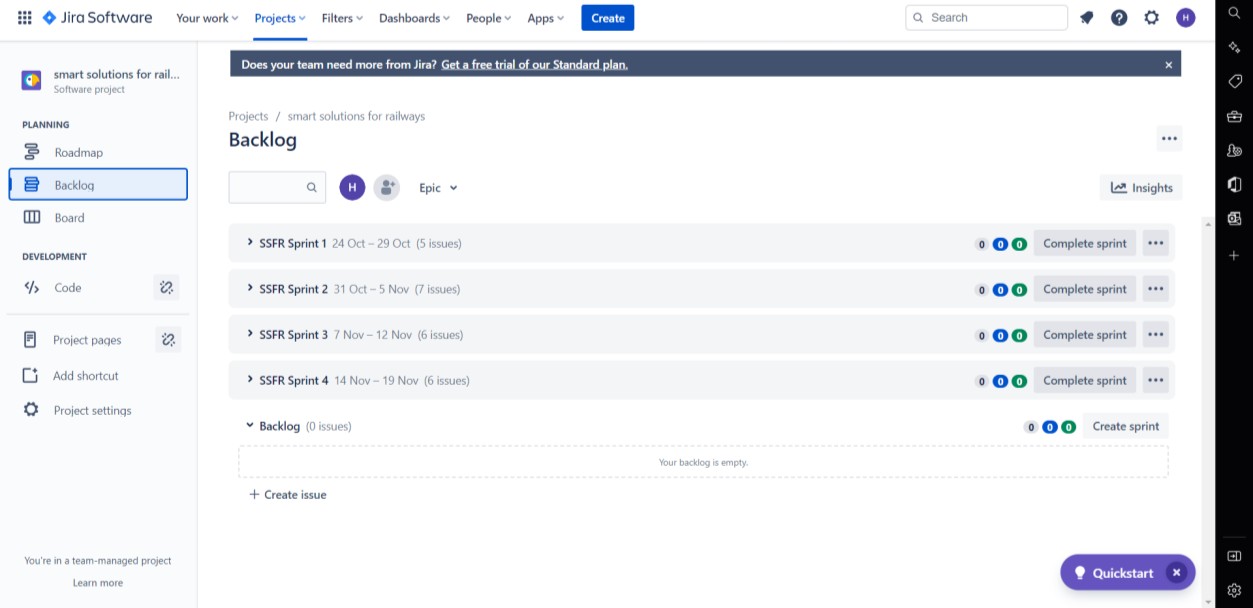
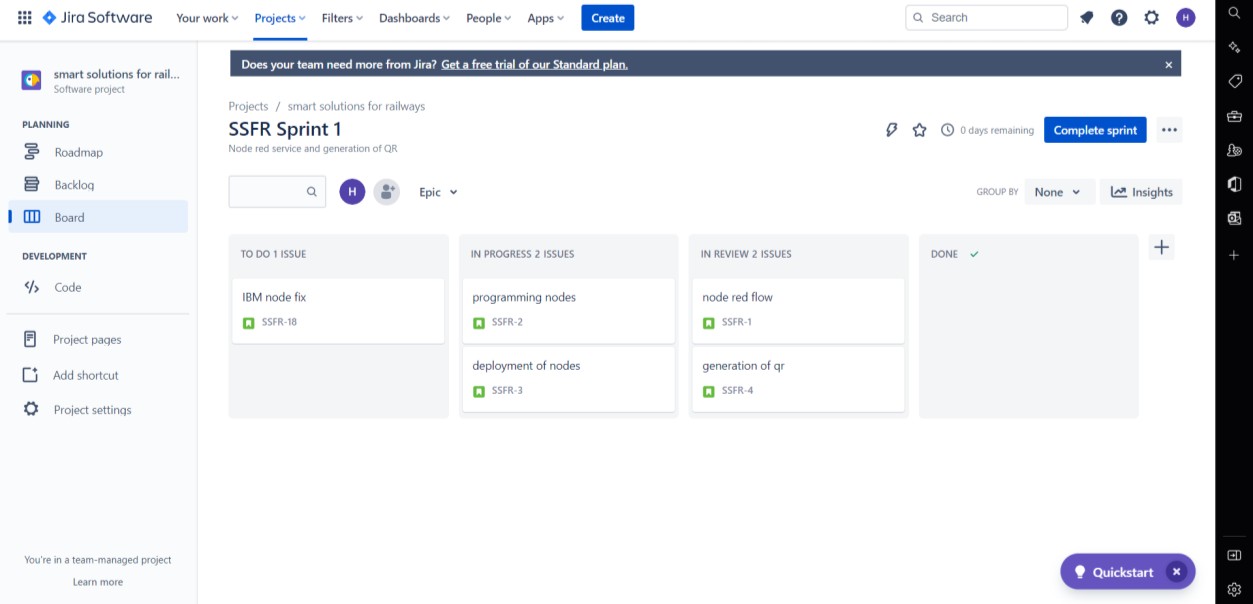
**6. PROJECT PLANNING AND SCHEDULING:**

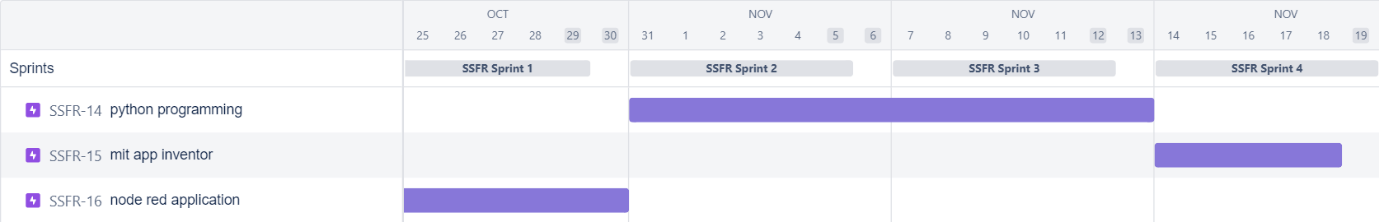
6.1 SPRINT PLANNING & ESTIMATION:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SPRINT | FUNCTIONAL REQUIREMENTS (EPIC) | USER STORY/TASK | STORY POINTS | PRIORITY | TEAM MEMBERS |
| Sprint-1 | Hardware utilization | Integrate the hardware to be able to access the cloud functions | 2 | Medium | Sowmya B, Shamyukdha PV, Vijayalakshmi C V, Vaishnavi N |
| Sprint-2 | UI/UX optimization & debugging | Optimize all the shortcomings and provide better user experience. | 1 | Medium | Sowmya B,Shmayukdha PV,Vijayalakshmi C V, Vaishnavi N |
| Sprint-3 | Resource initialization | Create and initialize accounts in various public APIs like OpenWeather API. | 1 | Low | Sowmya B,Shamyukdha PV,Vijayalakshmi C V, Vaishnavi N |
| Sprint-4 | Local server/software run | Write a Python program that outputs results given the inputs like weather and location. | 2 | Medium | Sowmya B,Shamyukdha PV,Vijayalakshmi C V, Vaishnavi N |
| Sprint-4 | Push the server/software to cloud | Push the code from Sprint 1 to cloud so it can be accessed from anywhere | 2 | Medium | Sowmya B,Shamyukdha PV,Vijayalakshmi C V, Vaishnavi N |

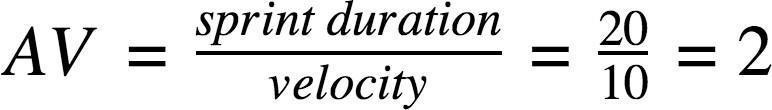
6.2 SPRINT DELIVERY SCHEDULE:

|  |  |  |
| --- | --- | --- |
| **TITLE** | **DESCRIPTION** | **DATE** |
| Literature survey & Information gathering | A literature review is a comprehensive summary of previous researches on the topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. | 5 September 2022 |
| Prepare empathy map | An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. It helps us to understand the customers’ pain, gain and difficulties from their point of view. | 12 September 2022 |
| Ideation – brainstorming | Brainstorming is a group problem-solving method that helped us to gather and organize various ideas and thoughts from team members. | 17 September 2022 |
| Define problem statement | The Customer Problem Statement helps us to focus on what matters to create experiences people will love. A well-articulated customer problem statement allowed us to find the ideal solution for the challenges customers face. | 19 September 2022 |
| Problem solution fit | It helped us understand and analyze all the thoughts of our customer, their choice of options, problems, root cause, behavior and emotions. | 26 September 2022 |
| Proposed solution | It helped us analyze and examine our solution more in the grounds of uniqueness, social impact, business model, scalability etc. | 28 September 2022 |
| Solution architecture | Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. It helped us understand the features and components used to complete the project. | 1 October 2022 |
| Customer journey map | It helped to analyze the various steps, interactions, goals and motivation, positives, negatives and opportunities. | 7 October 2022 |
| Solution requirements | It briefs about functional and non-functional requirements. It involves the various steps in the entire process. It also specifies features usability, security, reliability, performance, availability and scalability. | 12 October 2022 |
| Technology stack | A tech stack is the combination of technologies a company uses to build and run an application or project. It helps us analyze and understand various technologies that needs to be implemented in the project. | 15 October 2022 |
| Data flow | A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enter and leaves the system, what changes the information, and where data is stored. | 20 October 2022 |
| Sprint delivery plan | Sprint Planning is an event in scrum that defines what can be delivered in the upcoming sprint and how that work will be achieved. It helps us to organize and complete the work effectively and efficiently. | 22 October 2022 |
| Prepare milestone and activity list | Helps us understand and evaluate our progress and accuracy so far. | 23 October 2022 |
| Project development – delivery of sprint 1 | Develop and submit the developed code by testing it. | 3 November 2022 |

6.3 REPORTS FROM JIRA:



Velocity:

 Imagine we have 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)

Burndown chart:

A burn-down chart is 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.

**7. CODING AND SOLUTIONING:**

7.1 FEATURE 1:

import wiotp.sdk.device

import time

import random

import ibmiotf.application

import ibmiotf.device

import requests, json

myConfig = { #Configuration

    "identity": {

"orgId": "d5zx56",

"typeId": "Connectivity123", "deviceId":"ESP32"},

#API Key

"auth": {

"token": "9514598766"

}

}

#Receiving callbacks from IBM IOT platform

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.commandCallback= myCommandCallback client.connect()

#OpenWeatherMap Credentials

BASE\_URL ="<https://api.openweathermap.org/data/2.5/weather>?"

CITY = "Chennai"

URL = BASE\_URL + "q=" + CITY + "&units=metric"+"&appid=" +

"9cca583812b638930cefd580106f6c58"

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']

#messge part       msg=random.randint(0,5)       if msg==1:

         message="SLOW DOWN, SCHOOL IS NEAR"       elif msg==2:          message="NEED HELP, POLICE STATION AHED"       elif msg==3:

         message="EMERGENCY, HOSPITAL NEARBY"       elif msg==4:

         message="DINE IN, RESTAURENT AVAILABLE"       else:

         message="" #Speed Limit part       speed=random.randint(0,150)       if speed>=100:          speedMsg=" Limit Exceeded"       elif speed>=60 and speed<100:

         speedMsg="Moderate"       else:

         speedMsg="Slow"

#Diversion part       sign=random.randint(0,5)       if sign==1:          signMsg="Right Diversion"       elif sign==3:

         signMsg="Left Diversion"       elif sign==5:

         signmsg="U Turn"       else:

         signMsg=""

#Visibility       if temperature < 24:

         visibility="Fog Ahead, Drive Slow"       elif temperature < 20:

         visibility="Bad Weather"       else:

         visibility="Clear Weather"

   else:

      print("Error in the HTTP request")

   myData={'Temperature':temperature, 'Message':message, 'Sign':signMsg, 'Speed':speedMsg,

'Visibility':visibility}

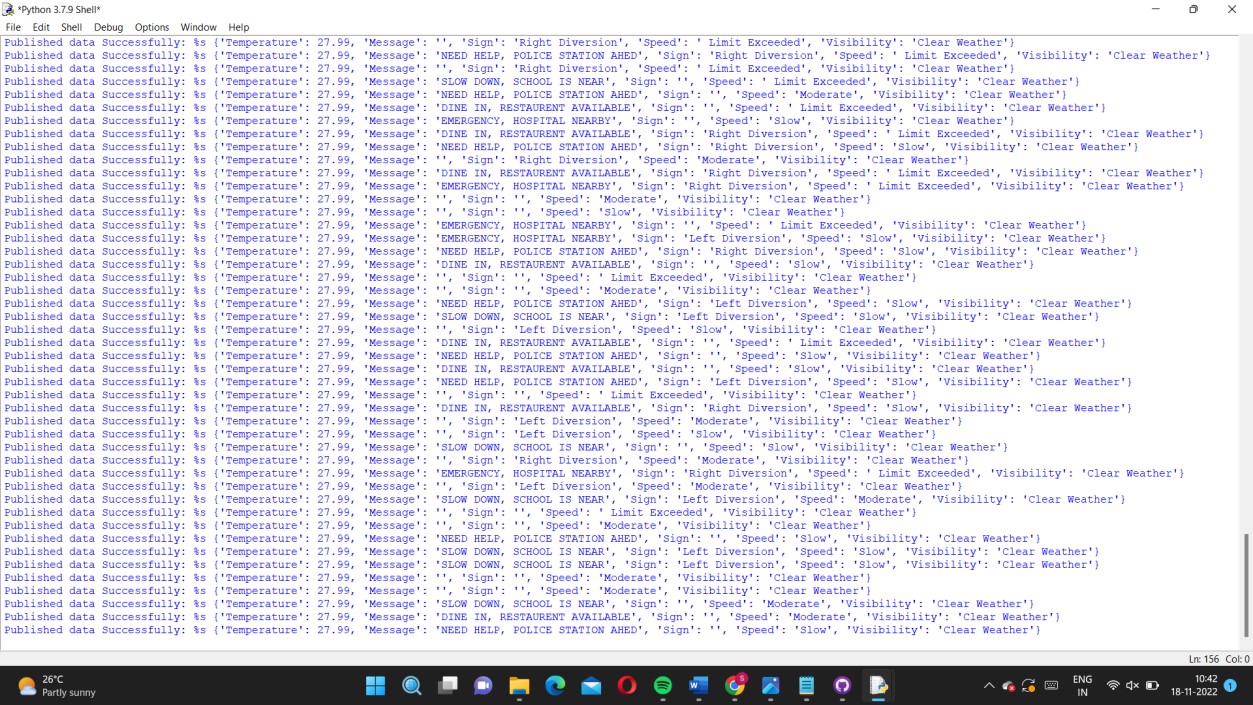
   client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)

#PUBLISHING TO IOT WATSON

   print("Published data Successfully: %s", myData)

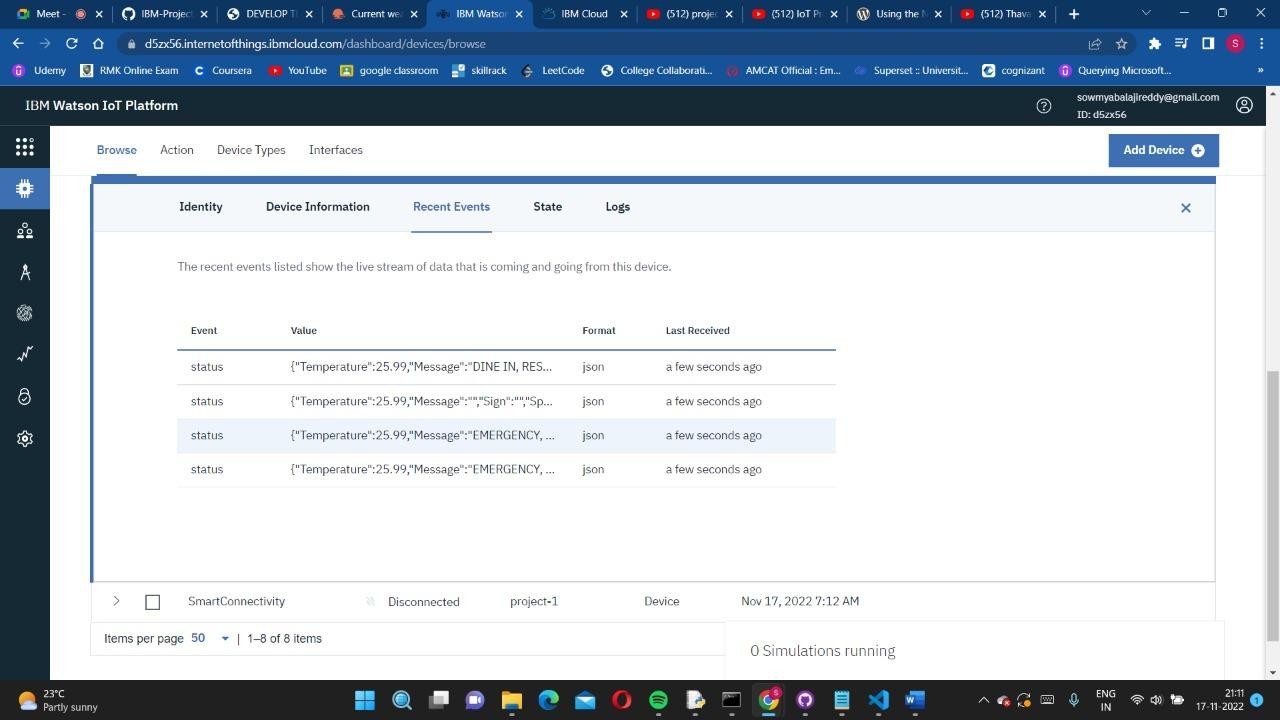
client.disconnect()

OUTPUT:



7.2 FEATURE 2:

By running the python code, the data will be published in the IBM Cloud.

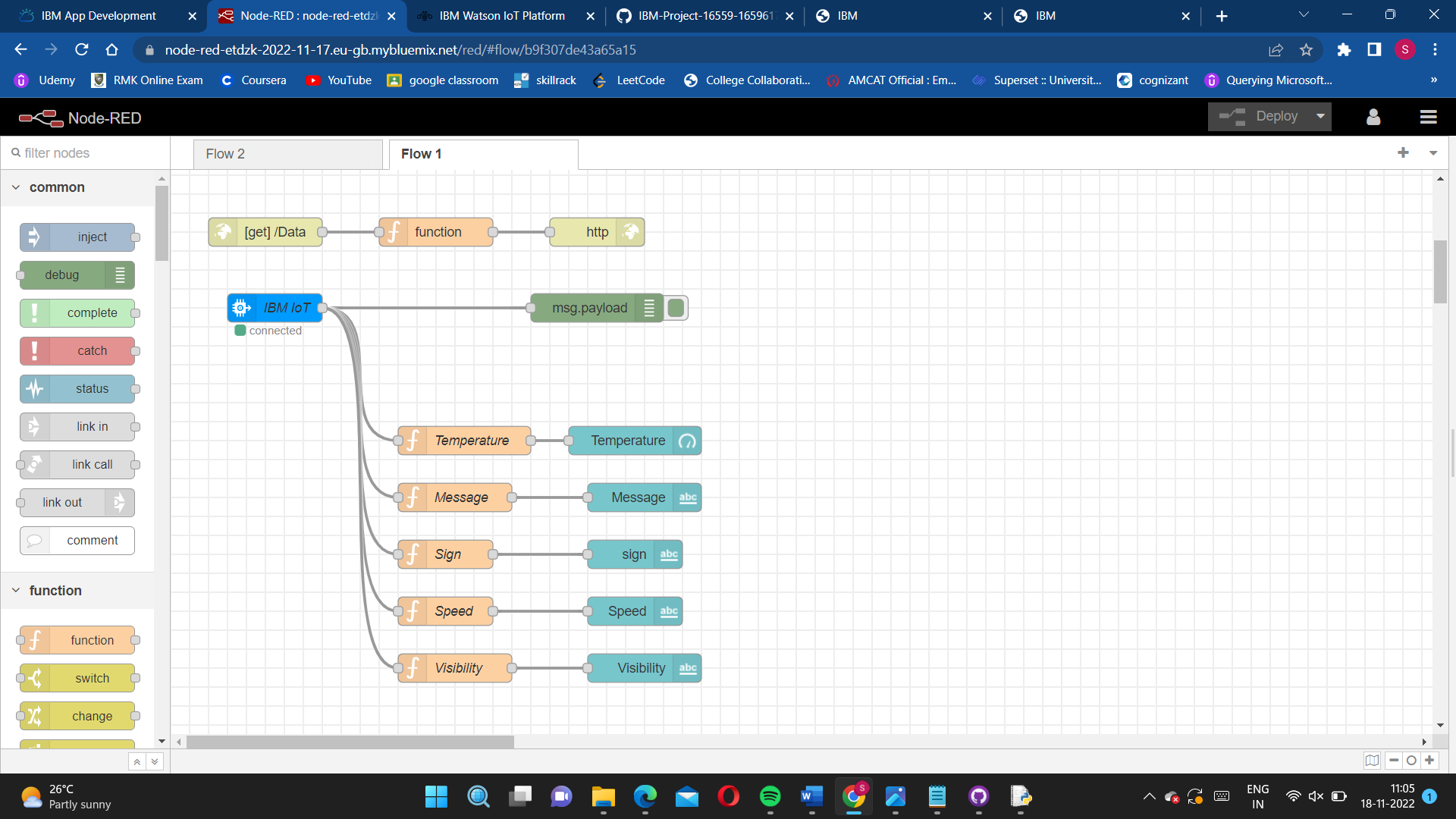


**8. TESTING:**

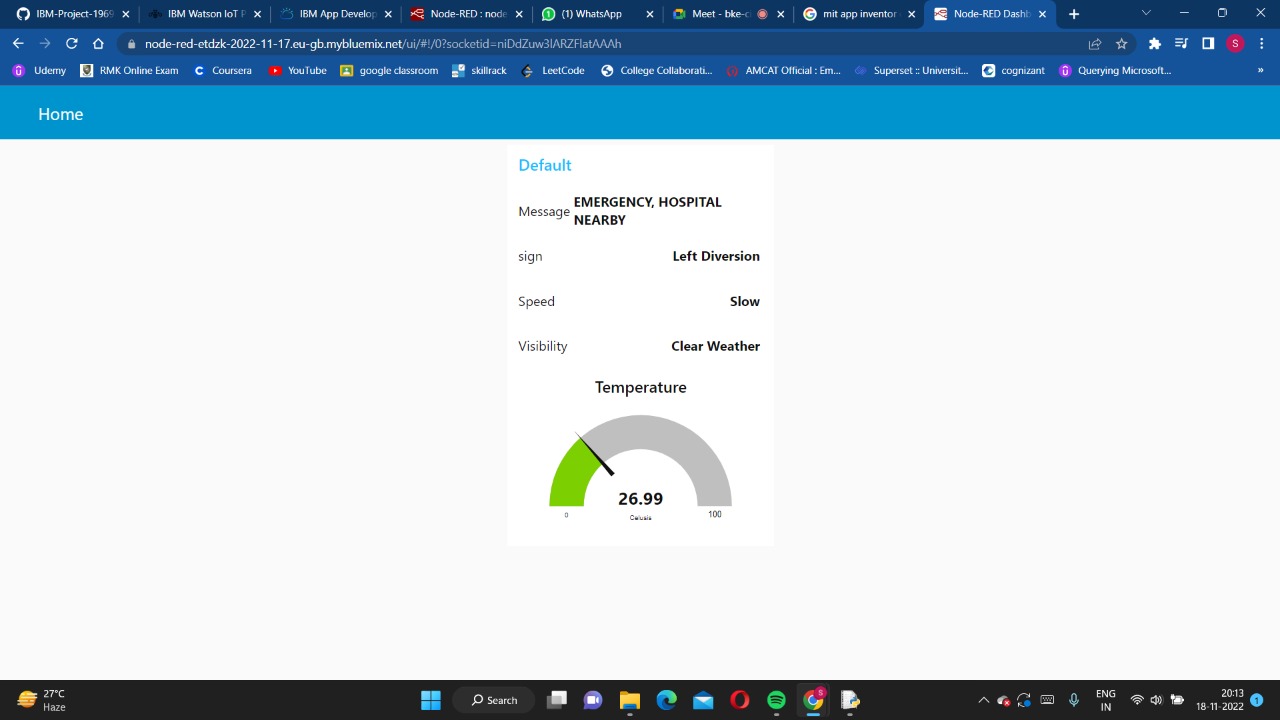
Test cases help guide the tester through a sequence of steps to validate whether a software application is free of bugs, and working as required by the end-user. Learning how to write test cases for software requires basic writing skills, attention to detail, and a good understanding of the application under test (AUT).

8.1 TEST CASES:

NODE RED

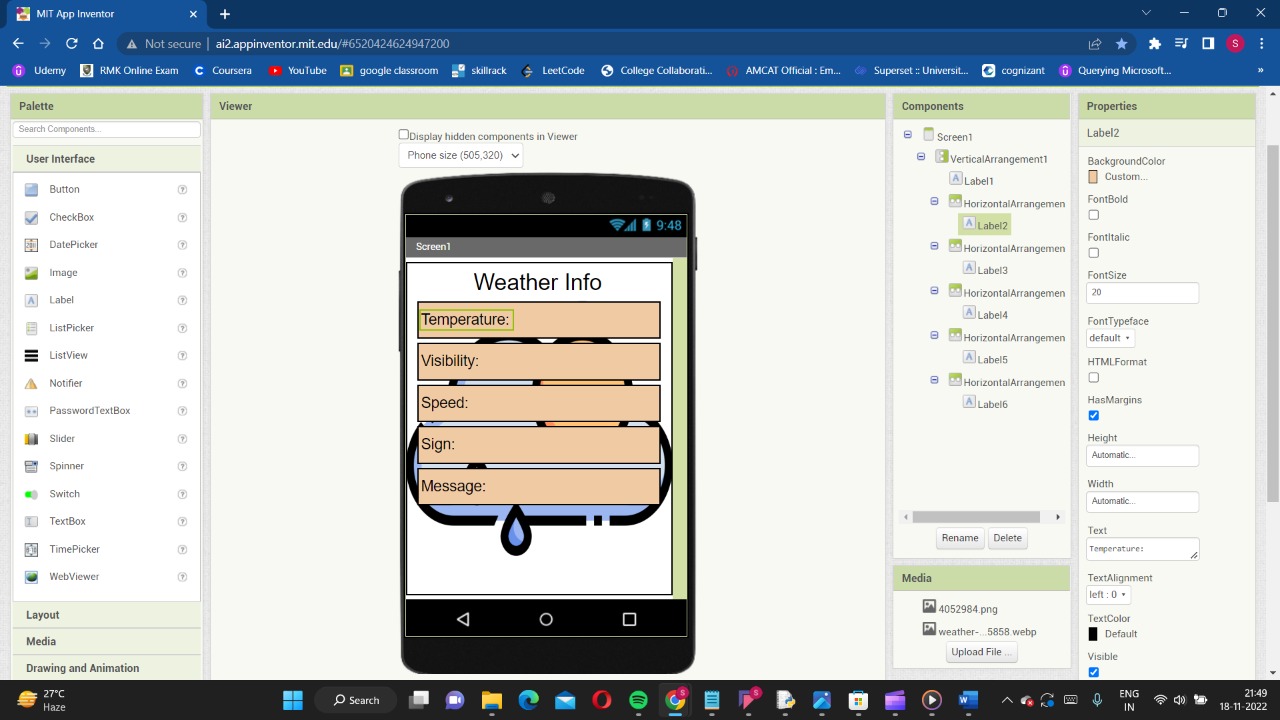


OUTPUT



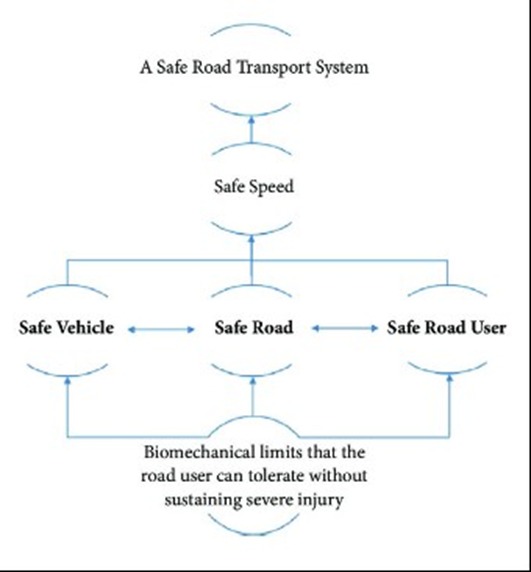
8.2 USER ACCEPTANCE TESTING:

MIT APP INVENTER



**9. RESULTS:**

9.1 PERFORMANCE METRICS:



**10. ADVANTAGES:**

* **Preventing Wrong-way Crashes**

The National Highway Traffic Safety Administration has stated that hundreds of lives are lost annually to wrong-way crashes. In addition, thousands of people sustain injuries in such accidents. Based on research and field tests performed by the Florida Department of Transportation, certain kinds of intelligent road indicators may effectively catch the attention of people driving the wrong way on a roadway. The indicators that were tested included blank indicators that light up when they detect the presence of wrong-way vehicles. Another type of sign was designed with lights that light up in an asynchronous manner. Once a driver is alerted by the lights and can see the “Wrong Way” lettering, that person can turn around and proceed in the correct direction. This could save numerous lives and prevent countless injuries.

* **Better Traffic Management and Safety**

Through refined [telematics and intelligent technology](https://www.geotab.com/blog/improving-road-safety/), it can be easier to “read” the locations and speeds of vehicles, such as those in a fleet. When vehicles and smart [traffic control](https://worksafetci.com/signs/temporary/) systems are connected via the cloud, the end results may be more manageable traffic, decreased gridlock, and better traffic

* **Increased Cost Efficiency**

We need to explore more cost-effective ways to [strengthen the infrastructure](https://mobility.here.com/smart-traffic-systems-101-components-benefits-and-big-data-connection). Building roads is expensive. While there is no substitution for new and upgraded roads, smart roadway indicators can be added to increase efficiency. They provide innovative ways to improve traffic flow, reduce congestion, regulate the patterns of traffic, and create an optimal balance of public and private transportation.

* **Combating Poor Visibility**

Road placards cannot help us if we are unable to read them. Many factors may cause drivers to misinterpret roadside signage or to miss it altogether. Aging drivers can have difficulty seeing roadway signs as they drive past them. Inexperienced drivers can easily misunderstand their meanings. Even those of us who have driven for years may find it [challenging to remember](https://singularityhub.com/2020/01/29/how-smart-roads-will-make-driving-easier-safer-and-greener/) the messages conveyed by [conventional road signs](https://worksafetci.com/signs/guide-signs-conventional-roads/). Additionally, bad lighting and weather can further decrease our capacity to use the signage as intended. Smart road indicators make it easier for us to detect and implement their alerts and instructions.

**DISADVANTAGES:**

* **Important investment:**

 Buying a screen is much more expensive than putting up a poster and the solutions to control screens are rarely free. In the long run, it is possible to make the screen more profitable but it will take months or years depending on your needs.

* **Editing and renewing the content can be complex:**

If the people managing the screens are not graphic designers, it can be difficult to update the content regularly on the screen.

* **Return on investment:**

[ROI can be hard to calculate](https://www.lcd-enclosure.com/digital-signage-and-return-on-investment-roi/). There is a high initial spend in installing digital signage and the ROI can become complex when you try and calculate sale’s increases with incidents such as screen damage and repair. However, the vulnerability of digital signage screens can be protected with an [LCD enclosure](https://www.lcd-enclosure.com/lcd-enclosures/lcd-monitor-enclosure/)preventing the need for additional repair costs.

* **Still new and improving:**

As such there is always going to be a better, cheaper and more effective solution around the corner. Prices for the technology are still falling too which may be leading to many potential installers playing the waiting game until the price and technology is just right.

* **May require multiple partners:**

With hardware such as [LCD enclosures](https://www.lcd-enclosure.com/lcd-enclosures/), [screens](https://www.lcd-enclosure.com/digital-signage-what-screen/), media players, [content](https://www.lcd-enclosure.com/tips-for-creating-outdoor-digital-signage-content/) and networking involved in many campaigns there may be four or five different companies involved in a single project.

* **Lack of understanding:**

There are many common mistakes made because of a lack of understanding. [Poor content](https://www.lcd-enclosure.com/importance-of-preventing-digital-advertising-display-content-from-going-stale/), [the wrong location](https://www.lcd-enclosure.com/where-is-the-right-location-for-a-digital-sign/) and the wrong screen are particularly common especially with [outdoor digital signage](https://www.lcd-enclosure.com/digital-signage-enclosures/outdoor-digital-signage/) where demands can differ.

* **Environment:**

While digital screens require power and therefore can’t claim to be green, there is high energy use in the printing, erecting and replacement of traditional print media.

* **Lack of a clear purpose behind many campaigns:**

Many people embark on digital signage without a clear purpose in mind which can affect the effectiveness of the system.

**11. CONCLUSION:**

**Smart signs** offer crucial information to drivers as well as other common road users. They not only save the lives of those driving the vehicle, but also those using the road on foot. Neglecting their installation is dangerous for both car drivers as well as pedestrians. Maintaining order and reducing accidents, these speed limit signs are the lifeline of today's road networks across the globe. No smart road transport system can be imagined without these devices.

The world doesn’t change on its own but we humans can change the world to be safe, better, and harmless. Since the road isn’t said to be safe let’s make it safer with the technologies present and available to us. The Internet of Things is one of the technologies that can lead us to travel on enhanced safe roads. So let's come together to create a better world with no accidents and a smart road for the future generation.

**12. FUTURE SCOPE:**

IOT obtains the majority of its data with the help of connected cars. These incorporate a large number of sensors that establish communication with the cloud, other vehicles, and devices.

It provides data and information of great utility for the improvement of road safety. The safe system approach to road safety emphasizes safety by design ensuring safe vehicles, road networks, and road users. Evolving towards the future, the road needs to boil with advanced sensors and antenna systems to have peace with the new era.

**13. APPENDIX:**

13.1 SOURCE CODE:

import wiotp.sdk.device

import time

import random

import ibmiotf.application

import ibmiotf.device

import requests, json

myConfig = { #Configuration

"identity": {

"orgId": "d5zx56",

"typeId": "SMARTBOARD", "deviceId":"SMARTCONNECTIVITY"},

#API Key

"auth": {

"token": "957846465"

}

}

#Receiving callbacks from IBM IOT platform

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.commandCallback= myCommandCallback

client.connect()

#OpenWeatherMap Credentials

BASE\_URL ="https://api.openweathermap.org/data/2.5/weather?"

CITY = "Chennai"

URL = BASE\_URL + "q=" + CITY + "&units=metric"+"&appid=" + "9cca583812b638930cefd580106f6c58"

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']

#messge part

msg=random.randint(0,5)

if msg==1:

message="SLOW DOWN, SCHOOL IS NEAR"

elif msg==2:

message="NEED HELP, POLICE STATION AHED"

elif msg==3:

message="EMERGENCY, HOSPITAL NEARBY"

elif msg==4:

message="DINE IN, RESTAURENT AVAILABLE"

else:

message=""

#Speed Limit part

speed=random.randint(0,150)

if speed>=100:

speedMsg=" Limit Exceeded"

elif speed>=60 and speed<100:

speedMsg="Moderate"

else:

speedMsg="Slow"

#Diversion part

sign=random.randint(0,5)

if sign==1:

signMsg="Right Diversion"

elif sign==3:

signMsg="Left Diversion"

elif sign==5:

signmsg="U Turn"

else:

signMsg=""

#Visibility

if temperature < 24:

visibility="Fog Ahead, Drive Slow"

elif temperature < 20:

visibility="Bad Weather"

else:

visibility="Clear Weather"

else:

print("Error in the HTTP request")

myData={'Temperature':temperature, 'Message':message, 'Sign':signMsg, 'Speed':speedMsg, 'Visibility':visibility}

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

#PUBLISHING TO IOT WATSON

print("Published data Successfully: %s", myData)

client.commandCallback= myCommandCallback

time.sleep(5)

client.disconnect()

GitHub Link:

Project Demo Link: