SIGN WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Department Of Electronic Communication Engineering, Apollo engineering college ,Poonamallee,Chennai.

- TEAM ID PNT2022TMID36746
- PROJECT NAME SIGN WITH SMART CONNECTIVITY FOR BETTER ROAD SAFTEY
- TEAM LEADER ALWIN.V (210219106004)
- TEAM MEMBER 1 VIGNESH.V (210219106039)
- TEAM MEMBER 2 VISHAL.M (210219106041)
- TEAM MEMBER 3 SANJAY KUMAR.V (210219106032)
- TEAM MEMBER 4 ABDUL RAHIM.S (210219106001)

1.INTRODUCTION

1.1 PROJECT OVERVIEW

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 some road diversions due to heavy traffic or due to accidents then we can change the road signs accordingly if they are digitalize. Intelligent transportation systems (ITS) offer significant opportunities to save lives.

A Road Safety International task force, comprising leading international experts in road safety and connected mobility, has focused on the relation between interconnected mobility and road safety.

1.2 PURPOSE

The basic strategy of a Safe System approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury. This threshold will vary from crash scenario to crash scenario, depending upon the level of protection offered to the road users involved. For example, the chances of survival for an unprotected pedestrian hit by a vehicle diminish rapidly at speeds greater than 30 km/h, whereas for a properly restrained motor vehicle occupant the critical impact speed is 50 km/h (for side impact crashes) and 70 km/h (for head-on crashes).

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

The early effects to prevent road accidents and to ensure road safety includes the use of speed detection devices,CCTVs,speed limiters and emergency accident units as the first phase.Despite achieving the state-of the art performance, the existing systems suffer from two main problems,
• Over Speed : These systems cannot control speed at some specific zones.
• Exact location of accident occurred : These systems cannot give the precise location of accident .

2.2 REFERENCES

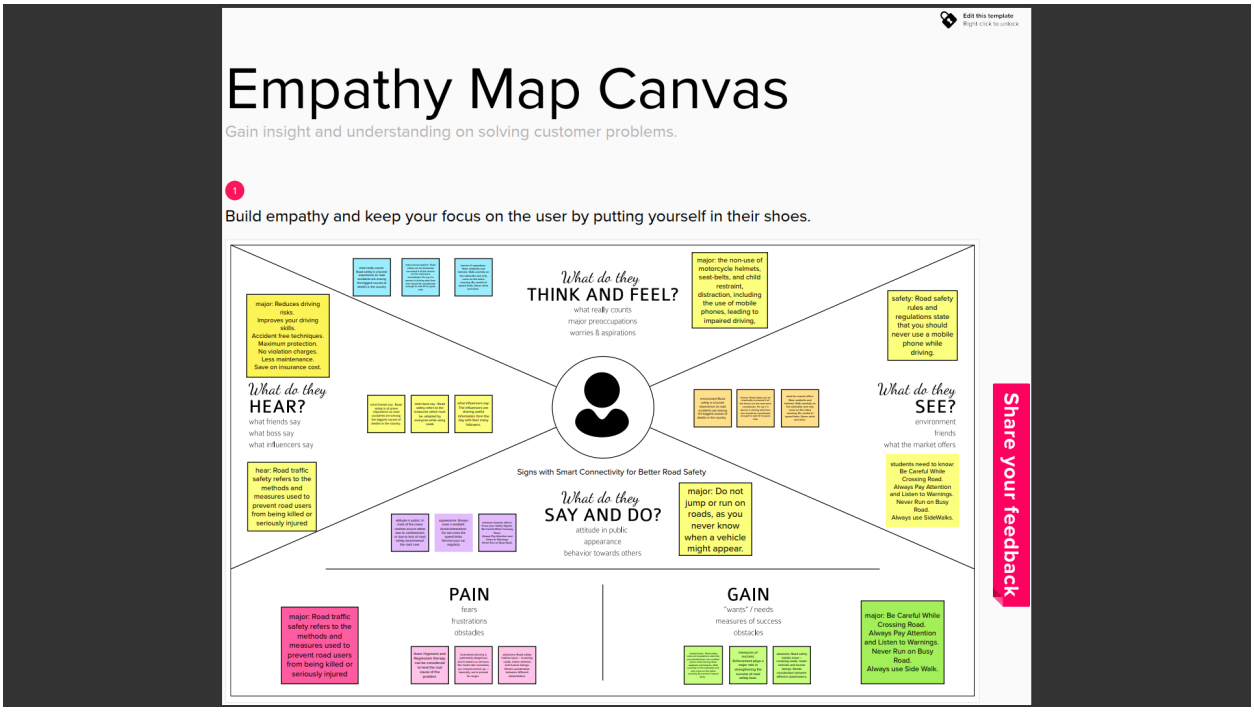
McLeod, Sam; Curtis, Carey (21 December 2020). "Integrating urban road safety and sustainable transportation policy through the hierarchy of hazard controls".

2.3 PROBLEM STATEMENT DEFINITION

Within recent times, there has been a dramatic increase in the number of road accidents involving child pedestrians. This research proposal will seek to highlight the strategies that can be developed and implemented to improve the road safety of child pedestrians. Purpose statement and an associated research question Purpose Statement The purpose of this paper will seek to address the strategies that can be developed and implemented to enhance road safety for child pedestrians and thus improve casualty reduction.

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



An Empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can

represent a group of users, such as a customer segment. Our empathy map canvas is shown as a sign with smart connectivity for better road safety

3.2 IDEATION & BRAINSTORMING

Ideation refers to the hole creative process of coming up with and communicating new ideas. It can take many different forms,from coming up with a brand-new idea to combining multiple existing ideas to create a new process or organizational system.Ideation is similar to a practice known as brainstorming

Ideation phase :

The main aim is to develop a system for continuous monitoring of river water quality at remote places using wireless sensor networks with low power consumption, low-cost and high detection accuracy. pH, conductivity, turbidity level, etc. are the limits that are analyzed to improve the water quality. Following are the aims of idea implementation
(a) To measure water parameters such as pH, dissolved oxygen, turbidity, conductivity, etc. using available sensors at a remote place.
b) To assemble data from various sensor nodes and send it to the base station by the wireless channel.
(c) To simulate and evaluate quality parameters for quality control.
(d) To send SMS to an authorized person routinely when water quality detected does not match the preset standards, so that, necessary actions can be taken.

Control surface:

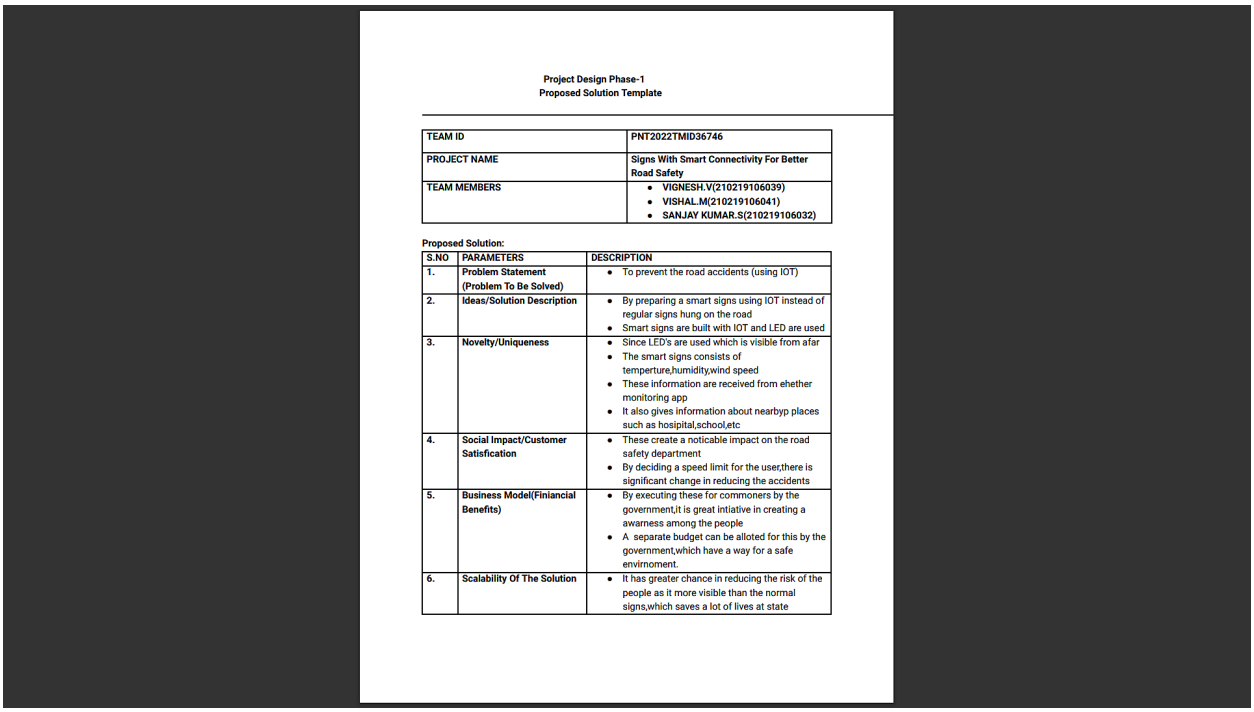
An Arduino mega is utilized as a core person. The Arduino victimized here is mega 2560 because multiple analog sign sensors probe requisite to be conterminous with the Arduino inhabit. It has a set of registers that use as a solon use RAM. Specific intend to know registers for on chip component resources are also mapped into the assemblage grapheme. The addressability of store varies depending on instrumentation series and all PIC devices someone several banking mechanisms to utilise addressing to additional faculty.
Subsequent series of devices have move instructions which can covert move had to be achieved via the
register. Thus the mechanism functions with the exploit of coding intrinsically in the Arduino UNO R3 skate.

PH sensor:

The pH of thing is a useful constant to display because graduate and low pH levels can hump large effects on the author. The pH of a statement can grasp from 1 to 14. A pH sensor is an instrumentation that measure

3.3 PROPOSED SOLUTION

Proposed Solution means the technical solution to be provide by the implementation agency in response to the requirements and the objectives of the project. he following information may be useful to you in completing this portion of your team's work. Skim this section, then refer to it as necessary.



Project Design Phase-1
Proposed Solution Template

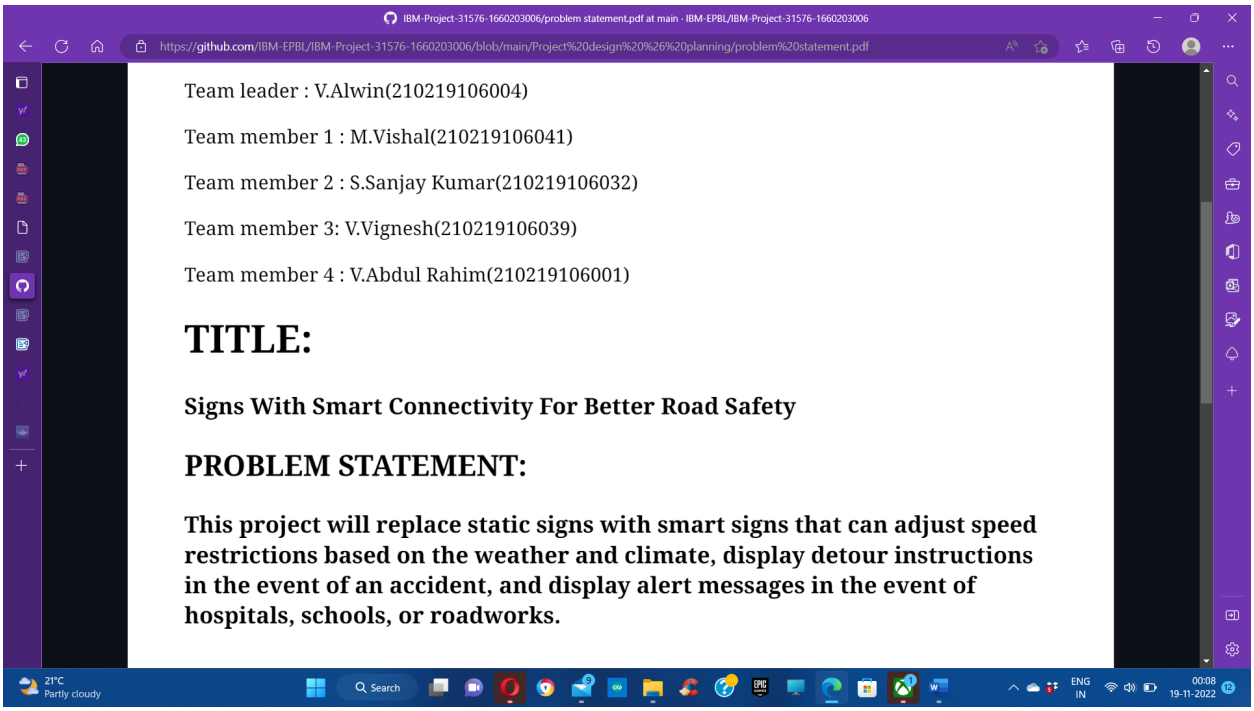
TEAM ID	**PNT2022TMID36746**
PROJECT NAME	**Signs With Smart Connectivity For Better Road Safety**
TEAM MEMBERS	• **VIGNESH.V(210219106039)** • **VISHAL.M(210219106041)** • **SANJAY KUMAR.S(210219106032)**

Proposed Solution:

S.NO	PARAMETERS	DESCRIPTION
1.	**Problem Statement (Problem To Be Solved)**	• To prevent the road accidents (using IOT)
2.	**Ideas/Solution Description**	• By preparing a smart signs using IOT instead of regular signs hung on the road • Smart signs are built with IOT and LED are used
3.	**Novelty/Uniqueness**	• Since LED's are used which is visible from afar • The smart signs consists of temperture,humidity,wind speed • These information are received from ehether monitoring app • It also gives information about nearbyp places such as hosipital,school,etc
4.	**Social Impact/Customer Satisfication**	• These create a noticable impact on the road safety department • By deciding a speed limit for the user,there is significant change in reducing the accidents
5.	**Business Model(Finiancial Benefits)**	• By executing these for commoners by the government,it is great intiative in creating a awarness among the people • A separate budget can be alloted for this by the government,which have a way for a safe envirnoment.
6.	**Scalability Of The Solution**	• It has greater chance in reducing the risk of the people as it more visible than the normal signs,which saves a lot of lives at state

3.4 PROBLEM SOLUTION FIT:

Problem solving is the act of defining a problem, determining the cause of problem, and identifying the problem for solving ,finding the suitable solution for issues can be accomplished by following.

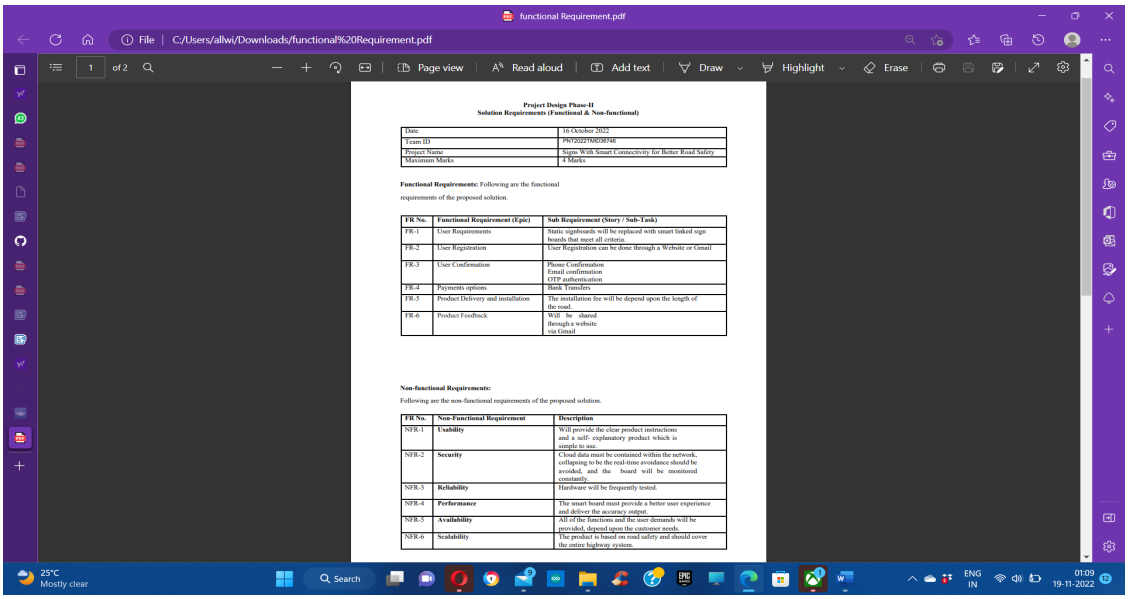


4. FUNCTIONAL ANALYSIS

Requirement analysis also called as requirement engineering is the process of determining user expectation for a new or modified product. These features are called requirement must be qualifiable relevant and detailed. Its classified as two major type. They are;

4.1 FUNCTIONAL REQUIREMENT

4.2 NON-FUNCTIONAL REQUIREMENT



Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	16 October 2022
Team ID	PNT2022TMID36746
Project Name	Signs With Smart Connectivity for Better Road Safety
Maximum Marks	4 Marks

Functional Requirements: Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirements	Static signboards will be replaced with smart linked sign boards that meet all criteria.
FR-2	User Registration	User Registration can be done through a Website or Gmail
FR-3	User Confirmation	Phone Confirmation Email confirmation OTP authentication
FR-4	Payments options	Bank Transfers
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

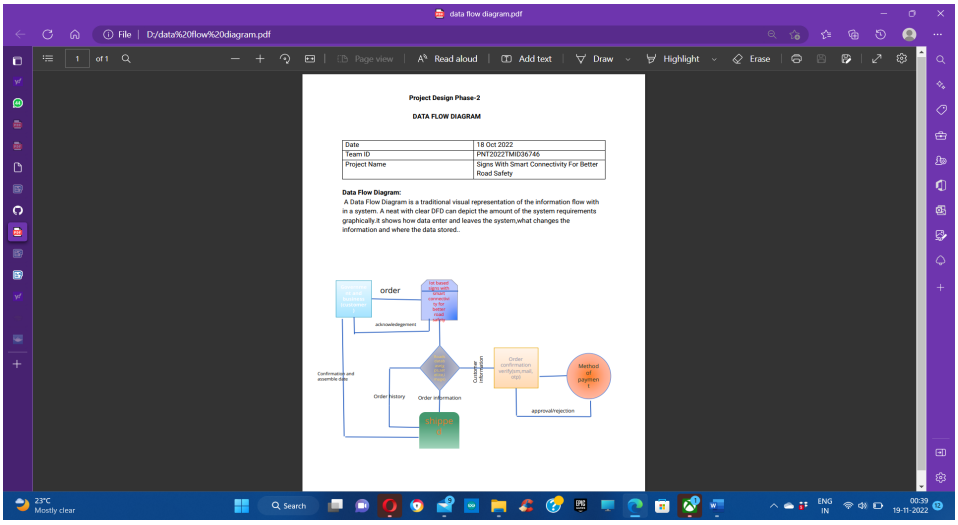
Non-functional Requirements:
Following are the non-functional requirements of the proposed solution.

FR 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 tested.
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 DIAGRAM

Data flow diagram is a way of representing a flow of data through a processer or a system. DFD also provide information about the input and output of each entity and the process itself.



Project Design Phase-2

DATA FLOW DIAGRAM

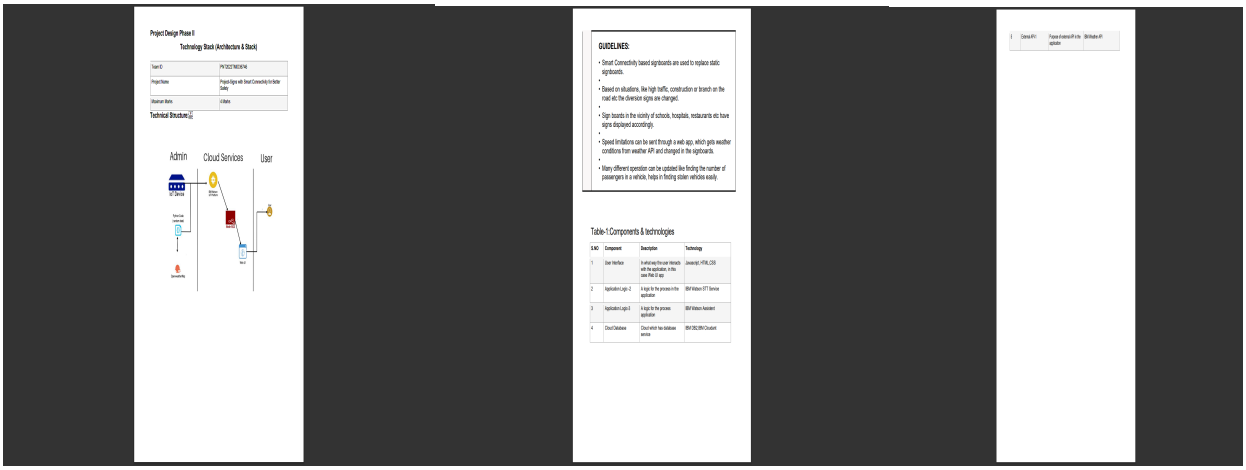
Date	18 Oct 2022
Team ID	PNT2022TMID36746
Project Name	Signs With Smart Connectivity For Better Road Safety

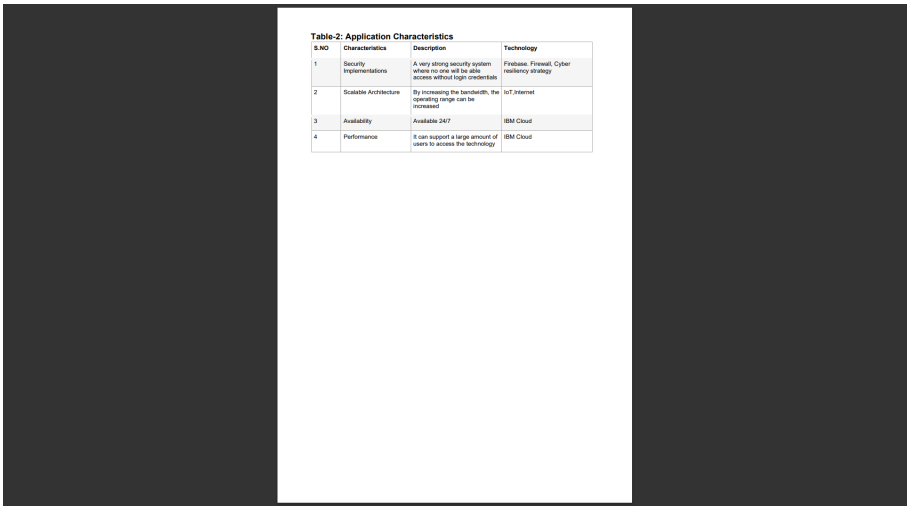
Data Flow Diagram:
A Data Flow Diagram is a traditional visual representation of the information flow with in a system. A neat with clear DFD can depict the amount of the system requirements graphically.it shows how data enter and leaves the system,what changes the information and where the data stored.

5.2 SOLUTION &TECHNICAL ARCHITECTURE

A Solution architecture is an architectural description of a specific solution.

SAs combine guidance from different enterprise architectural viewpoints (business, information and technical) as well as from the enterprise solution architecture (ESA).





5.3 USER STORIES

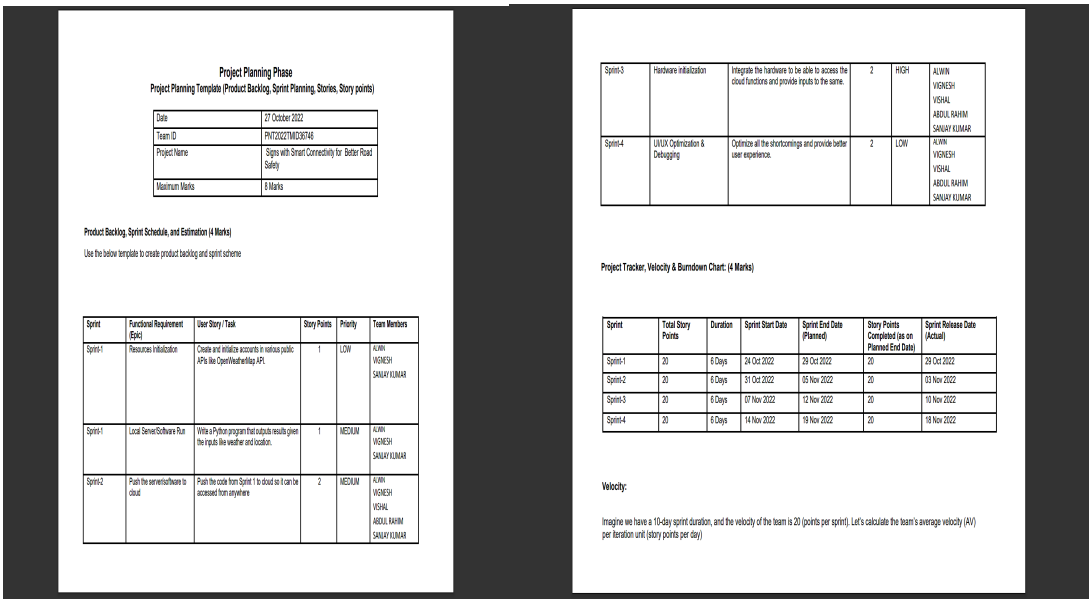
the case as research reveals a range of counter-intuitive road safety dynamics; many narrow approaches to road safety management appear to trigger adverse risk compensation and negative externality effects, potentially running counter to broader sustainability goals. Recognizing the urgent need to integrate road safety with broader urban sustainability

measures, this paper presents a review of road safety literature using the established Hazard Control Hierarchy. In doing so, we identify and categorize opportunities to more effectively combine Vision Zero with broader sustainable accessibility policy objectives. We synthesize the literature against the Hazard Control Hierarchy to devise a framework to more effectively integrate the work of professional disciplines which shape the safety and sustainability of the urban built environment.

6.PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING &ESTIMATION

Sprint planning is an event in scrum that kicks of the sprint. The purpose of sprint planning is to define what we can deliver in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team.



Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	27 October 2022
Team ID	PNT2022TMID39748
Project Name	Signs with Smart Connectivity for Better Road Safety
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint scheme

Sprint	Functional Requirement (Epic)	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Resources Initialization	Create and initialize accounts in various public APIs like OpenWeatherMap API.	1	LOW	ALWIN VIGNESH SANJAY KUMAR
Sprint-1	Local Server/Software Run	Write a Python program that outputs results given the inputs like weather and location.	1	MEDIUM	ALWIN VIGNESH SANJAY KUMAR
Sprint-2	Push the server/software to cloud	Push the code from Sprint 1 to cloud so it can be accessed from anywhere	2	MEDIUM	ALWIN VIGNESH VISHAL ABDUL RAHIM SANJAY KUMAR
Sprint-3	Hardware Initialization	Integrate the hardware to be able to access the cloud functions and provide inputs to the same.	2	HIGH	ALWIN VIGNESH VISHAL ABDUL RAHIM SANJAY KUMAR
Sprint-4	UI/UX Optimization & Debugging	Optimize all the shortcomings and provide better user experience.	2	LOW	ALWIN VIGNESH VISHAL ABDUL RAHIM SANJAY KUMAR

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	20	03 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	18 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)

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
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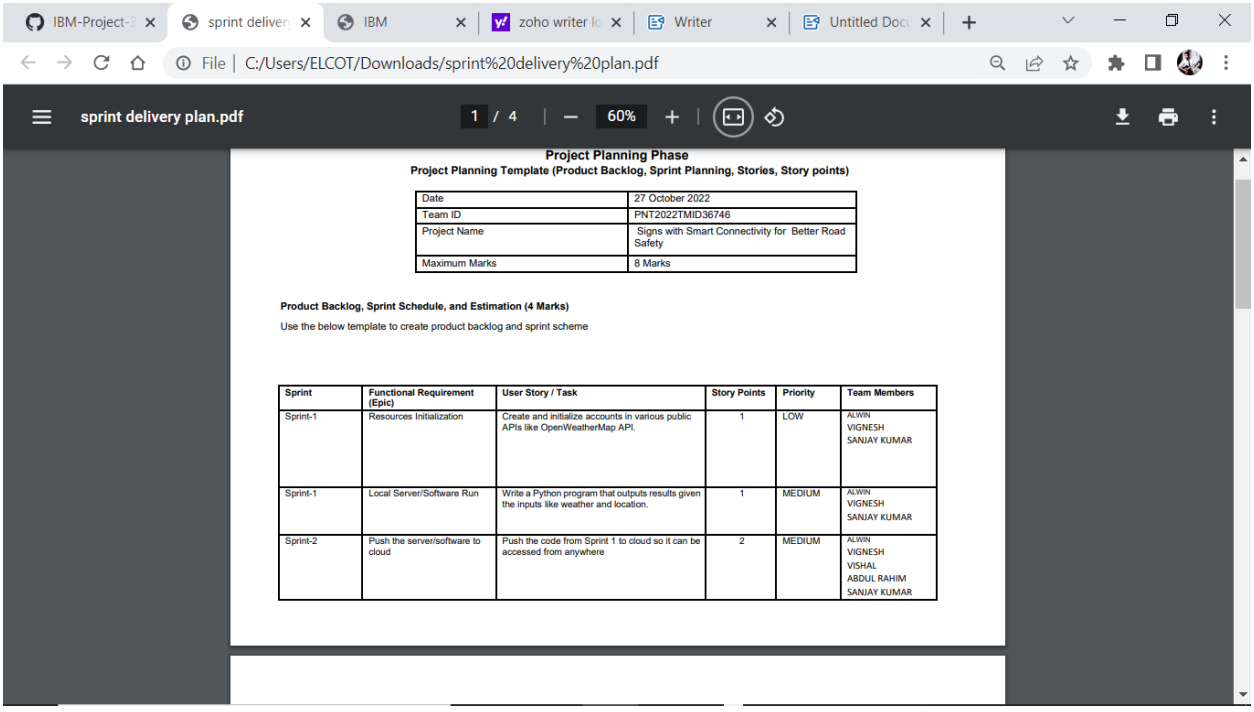
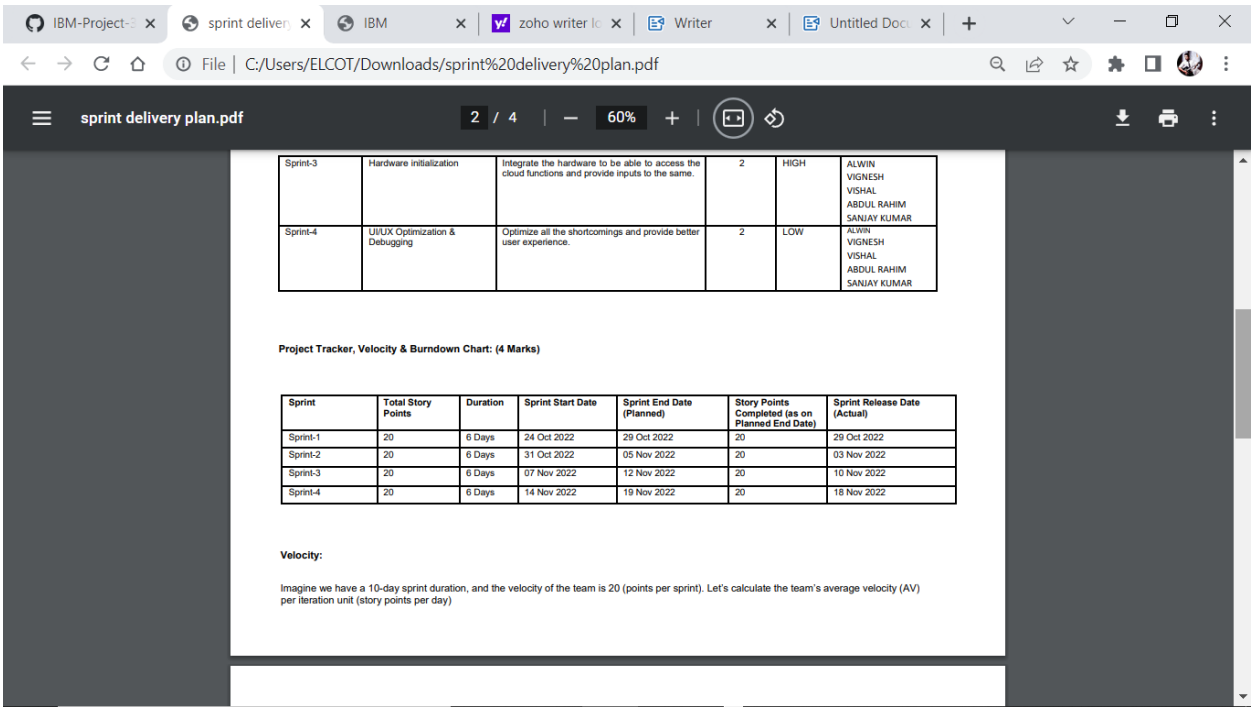
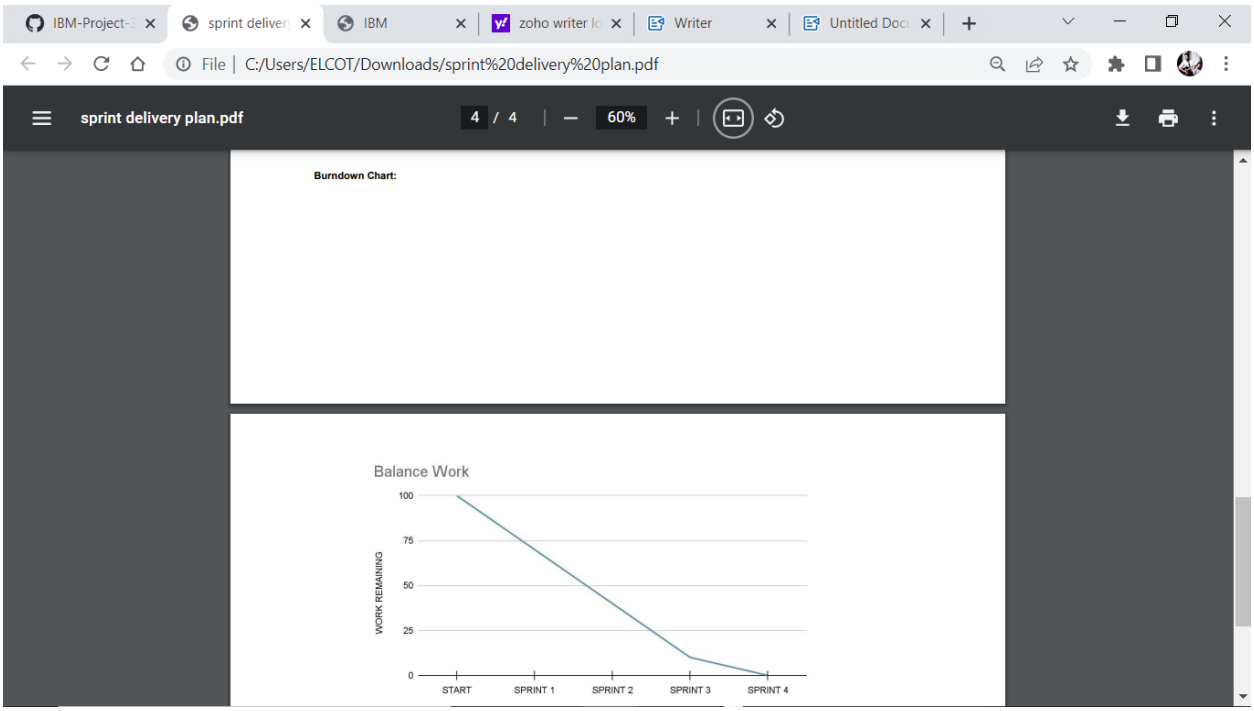
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	18 Nov 2022

6.2 SPRINT DELIVERY SCHEDULE

The deliverables of the sprint are not as predictable as they are for the other project. Sprint participants have produced sketches and drawing, writing, photographs, comic, strip, video and fully coded working prototypes







7.CODING & SOLUTIONING

(Explain the feature added in the project along with code)

7.1 Feature 1

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
//-------credentials of IBM Accounts------
#define ORG "qguokr"//IBM ORGANITION ID
#define DEVICE_TYPE "arduino_uno"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "ultrasonic_sensor"//Device ID mentioned in ibm watson
IOT Platform
#define TOKEN "89101112" //Token String data3;
float dist;
//-------- Customise the above values -------- char server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and
format in which
data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd REPRESENT command type AND
COMMAND IS
TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
//----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient PubSubClient client(server, 1883,
callback
,wifiClient); //calling the predefined client id by passing parameter like server id,portand
wificredential
int LED = 4; int trig = 5;
int echo = 18; void
setup()
{
Serial.begin(115200);
pinMode(trig,OUTPUT);
pinMode(echo,INPUT);
pinMode(LED, OUTPUT);
delay(10); wificonnect();
mqttconnect();
}
```

```
void loop()// Recursive Function
{
digitalWrite(trig,LOW);
 digitalWrite(trig,HIGH);
 delayMicroseconds(10);
 digitalWrite(trig,LOW);
 float dur = pulseIn(echo,HIGH);
 float dist = (dur * 0.0343)/2;
 Serial.print ("Distancein cm");
 Serial.println(dist);

 PublishData(dist);
 delay(1000);
 if (!client.loop()) {
 mqttconnect();
 }
}
/*.....retrieving to
Cloud.....*/
void PublishData(float dist) {
 mqttconnect();//function call for connecting to ibm
 /*
 creating the String in in form JSon to update the data to ibm cloud */
 String object; if (dist
<100)
 {
 digitalWrite(LED,HIGH);
 Serial.println("object is near");
 object = "Near";
 }
 else
 {
 digitalWrite(LED,LOW);
 Serial.println("no object found");
 object = "No";
 }
 String payload = "{\"distance\":";
 payload += dist;
 payload += "," "\"object\":\"";
 payload += object;
 payload += "\"}";
```

```
 Serial.print("Sending payload: ");
 Serial.println(payload);

 if (client.publish(publishTopic, (char*) payload.c_str())) { Serial.println("Publish ok");// if it
sucessfully
upload data on the cloud then it will print publish ok in Serial monitor or else it will print publish
failed
 } else
{
 Serial.println("Publish failed");
 }
}
void mqttconnect() { if
(!client.connected()) {
 Serial.print("Reconnecting client to ");
 Serial.println(server);
 while (!!!client.connect(clientId, authMethod, token)) {
 Serial.print(".");
 delay(500);
 }
 initManagedDevice();
 Serial.println();
 }
}
void wificonnect() //function defination for wificonnect
{
 Serial.println();
 Serial.print("Connecting to ");
 WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish the connection
 while (WiFi.status() != WL_CONNECTED) {
 delay(500);
 Serial.print("."); }
 Serial.println("");
 Serial.println("WiFi connected");
 Serial.println("IP address: ");
 Serial.println(WiFi.localIP());
}
void initManagedDevice() {
 if (client.subscribe(subscribetopic)) {
 Serial.println((subscribetopic));
 Serial.println("subscribe to cmd OK");
```

```
 } else {
 Serial.println("subscribe to cmd FAILED");
 }
}
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{
 Serial.print("callback invoked for topic: ");
 Serial.println(subscribetopic);
 for (int i = 0; i < payloadLength; i++) {
 //Serial.print((char)payload[i]);
 data3 += (char)payload[i];
 }
 // Serial.println("data: "+ data3);
// if(data3=="Near")
// {
// Serial.println(data3);
// digitalWrite(LED,HIGH);
// }
// else
// {
// Serial.println(data3);
// digitalWrite(LED,LOW);
// } data3="";
}
```

7.2 Feature 2

```
#include <WiFi.h>//library for wifı
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#define DHTPIN 5 // what pin we're connected to
#define DHTTYPE DHT22 // define type of sensor DHT 11
DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr
of dht connected
void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);
//-------credentials of IBM Accounts------
#define ORG "qguokr"//IBM ORGANITION ID
#define DEVICE_TYPE "ibm"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "wikki14"//Device ID mentioned in ibm watson IOT Platform
```

```
#define TOKEN "123456789" //Token
String data3;
float h, t;
//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server
Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of
event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd REPRESENT
command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the
predefined client id by passing parameter like server id,portand
wificredential
void setup()// configureing the ESP32
{
Serial.begin(115200);
dht.begin();
pinMode(33, INPUT); //North
pinMode(25, INPUT); // South
pinMode(26, INPUT); // East
pinMode(27, INPUT); // West
delay(10);
Serial.println();
wificonnect();
mqttconnect();
}
int n, s, e, w;
void loop()// Recursive Function
{
h = dht.readHumidity();
t = dht.readTemperature();
Serial.print("temp:");
Serial.println(t);
Serial.print("humidity:");
Serial.println(h);
n = digitalRead(33);
```

```
s = digitalRead(25);
e = digitalRead(26);
w = digitalRead(27);
PublishData(t, h, n, s, e, w);
delay(1000);
if (!client.loop()) {
mqttconnect();
}
}
/*.....retrieving to
Cloud.....*/
void PublishData(float temp, float humid, int n, int s, int e, int w) {
mqttconnect();//function call for connecting to ibm
/*
creating the String in in form JSon to update the data to ibm cloud
*/
String payload = "{\"temp\":";
payload += temp;
payload += "," "\"humidity\":";
payload += humid;
payload += "," "\"North\":";
payload += n;
payload += "," "\"South\":";
payload += s;
payload += "," "\"East\":";
payload += e;
payload += "," "\"West\":";
payload += w;
payload += "}";
Serial.print("Sending payload: ");
Serial.println(payload);
if (client.publish(publishTopic, (char*) payload.c_str())) {
Serial.println("Publish ok");// if it sucessfully upload data on the
cloud then it will print publish ok in Serial monitor or else it will
print publish failed
} else {
Serial.println("Publish failed");
}
}
void mqttconnect() {
if (!client.connected()) {
```

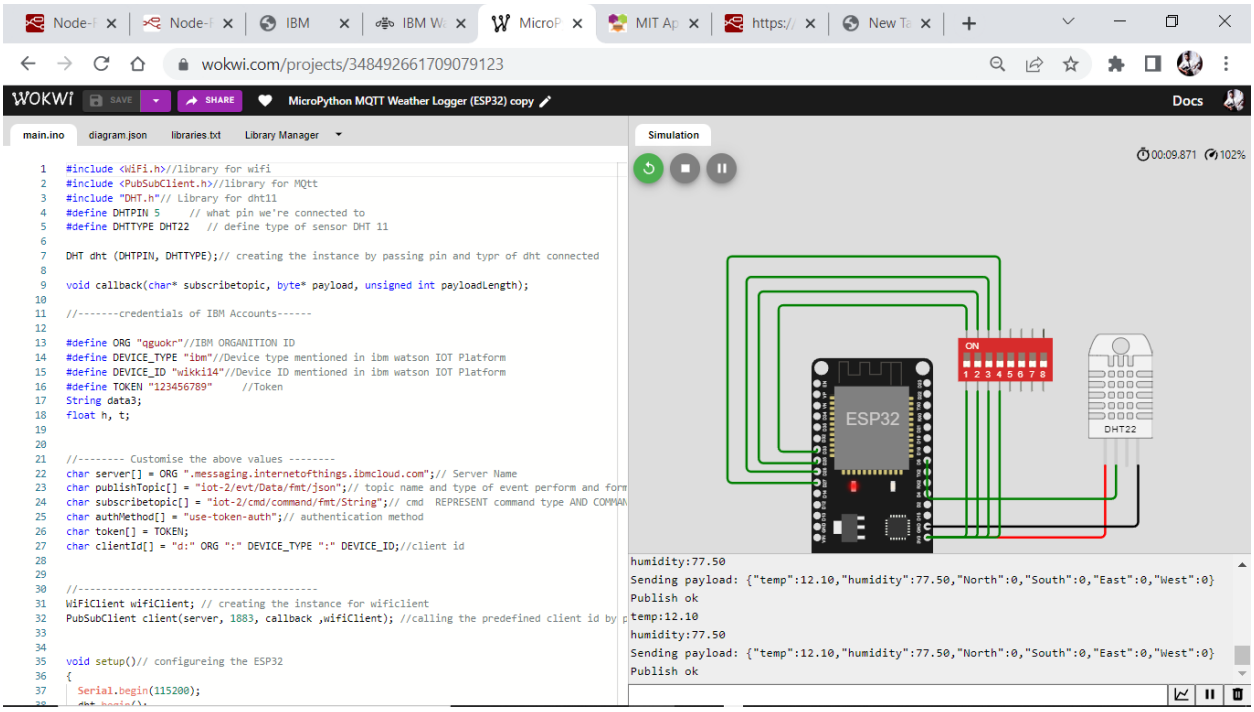
```
Serial.print("Reconnecting client to ");
Serial.println(server);
while (!!!client.connect(clientId, authMethod, token)) {
Serial.print(".");
delay(500);
}
initManagedDevice();
Serial.println();
}
}
void wificonnect() //function defination for wificonnect
{
Serial.println();
Serial.print("Connecting to ");
WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to
establish the connection
while (WiFi.status() != WL_CONNECTED) {
delay(500);
Serial.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
Serial.println("IP address: ");
Serial.println(WiFi.localIP());
}
void initManagedDevice() {
if (client.subscribe(subscribetopic)) {
Serial.println((subscribetopic));
Serial.println("subscribe to cmd OK");
} else {
Serial.println("subscribe to cmd FAILED");
}
}
void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength)
{
Serial.print("callback invoked for topic: ");
Serial.println(subscribetopic);
for (int i = 0; i < payloadLength; i++) {
//Serial.print((char)payload[i]);
data3 += (char)payload[i];
```

```
}
Serial.println("data: "+ data3);
// if(data3=="lighton")
// {
// Serial.println(data3);
// digitalWrite(LED,HIGH);
// }
// else
// {
// Serial.println(data3);
// digitalWrite(LED,LOW);
// }
// data3="";
}
```

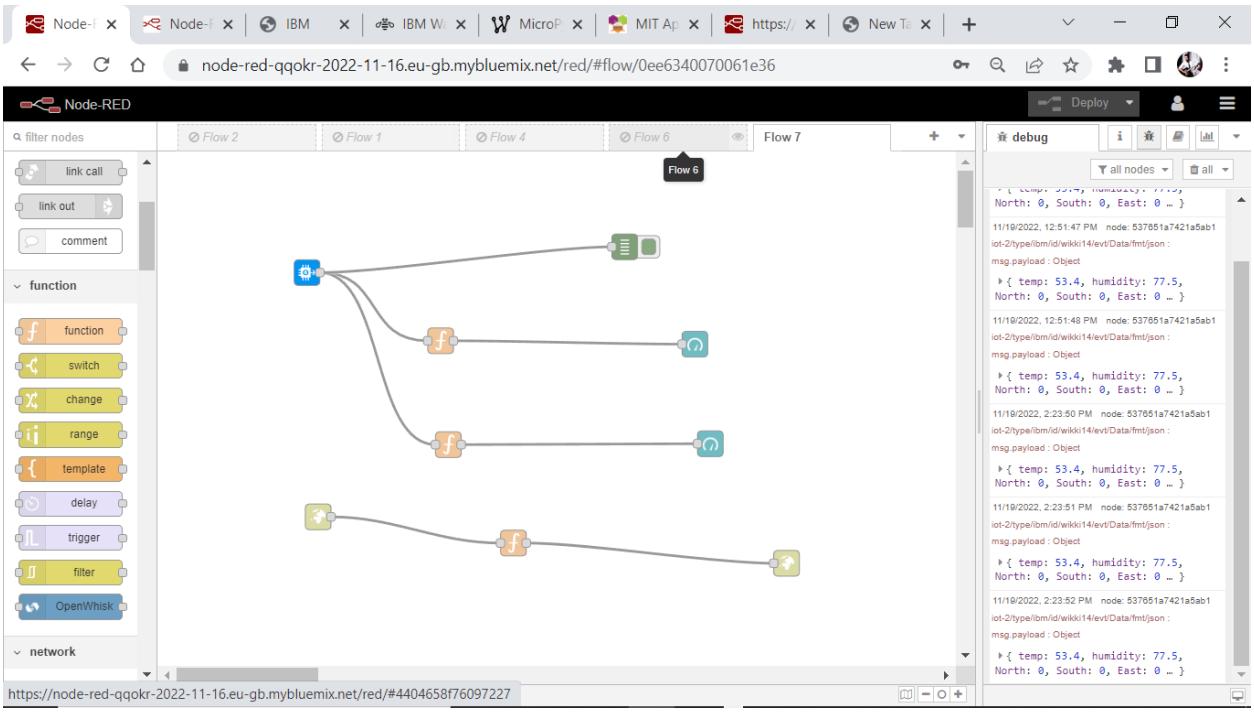
8.TESTING:

TEST CASES:

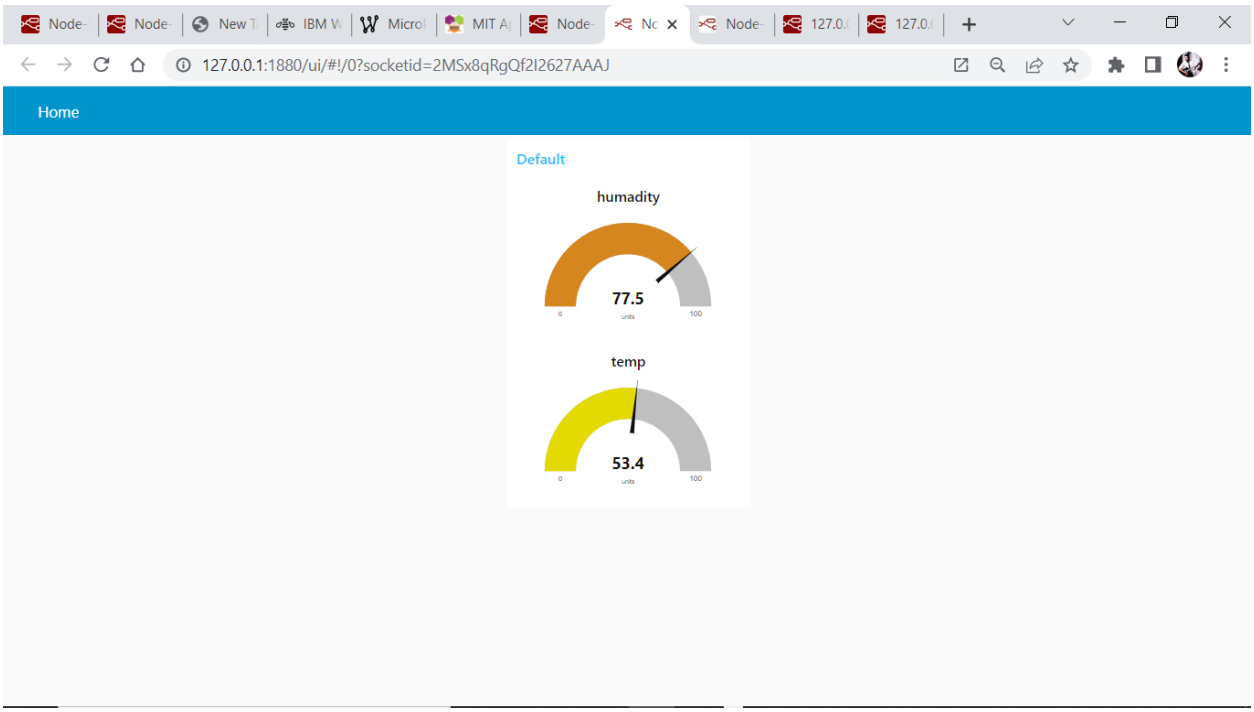
WOWKI SIMULATION:



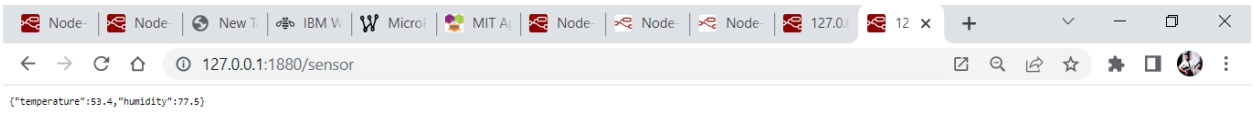
NODE-RED:



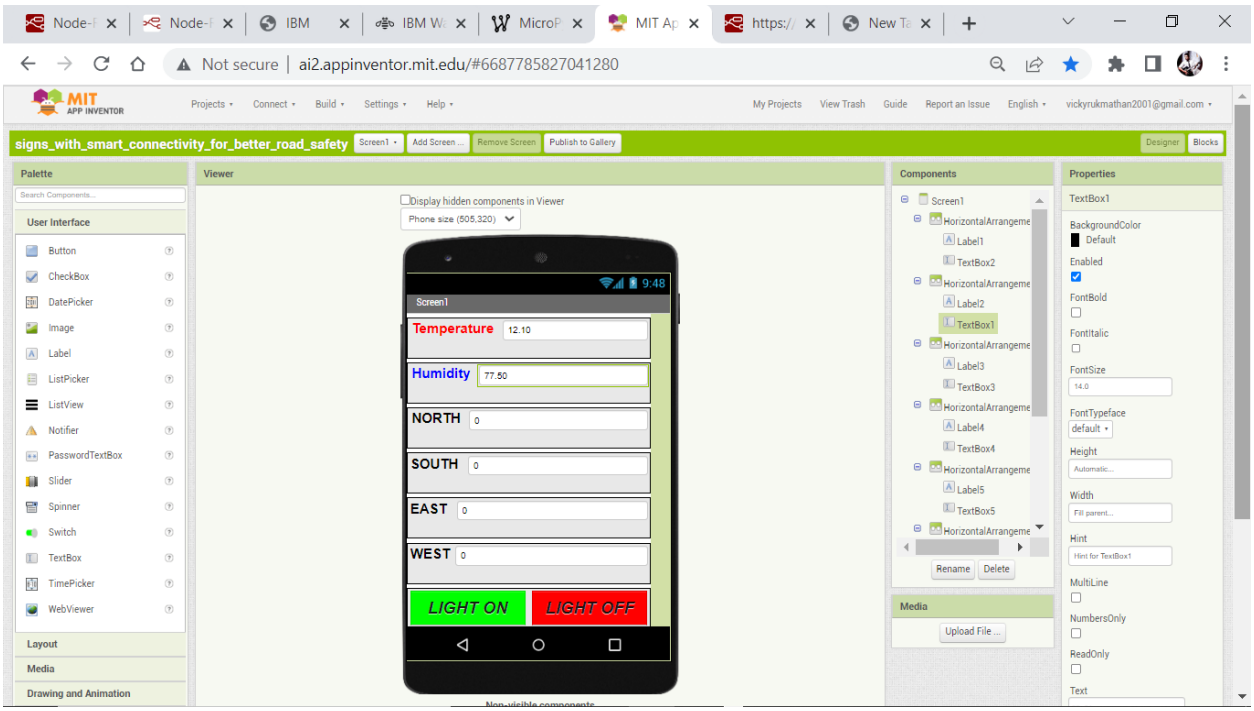
NODE-UI:



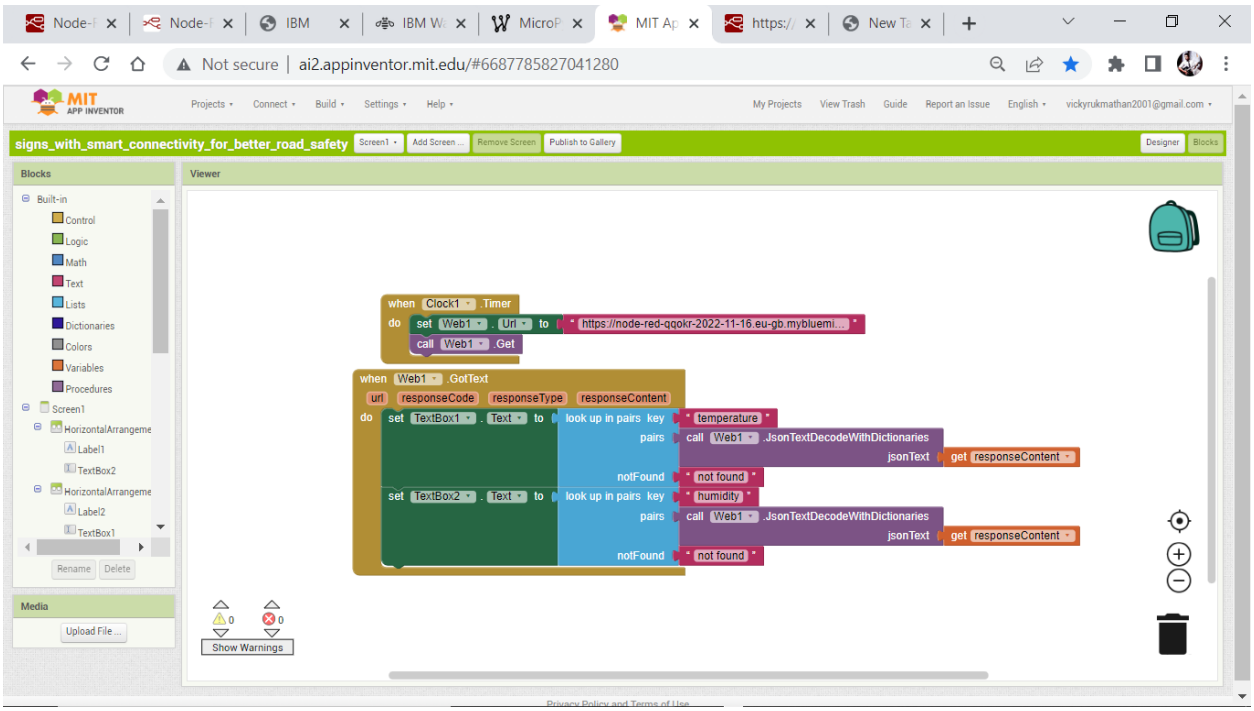
OUTPUT FROM NODE-RED:



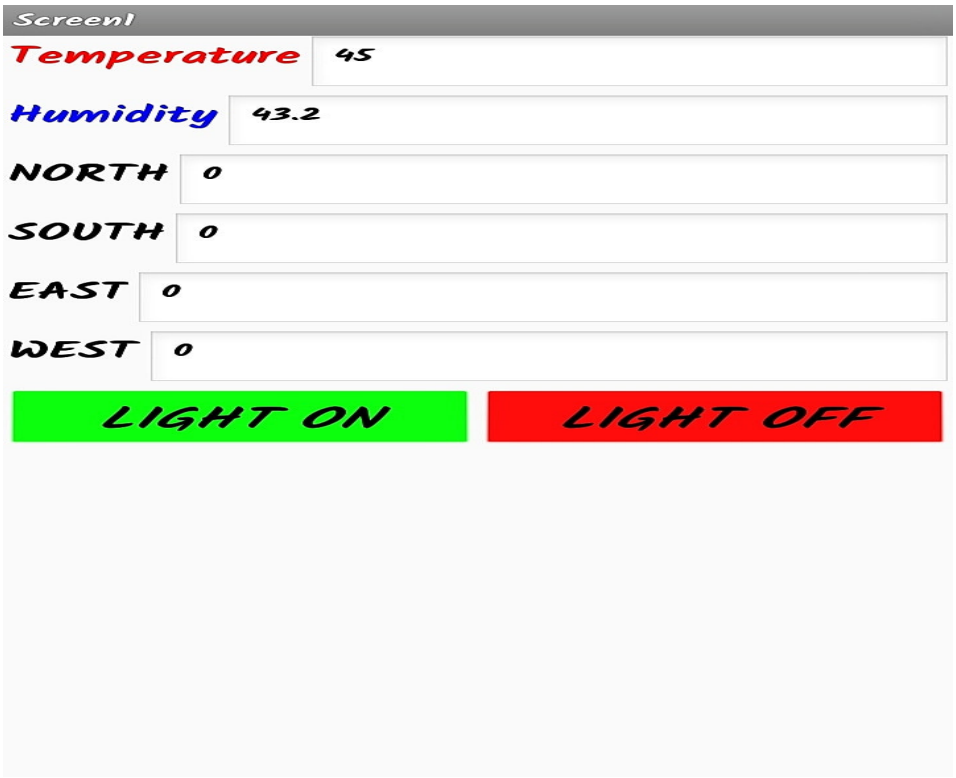
MIT APP INVENTOR UI DESIGN:



MIT-APP BACKEND DESIGN:



OUTPUT(DISPLAY FROM MIT-APP)



8.2 USER ACCEPTANCE TESTING:

Project Development Phase Sprint 4

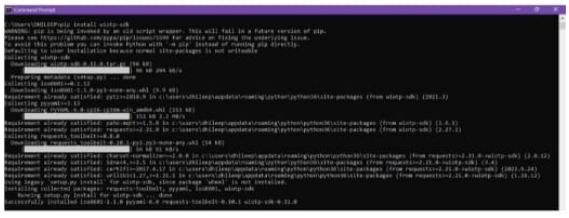
Date	17 November 2022
Team ID	PNT2022TMID36746
Project Name	Signs with smart connectivity for Better road safety

Code for print the random temperature, Road signs, Speed limit, Message : (RandomValues.py)

```
import wiotp.sdk.device import time
import random
import ibmiotf.application import ibmiotf.device import requests, json
myConfig = {
#Configuration "identity": {
"orgId": "qguokr",
"typeId": "ibm", "deviceId":"wikki14"
},
#API Key
"auth": {
"token": "123456789"
}
}
#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.connect()

#OpenWeatherMap Credentials
BASE_URL = "https://api.openweathermap.org/data/2.5/weather?" CITY = "Salem, IN"
URL = BASE_URL + "q=" + CITY + "&units=metric"+"&appid=" + "f58e4720c739a54c439aba9b05176839"
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="GO SLOW, SCHOOL ZONE AHEAD"
elif msg==2:
message="NEED HELP, POLICE STATION AHEAD"
elif msg==3:
message="EMERGENCY, HOSPITAL NEARBY"
elif msg==4:
message="DINE IN, RESTAURENT AVAILABLE"
elif msg==5:
message="PETROL BUNK NEARBY"
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"
```

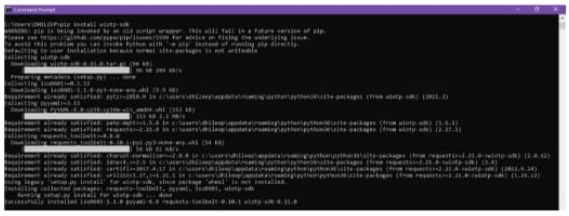
```
elif sign==2:
signMsg="Speed Breaker" elif sign==3:
signMsg="Left Diversion" elif sign==4:
signmsg="U Turn" else:
signMsg=""
#Visibility
if temperature < 24:
visibility="Fog Ahead, Drive Slow" elif temperature < 20:
visibility="Bad Weather" else:
visibility="Clear Weather"
else:
print("Error in the 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: ", myData)
print("
") client.commandCallback = myCommandCallback time.sleep(5)
client.disconnect()
```

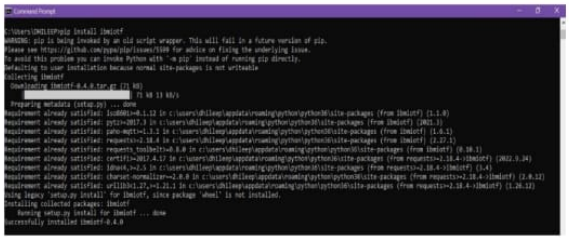
Import wiotp-sdk & ibmiotf :



print(
") client.commandCallback = myCommandCallback time.sleep(5)
client.disconnect()

Import wiotp-sdk & ibmiotf :





Python IDLE Output :

9.RESULT:

The result shows three switches through which you can switch the display to different modes.
Mode1 : Displaying Speed Limit
Mode2 : Display of Diversions, Alerts of Accident prone area
Mode3 : Information sign boards

10.ADVANTAGES AND DISADVANTAGES

Advantages :
- **Efficient Traffic Management**
- **Automated Toll and Ticketing**
- **Self-driving Cars**
- **Advanced Vehicle Tracking or Transportation Monitoring**
- **Enhanced Security of the Public Transport**

Disadvantages :
- **Property Damage**
- **Bodily Injury**
- **Cyber Risk**

11.CONCULSION:

Roads were previously only functional in nature. Highways are now built to be safe, long-lasting, and easily accessible. The thought of a roadway being a vector for IOT networks or any other communication system was unthinkable and impractical. However, recent advances, such as the installation of digital sign boards along roadside, have provided a gateway that allows highways to function as data conveyors. Data such as road conditions and traffic patterns are now shown on sign boards. Wireless networks can use sensor technology to enable more detailed communications at higher levels. IoT systems could be used by state and local transportation departments to target road maintenance needs, traffic utilisation, weather conditions, and accident records.

12.FUTURE SCOPE:

1. Solar powered roadways
Photovoltaic cells are embedded within hexagonal panels made of tempered glass, which are used to pave roads. These panels contain LEDs, microprocessors, snow-melting heating devices and inductive charging capability for electric vehicles when driving. Glass is renewable and can be engineered to be stronger than steel, and to allow cars to stop safely even when traveling at high speeds. While this idea has gained widespread support, scalability is a challenge as it remains expensive.

2. Smart Roads
Specially engineered roadways fitted with smart features, including sensors that monitor and report changing road conditions, and WiFi transmitters that provide broadband services to vehicles, homes and businesses. The smart road can also charge electric cars as they drive.

3. Glow in the dark roads
Glowing markers painted onto existing roadway surfaces use a photo-luminescent powder that absorbs and stores daylight. The 500m long strips glow for 8 hours after dark. This technology is still in the testing phase, and the glow is not yet consistent, but it could be more cost-effective than traditional road lighting technologies.

4. Interactive lights
Road lights activated by motion sensors to illuminate a particular section of the road as cars approach. The lights dim once the car passes. Suited for roads with less traffic, interactive lights provide night visibility as needed and reduce energy wastage when there are no cars. One design, developed in Holland, uses the wind generated by passing vehicles to power lights.

13.appendix

github link:https://github.com/IBM-EPBL/IBM-Project-31576-1660203006
demo link:https://github.com/IBM-EPBL/IBM-Project-31576-1660203006/tree/main/FINAL%20DELIVERABLES