TEAM ID : PNT2022TMID47020

PROJECT NAME

SIGNS WITH SMART CONNECTIVITY FOR BETTER SAFETY

TEAM MEMBERS:

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1. INTRODUCTION

Project Report

1. Project Overview

- To replace the static signboards, smart connected signboards 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, Restaurants) signs are also displayed accordingly.
- Different modes of operations can be selected with the help of buttons.

2. Purpose

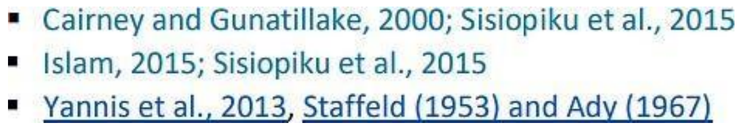
- Smart Traffic Management is a system to monitor and control traffic signals using sensors to regulate the flow of traffic and to avoid congestion for a smooth flow of traffic.
- Prioritizing traffic like ambulances, police etc. is also one application comes under smart traffic management.

2. LITERATURE SURVEY

1. Existing problem

- Analysis of crash data has suggested a link between roadside advertising signs and safety.
- Research suggests that crash risk increases by approXimately 25–29% in the presence of digital roadside advertising signs compared to control areas.
- On the other hand, static roadside advertising signs have not been linked with differences in the crash count.
- However, this finding is contrary to previous research that suggests differences in crash counts exist in the presence of static roadside advertising.
- The quantity and quality of available evidence limit our conclusion.
- Fixed object, side swipe and rear end crashes are the most common types of crashes in the presence of roadside advertising signs. ▪ In addition, drivers showed increased eye fixations and increased drifting between lanes on the road.

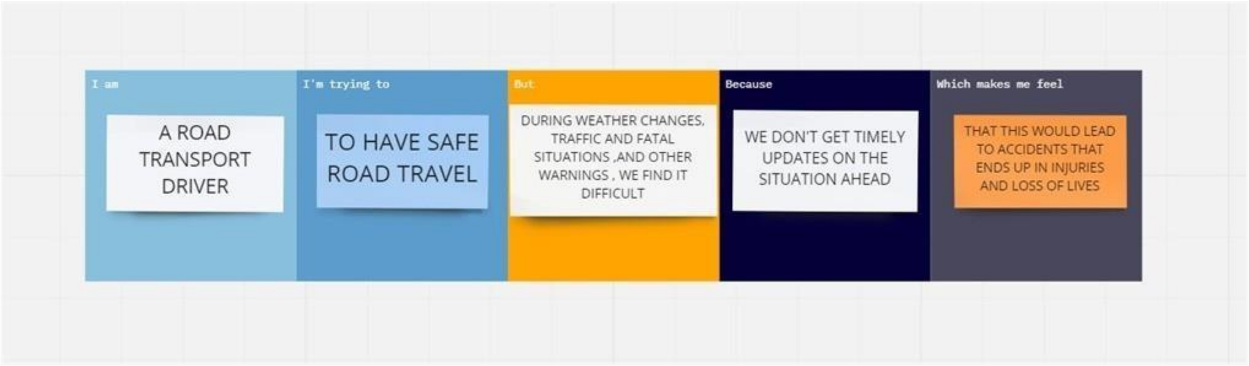
2.2. References



- Cairney and Gunatillake, 2000; Sisiopiku et al., 2015
- Islam, 2015; Sisiopiku et al., 2015
- Yannis et al., 2013, Staffeld (1953) and Ady (1967)

2.3. Problem Statement Definition

Road transport drivers find it hard to get adapted to the changes prevailing in the weather, traffic, other fatal situations and thereby applying suitable driving measures like increasing/ decreasing speeds and taking diversion measures accordingly becomes a challenging task. Road transport drivers find it hard to get adapted to the changes prevailing in the weather, traffic, other fatal situations and thereby applying suitable driving measures like increasing/ decreasing speeds and taking diversion measures accordingly becomes a challenging task.



I am	I'm trying to	But	Because	Which makes me feel
A ROAD TRANSPORT DRIVER	TO HAVE SAFE ROAD TRAVEL	DURING WEATHER CHANGES, TRAFFIC AND FATAL SITUATIONS ,AND OTHER WARNINGS , WE FIND IT DIFFICULT	WE DON'T GET TIMELY UPDATES ON THE SITUATION AHEAD	THAT THIS WOULD LEAD TO ACCIDENTS THAT ENDS UP IN INJURIES AND LOSS OF LIVES

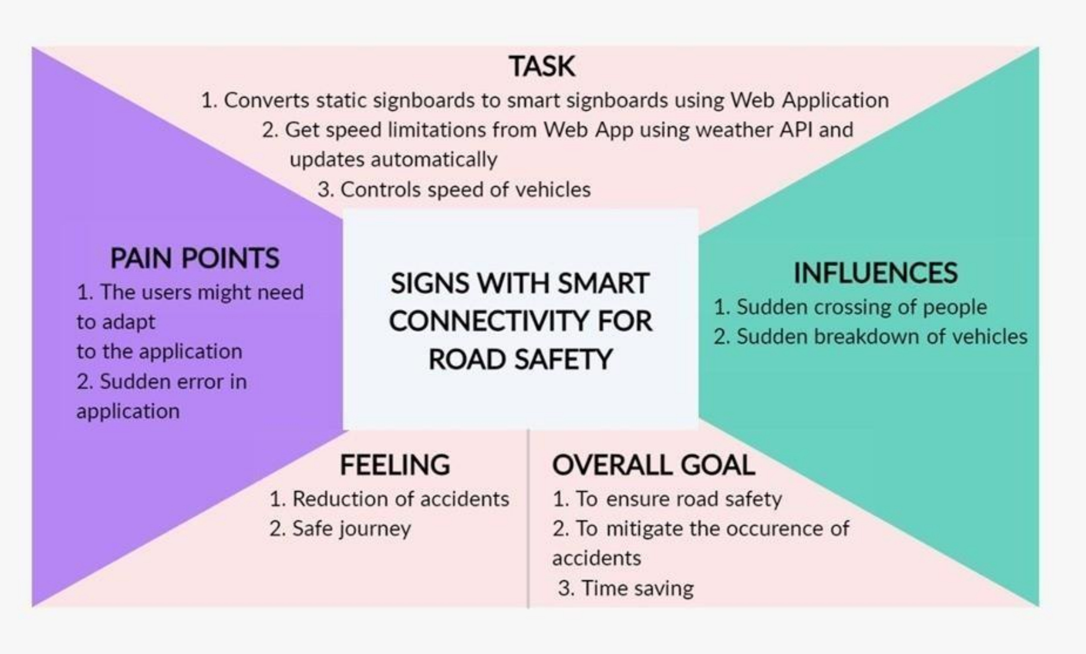
3. IDEATION & PROPOSED SOLUTION

1. Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user’s behaviours and attitudes.

It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user’s perspective along with his or her goals and challenges.



TASK

1. Converts static signboards to smart signboards using Web Application
2. Get speed limitations from Web App using weather API and updates automatically
3. Controls speed of vehicles

PAIN POINTS

1. The users might need to adapt to the application
2. Sudden error in application

SIGNS WITH SMART CONNECTIVITY FOR ROAD SAFETY

INFLUENCES

1. Sudden crossing of people
2. Sudden breakdown of vehicles

FEELING

1. Reduction of accidents
2. Safe journey

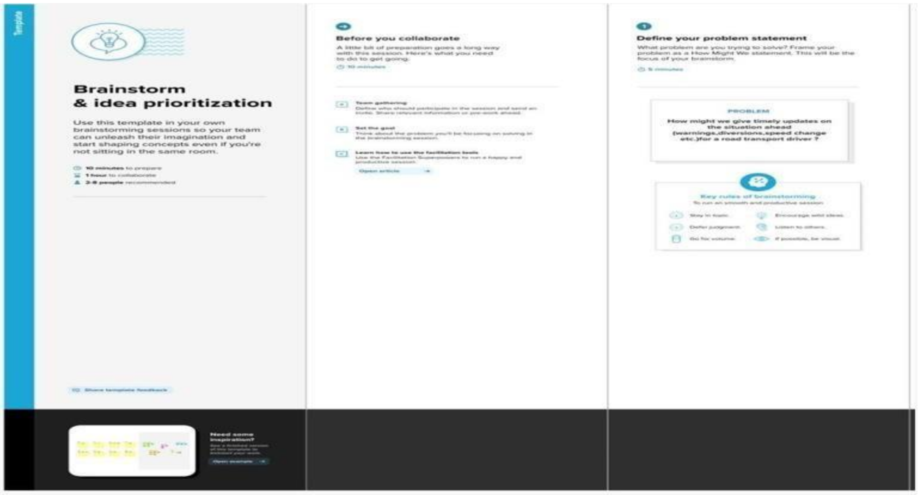
OVERALL GOAL

1. To ensure road safety
2. To mitigate the occurence of accidents
3. Time saving

3.2. Ideation & Brainstorming

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

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



Brainstorm & idea prioritization

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

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Need some inspiration?

See a finished version of this template to kickstart your work.

Before you collaborate

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

10 minutes

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

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

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

1

Define your problem statement

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

5 minutes

PROBLEM

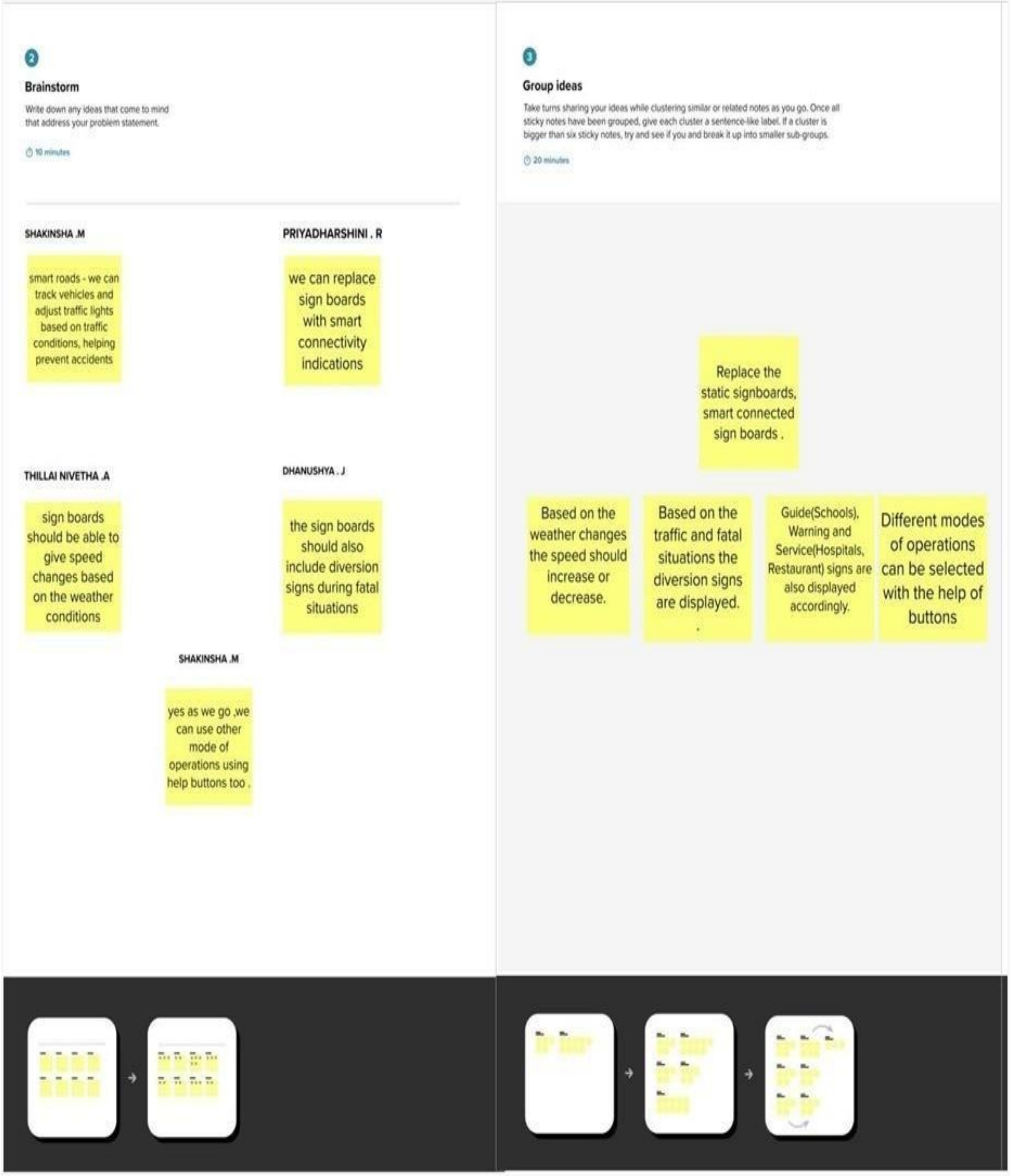
How might we give timely updates on the situation ahead (warnings,diversions,speed change etc.)for a road transport driver ?

Key rules of brainstorming

To run an smooth and productive session

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

Step-2: Brainstorm, Idea Listing and Grouping



2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

SHAKINSHA .M

smart roads - we can track vehicles and adjust traffic lights based on traffic conditions, helping prevent accidents

PRIYADHARSHINI . R

we can replace sign boards with smart connectivity indications

THILLAI NIVETHA .A

sign boards should be able to give speed changes based on the weather conditions

DHANUSHYA . J

the sign boards should also include diversion signs during fatal situations

SHAKINSHA .M

yes as we go ,we can use other mode of operations using help buttons too .

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Replace the static signboards, smart connected sign boards .

Based on the weather changes the speed should increase or decrease.

Based on the traffic and fatal situations the diversion signs are displayed.

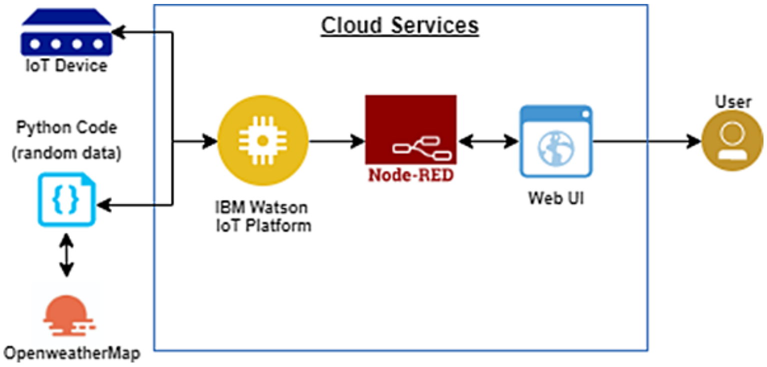
Guide(Schools), Warning and Service(Hospitals, Restaurant) signs are also displayed accordingly.

Different modes of operations can be selected with the help of buttons

3.3. Propose d Solution

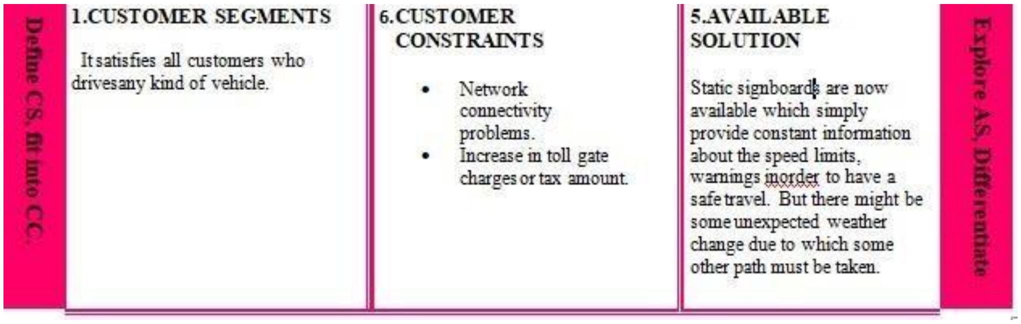
S.No.	Parameter	Description
1.	**Problem Statement (Problem to besolved)**	Road transport drivers find it hard to get adapted to the changes prevailing in the weather, traffic, other fatal situations and thereby applying suitable driving measureslike increasing/ decreasing speeds and taking diversion measures accordingly becomes a challenging task. Therefore, smart signboards that provide timelyupdation are employed.
2.	**Idea / Solution description**	● Static signboards are replaced with smart connected sign boardsthat get the speed limitations from a webapp using weather API and updateautomatically. ● Based on the weather changesthe speed may increase ordecrease. ● Based on the traffic and fatal situations the diversion signsare displayed. ● Guide (Schools), Warning and Service (Hospitals, Restaurant) signsare also displayed accordingly. ● Different modes of operations can be selected with the helpof buttons.

3.	**Novelty / Uniqueness**	**Preceding system's objectives:** ● A system that alerts drivers about road signs has been developed and tested using a smart mobile phone. ● A game theoretical adversarial intervention detection mechanism for reliable smart road signs has been proposed **Proposed system's objectives:** ● Receiving road sign values to the IBM IoT platform fromNode-RED Web UI ● Weather conditions can be viewed in the Web Application. The user willbe able to monitorthe prevailing changes through the app and act accordingly
4.	**Social Impact/ Customer Satisfaction**	**Social Impact:** ● Static signboards simply provide constant information about the speed limits, warnings in order to have a safe travel. But there might be some unexpected changes in the weatheror traffic situations due to which some other pathmust be taken. ● Such updated information regarding the roads are not provided in case of static signboards, whereas in case of smart sign boards, timely updated information regarding roads and road diversion measures are being displayed through theweb app developed. This in turn,proves to be an effective tool for a safe travel

		Customer Satisfaction: The mainobjectives of theproposed solution are: ● **Road safety and accident mitigation:** Ensures safety ofthe user by making them take suitable driving measures, thereby preventing the occurrence of accidents ●**Time saving:** Since regularly updated information regarding roads is provided, the user can take the suitablepathsand reach the destination in time
5.	**Business Model (Revenue Model)**	 IoT Device Python Code (random data) OpenweatherMap Cloud Services IBM Watson IoT Platform Node-RED Web UI User **Description of technical architecture:** ● Changing weather conditions are received through the web app using weather API and are displayed on thesmart signboards ● Warnings regarding lowering speeds at the location of hospitals and schools are displayed on the smart signboard Based on traffic and fatal situations, diversion signs are also displayed

6.	**Scalability of theSolution**	● In addition to displaying suitable diversion and weather change signs, these boards can be made to displaysom e other extrafeatures like finding the shortest path in reaching a destination and displaying it, thereby providing much more help to the user ● These effective smart signboards could be implemented throughout the entire nation along the most importantroadways, thereby users will find it much more useful and feel safe when travelling through those roads and saving their time also.

3.4.Problem Solution fit



Define CS, fit into CC

1.CUSTOMER SEGMENTS

It satisfies all customers who drivesany kind of vehicle.

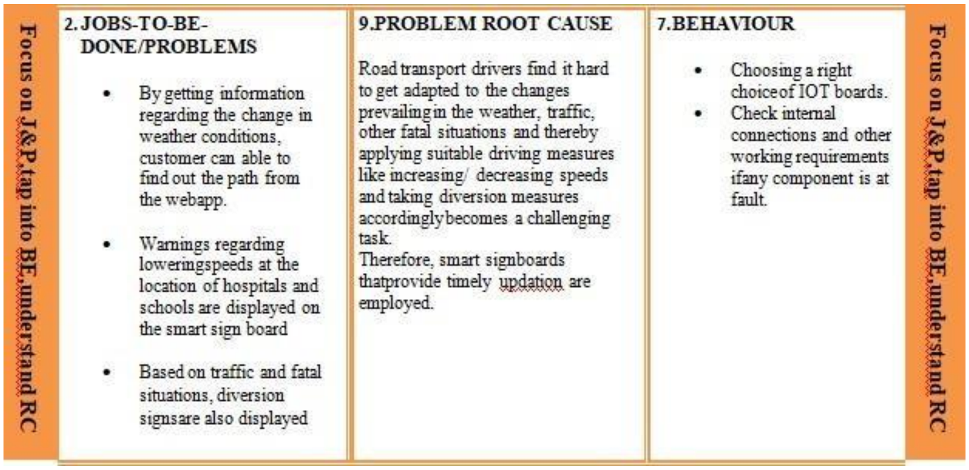
6.CUSTOMER CONSTRAINTS

- Network connectivity problems.
- Increase in toll gate charges or tax amount.

5.AVAILABLE SOLUTION

Static signboards are now available which simply provide constant information about the speed limits, warnings inorder to have a safe travel. But there might be some unexpected weather change due to which some other path must be taken.

Explore AS, Differentiate



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

2.JOBS-TO-BE-DONE/PROBLEMS

- By getting information regarding the change in weather conditions, customer can able to find out the path from the webapp.
- Warnings regarding loweringspeeds at the location of hospitals and schools are displayed on the smart sign board
- Based on traffic and fatal situations, diversion signsare also displayed

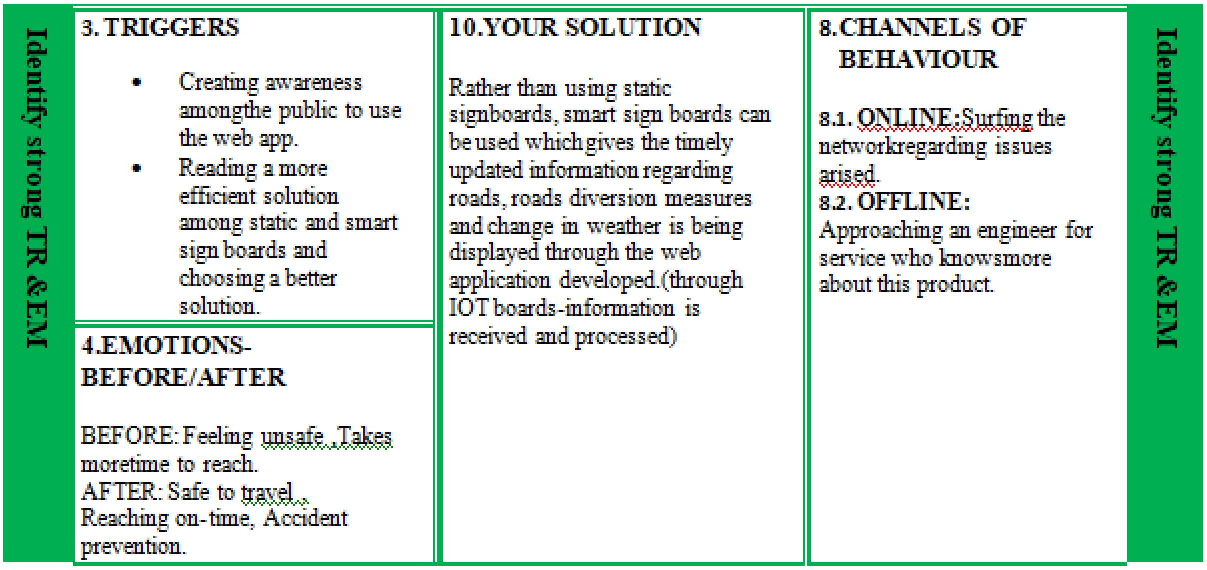
9.PROBLEM ROOT CAUSE

Road transport drivers find it hard to get adapted to the changes prevailingin the weather, traffic, other fatal situations and thereby applying suitable driving measures like increasing/ decreasing speeds and taking diversion measures accordinglybecomes a challenging task.
Therefore, smart signboards thatprovide timely updation are employed.

7.BEHAVIOUR

- Choosing a right choiceof IOT boards.
- Check internal connections and other working requirements ifany component is at fault.

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



Identify strong TR &EM

3. TRIGGERS

- Creating awareness amongthe public to use the web app.
- Reading a more efficient solution among static and smart sign boards and choosing a better solution.

4.EMOTIONS-BEFORE/AFTER

BEFORE: Feeling unsafe ,Takes moretime to reach.
AFTER: Safe to travel , Reaching on-time, Accident prevention.

10.YOUR SOLUTION

Rather than using static signboards, smart sign boards can be used whichgives the timely updated information regarding roads, roads diversion measures and change in weather is being displayed through the web application developed.(through IOT boards-information is received and processed)

8.CHANNELS OF BEHAVIOUR

8.1. ONLINE:Surfing the networkregarding issues arised.
8.2. OFFLINE:
Approaching an engineer for service who knowsmore about this product.

Identify strong TR &EM

4. REQUIREMENTANALYSIS

1. Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement(Epic)	Sub Requirement(Story/Sub-Task)
FR-1	User Visibility	Sign Boardsshould be madewith LED's whichare bright colored and are capable of attracting the drivers attention but it should alsonot be too distracting or blinding causeit may lead to accidents.
FR-2	User Understanding	For better understanding of the driver,the signs shouldbe big, clear and legible and it can also include illustrations which will make it easilyunderstandable to the driver.
FR-3	User Convenience	The display should be big enoughthat it shouldeven be visible from far distance clearly.

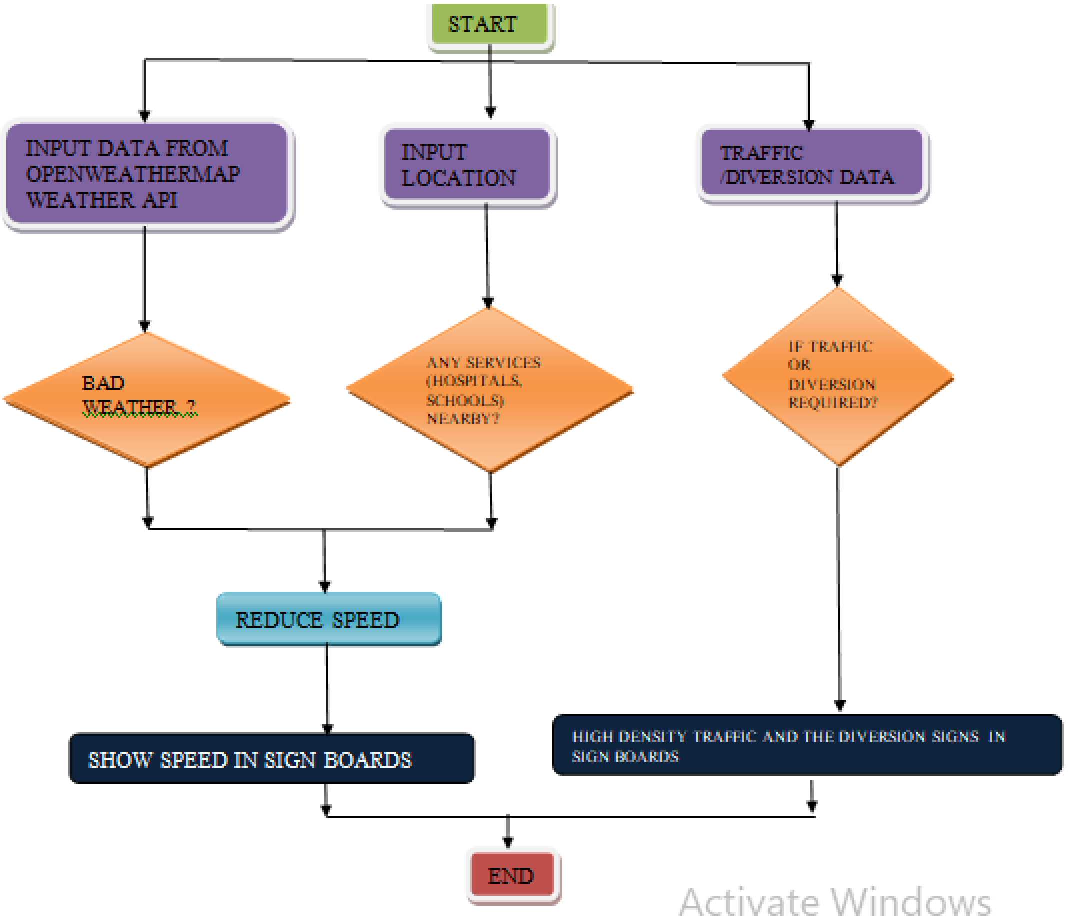
4.2. Non-Functional requirements

Following are the Non-Functional Requirements of the proposed solution

FR No.	Non-Functional Requirements	Description
NFR-1	**Usability**	It should be ableto Upgrade and Update whenthere is a need for it.
NFR-2	**Security**	It should have goodsecurity system 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 ableto automatically updateitself when certain weather or traffic problem occurs.
NFR-5	**Availability**	It should be available 24/7so that it can be beneficial to the customer i.ethe driver.
NFR-6	**Scalability**	It shouldbe able to easily changeand upgrade accordingto change andneed in requirement.

5. PROJECT DESIGN

1. Data Flow Diagrams


START
INPUT DATA FROM OPENWEATHERMAP WEATHER API
INPUT LOCATION
TRAFFIC /DIVERSION DATA
BAD WEATHER ?
ANY SERVICES (HOSPITALS, SCHOOLS) NEARBY?
IF TRAFFIC OR DIVERSION REQUIRED?
REDUCE SPEED
SHOW SPEED IN SIGN BOARDS
HIGH DENSITY TRAFFIC AND THE DIVERSION SIGNS IN SIGN BOARDS
END

2. Solution & Technical 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.

Example - Solution Architecture Diagram

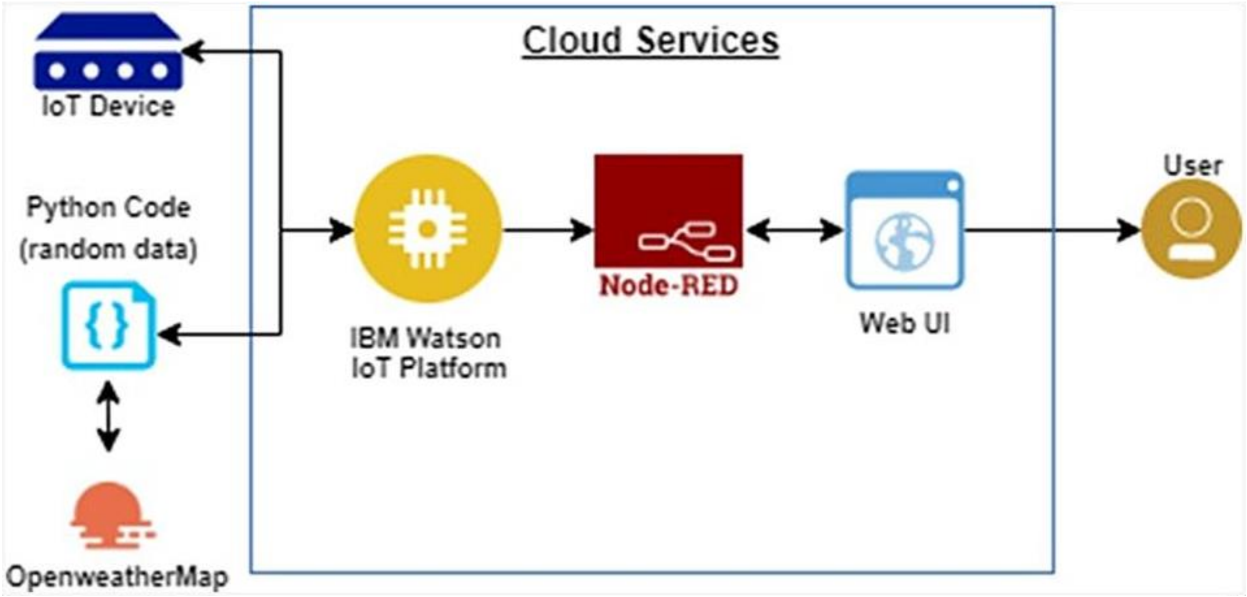


Figure 1: Architecture and data flow of the smart connectivity for better road safety

TechnicalArchitecture:

The Deliverable shall include the architectural diagram as below and the information as per thetable1& table 2

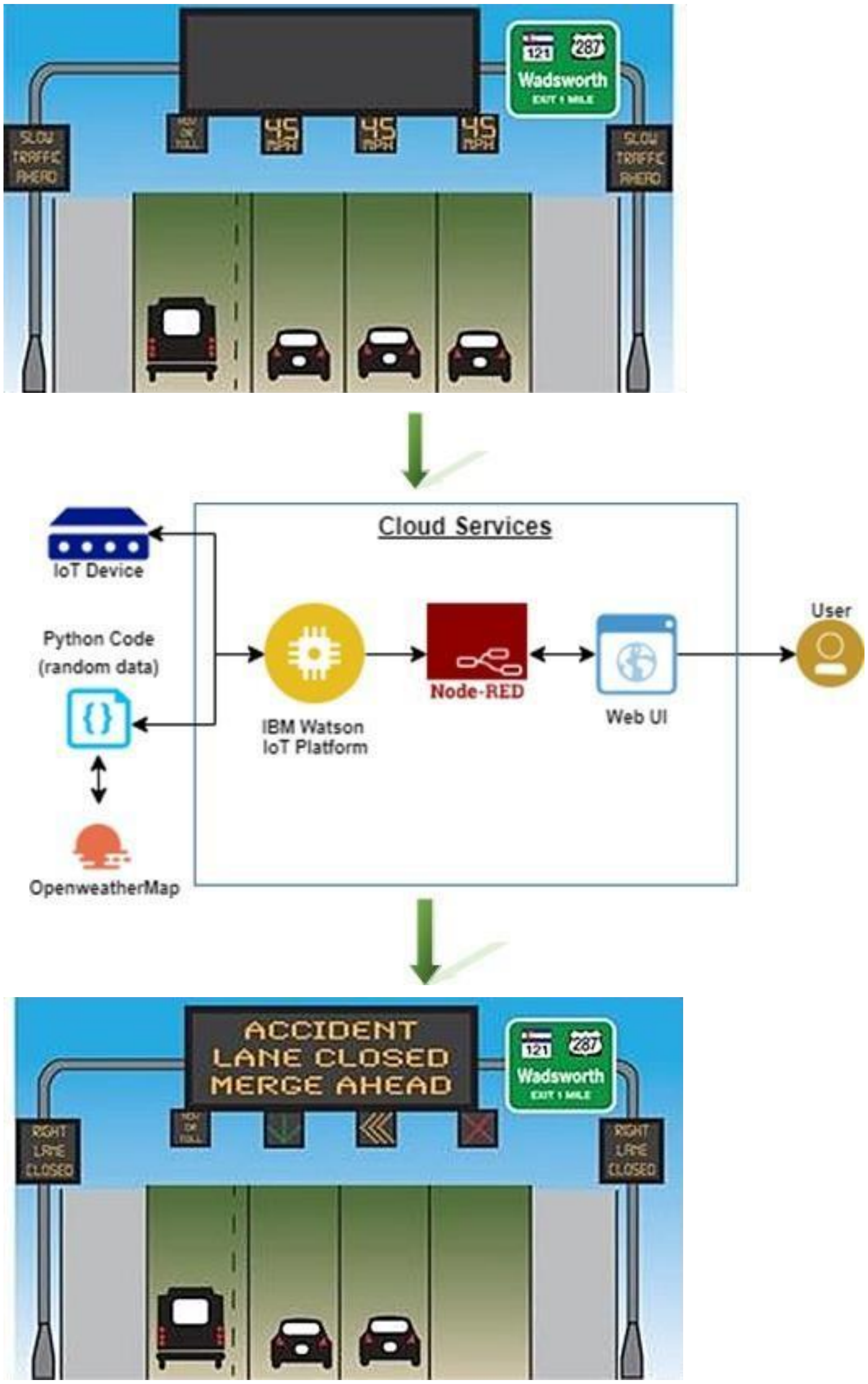


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	User interacts with theapplication using Web UI, Mobile App, Chatbotetc.	HTML, CSS, JavaScript /Angular Js / ReactJs etc.
2.	ApplicationLogic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in theapplication	IBM Watson STT service
4.	Application Logic-3	Logic for a process in theapplication	IBM Watson Assistant
5.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudantetc
6.	External API-1	To provide timely weatherupdates	IBM Weather API
7.	Infrastructure (Cloud)	Application Deployment onCloud	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Scalable Architecture	We can increase the options by updating the implementedapplication	IOT (Internet Of Things)
2.	Availability	To make it available 24/7 foruninterrupted services we have implemented in distributed servers (cloud)	IBM CLOUD

3.	Performance	Network conditions should be stable even at worst conditions	High speed networkaccording to the availability

5.3.User Stories:

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptancecriteria	Priority	Release
Customer	Registration	USN-1	I am able to get speed updates correctly	I can get speedconstraints	High	Sprint-1
		USN-2	As a user, I can registerin the application correctly	I can perfectly getsynced account details	Medium	Sprint-2
		USN-3	As a user, I can increase or decrease speed based inthe change in weather conditions with the help of sign boards	Increment or decrement inspeed	High	Sprint-1
		USN-4	As a user, I am able to gothrough an alternative direction when traffic is	Correct updates of traffic details ahead of time	Medium	Sprint-1

			ahead			
	Login	USN-5	As a user, I can log intothe application by entering email & password	I can log into the application	High	Sprint-2
Customer (Web user)	Generating data	USN-6	As a user I am able to utilize the web app to get information regarding weather changes	I can access information from web app	High	Sprint-1
Customer Care Executive	Problem solving	USN-7	As an executive I am ableto solve the problems of the userswith the given instructions	Easy maintenanceand problem solving	Medium	Sprint-2
Administrator	Administering the timely data	USN-8	As an admin I am able toget through the interface and administer the data functionality	Easy administrationwhen data is timely updated	High	Spirint-2

6. PROJECT PLANNING & SCHEDULING

1. Sprint Planning& Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	I am able to get speed updatescorrectly	10	High	Sheik beermohamed Sathish Venkatesh
Sprint-1		USN-2	As a user, I can register in the application correctly	10	Medium	Vijay Bala
Sprint-2		USN-3	As a user, I can increase or decrease speedbased in thechange in weather conditions with the help of sign boards	10	High	Sheik beer mohamed Sathish kumar Venkatesh
Sprint-2		USN-4	As a user, I am able to go through an alternative direction whentraffic is ahead	10	Medium	Vijay Bala
Sprint-3	Login	USN-5	As a user, I can loginto the application byentering email &password	10	High	Sheik beer Sathish kumar

Sprint-3	Generating data	USN-6	Asa user I am able to utilize theweb app to get information regarding location of thevehicle	10	High	Venkatesh Vijay Bala
Sprint-4	Problem solving	USN-7	Asan executive I am able to solve theproblems of the users with the given instructions	10	Medium	Sheik beermohamed
Sprint-4	Administering the timely data	USN-8	Asan admin I am able to get through the interface and administer thedata functionality	10	High	Sathish kumar Venktesh Vijay Bala

6.2.Sprint DeliverySchedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	I am able to get speed updatescorrectly	10	High	Sheik beermohamed
Sprint-1		USN-2	Asa user, I can register in the	10	Medium	Sathish Venkatesh

			application correctly			
Sprint-2		USN-3	Asa user, I can increase or decrease speedbased in thechange in weather conditions with the help of sign boards	10	High	Vijay Bala Sheik beermohamed
Sprint-2		USN-4	Asa user, I am able to go through an alternative direction whentraffic is ahead	10	Medium	Sathish kumar Venkatesh
Sprint-3	Login	USN-5	Asa user, I can loginto the application byentering email &password	10	High	Sheikbeermohamed Sathish kumar
Sprint-3	Generating data	USN-6	Asa user I am able to utilize theweb app to get information regarding location of the vehicle	10	High	Venkatesh Vijay Bala
Sprint-4	Problem solving	USN-7	Asan executive I am able to solve theproblems of the users with the given instructions	10	Medium	Sheik beermohamed

			users with the given instructions			
Sprint-4	Administering the timely data	USN-8	Asan admin I am able to get through the interface and administer thedata functionality	10	High	Sathish kumar Vemkatesh Vijay Bala

Project Tracker,Velocity & BurndownChart: (4Marks)

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

Velocity:

Imaginewe have a 10-day sprintduration, and the velocity of the team is 20 (points per sprint). Let'scalculate the team'saverage velocity (AV) per iterationunit (story points per day)

6.3. Reports from JIRA

There are plenty of expensive solutions such as Polarion and IBM Doors which are commonly used by companies in automotive and aerospace, but these are out of reach of the typical startup. However, in the spirit of a startup hustle mindset, it is possible to"hack" a requirements management (RM) solution that gives you most of the power of the big boys without the price tag. One of the best solutions around is Jira Cloud from Atlassian. It provides some customizations and is startup friendly at only $10/month for less than 10 users. You can also get a server version (Jira Server), but we'll focus on Jira Cloud today as this is the platform that is most used by start-ups

7.CODING & SOLUTIONING (Explain the featuresadded in the project along with code)

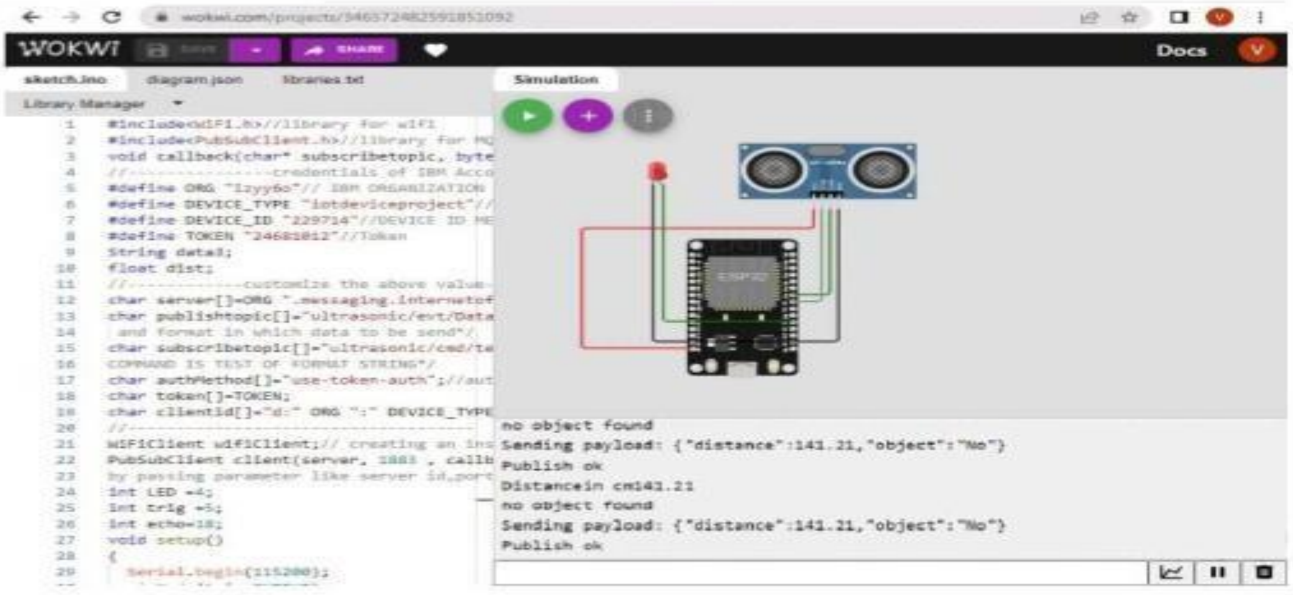
1. **Feature 1**

- Simulating Wokwi and storing values into the IBM Cloud

2. Simulation the code in wokwi .where we get the temperature and humidity data from the DHT11 sensor and with given data calculate the speed and set the speed limit.

3. Apart from this we have gota push button to set value for nearby schools

3. If there are nearby schools the button will be pressed once to set the value ,once again pressed will reset the value to 0.
4. Publish the data – temperature humidity , speedlimit and school to the ibm cloud device events.

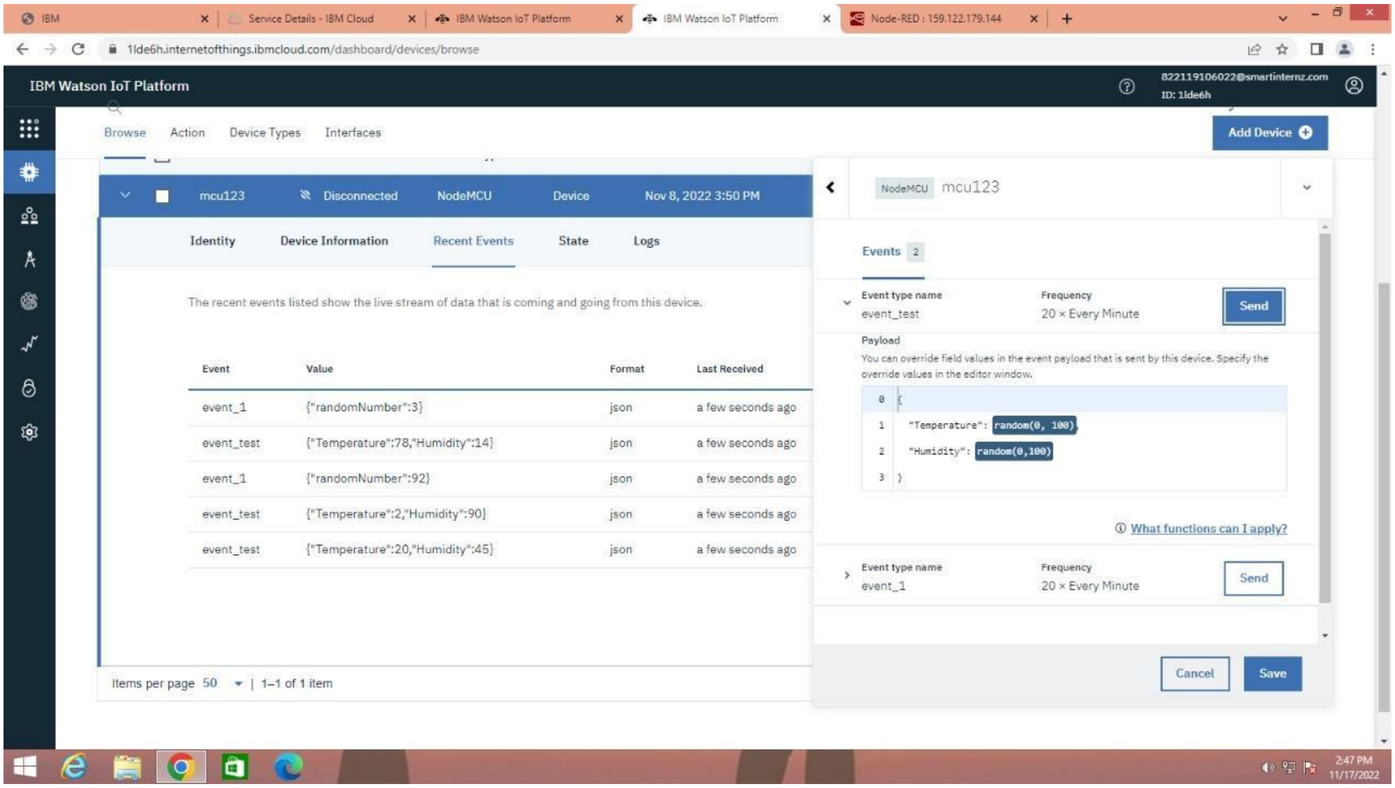


```
#include<WiFi.h>//library for wifi
#include<PubSubClient.h>//library for MQ
void callback(char* subscribetopic, byte
//-----------------credentials of IBM Acco
#define ORG "1zyy6o"// IBM ORGANIZATION
#define DEVICE_TYPE "iotdeviceproject"//
#define DEVICE_ID "229714"//DEVICE ID ME
#define TOKEN "24681012"//Token
String data3;
float dist;
//---------------customize the above value
char server[]=ORG ".messaging.internetof
char publishtopic[]="ultrasonic/evt/Data
 and format in which data to be send"/
char subscribetopic[]="ultrasonic/cmd/te
COMMAND IS TEST OF FORMAT STRING"/
char authMethod[]="use-token-auth";//aut
char token[]=TOKEN;
char clientId[]="d:" ORG ":" DEVICE_TYPE
//-----------------------------------------
WiFiClient wifiClient;// creating an ins
PubSubClient client(server, 1883 , callb
by passing parameter like server id,port
int LED =4;
int trig =5;
int echo=18;
void setup()
{
  Serial.begin(115200);
```

```
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
Distancein cm141.21
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
```

5. Here in IBM cloud we could see the data getting publishing.

6. The temperature humidity speedlimit and the school status are got as input in the json format.



mcu123	Disconnected	NodeMCU	Device	Nov 8, 2022 3:50 PM

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
event_1	{"randomNumber":3}	json	a few seconds ago
event_test	{"Temperature":78,"Humidity":14}	json	a few seconds ago
event_1	{"randomNumber":92}	json	a few seconds ago
event_test	{"Temperature":2,"Humidity":90}	json	a few seconds ago
event_test	{"Temperature":20,"Humidity":45}	json	a few seconds ago

Items per page 50 | 1–1 of 1 item

NodeMCU mcu123

Events 2

Event type name	Frequency	
event_test	20 × Every Minute	Send

Payload

You can override field values in the event payload that is sent by this device. Specify the override values in the editor window.

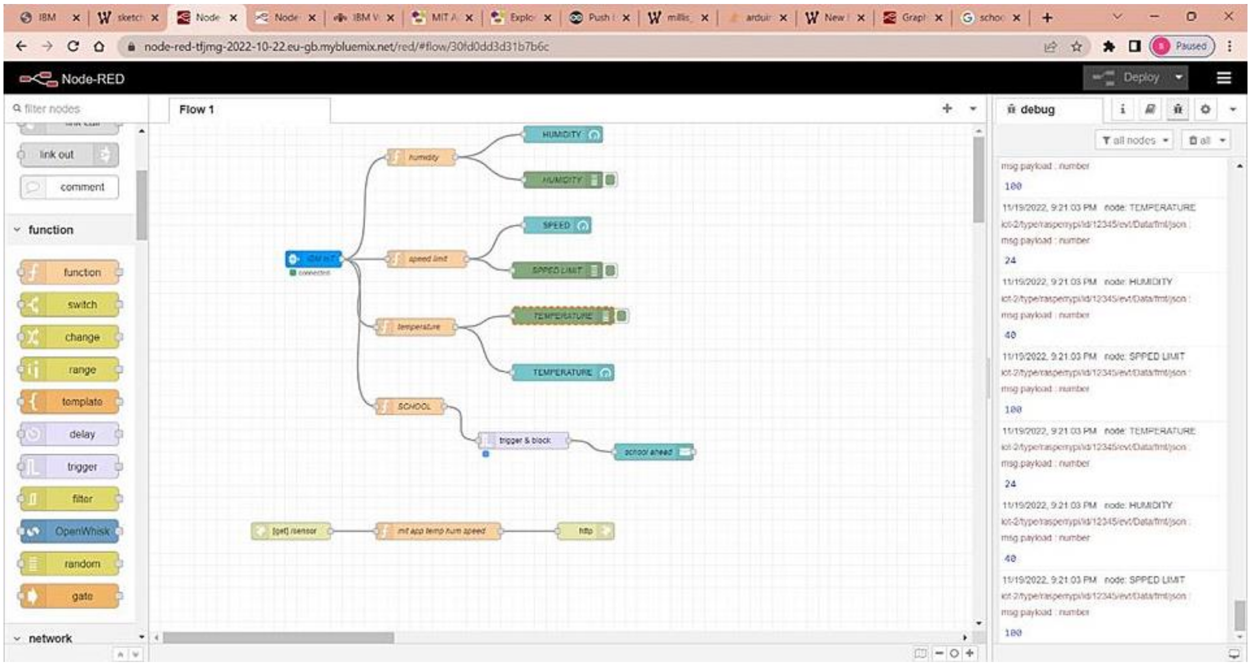
```
{
  "Temperature": random(0, 100)
  "Humidity": random(0,100)
}
```

ⓘ What functions can I apply?

Event type name	Frequency	
event_1	20 × Every Minute	Send

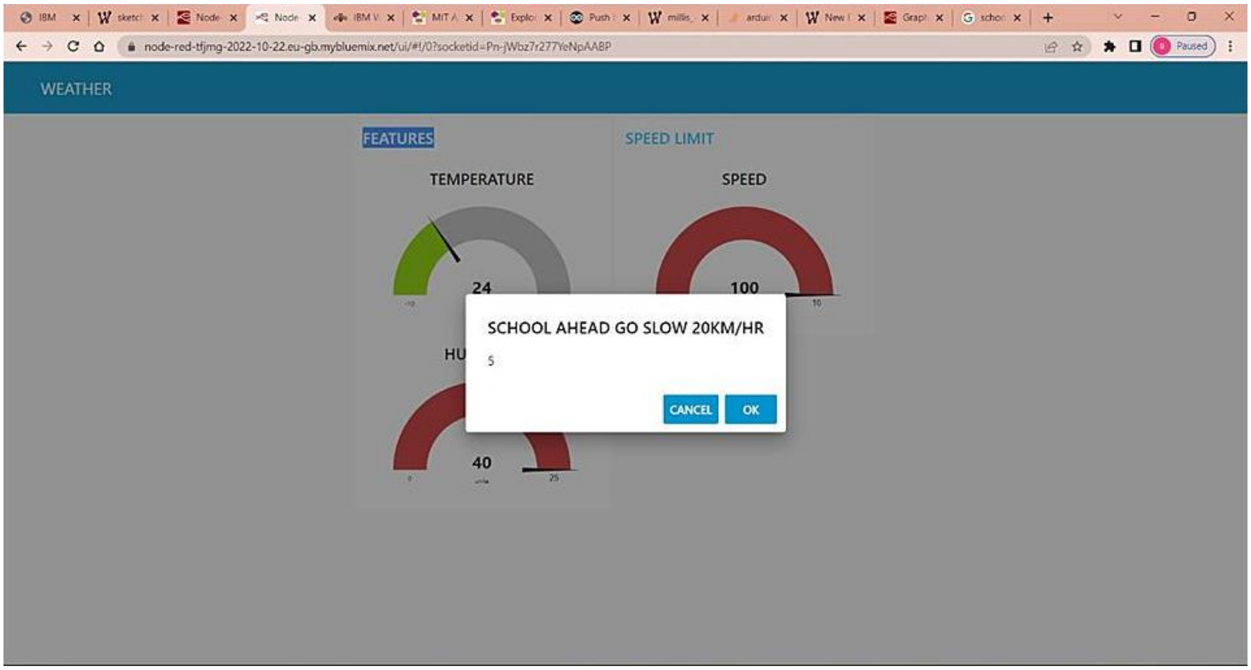
2. Feature 2

- **Node RED flow connecting IBM cloud output to dashboard:**
- Here we have set the node red flow diagram as given below.
- Get input from cloud device once events are published there – we have used four functions
  - Get the temperature value from payload- display it in a guage in the dashboard
  - Get the humidity value from payload- display it in a guage in the dashboard
  - Get the sppedlimit value form payload-display it in a guage in the dashboard
  - Get the school status from payload- if school is there then display the notification to alert the user to go slow in a speed limit of 20 km/hr.



```
msg.payload : number
100
11/19/2022, 9:21:03 PM  node: TEMPERATURE
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
24
11/19/2022, 9:21:03 PM  node: HUMIDITY
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
40
11/19/2022, 9:21:03 PM  node: SPPED LIMIT
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
100
11/19/2022, 9:21:03 PM  node: TEMPERATURE
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
24
11/19/2022, 9:21:03 PM  node: HUMIDITY
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
40
11/19/2022, 9:21:03 PM  node: SPPED LIMIT
iot-2/type/raspernypi/id/12345/evt/Data/fmt/json :
msg.payload : number
100
```

- Here we can see the dashboard with notification panel


node-red-tfjmg-2022-10-22.eu-gb.mybluemix.net/ui/#!/0?socketid=Pn-jWbz7r277YeNpAABP
WEATHER
FEATURES
SPEED LIMIT
TEMPERATURE
24
SPEED
100
10
HU
40
0
25
CANCEL
OK

SCHOOL AHEAD GO SLOW 20KM/HR

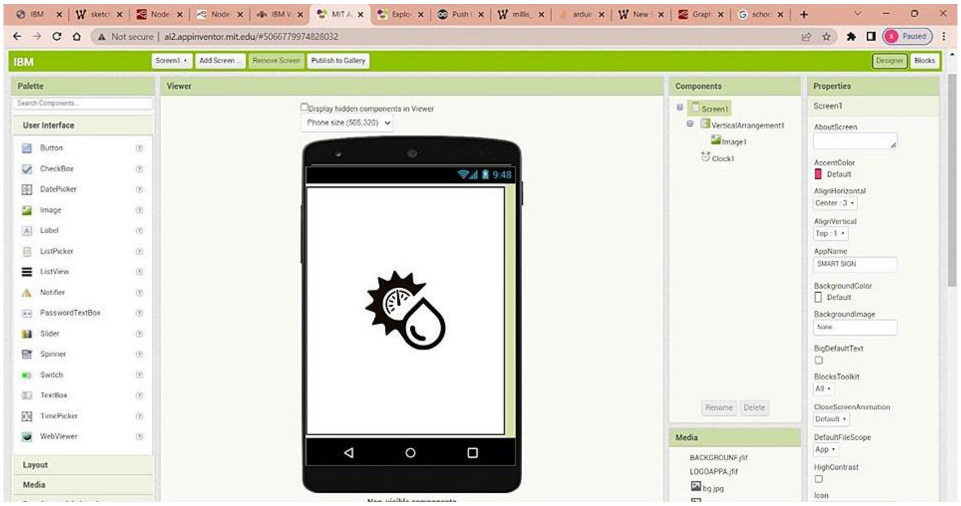
5

3. Feature 3

1. Creating MIT App Inventor

Screen 1:

Just an opening image with the logo



Screen1

AboutScreen

AccentColor
Default

AlignHorizontal
Center : 3

AlignVertical
Top : 1

AppName
SMART SIGN

BackgroundColor
Default

BackgroundImage
None

BigDefaultText
□

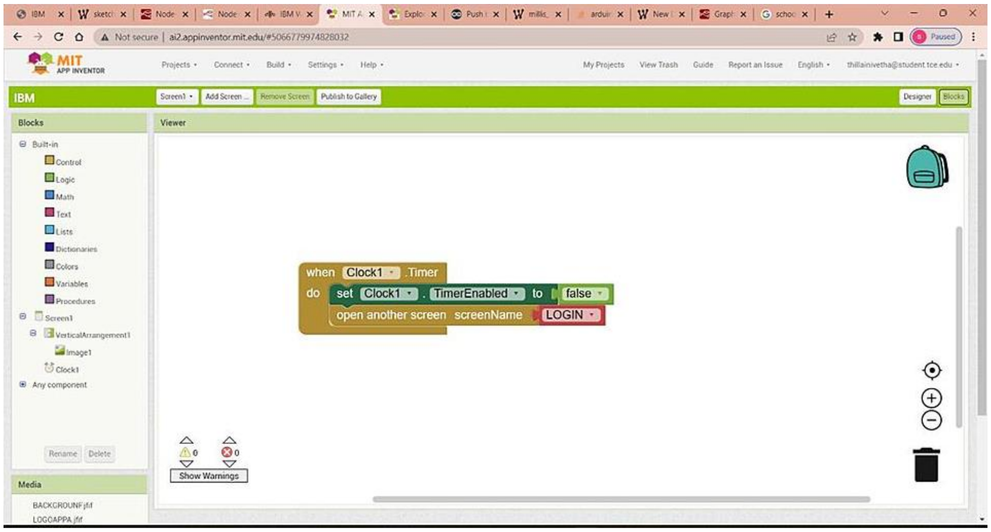
BlocksToolkit
All

CloseScreenAnimation
Default

DefaultFileScope
App

HighContrast
□

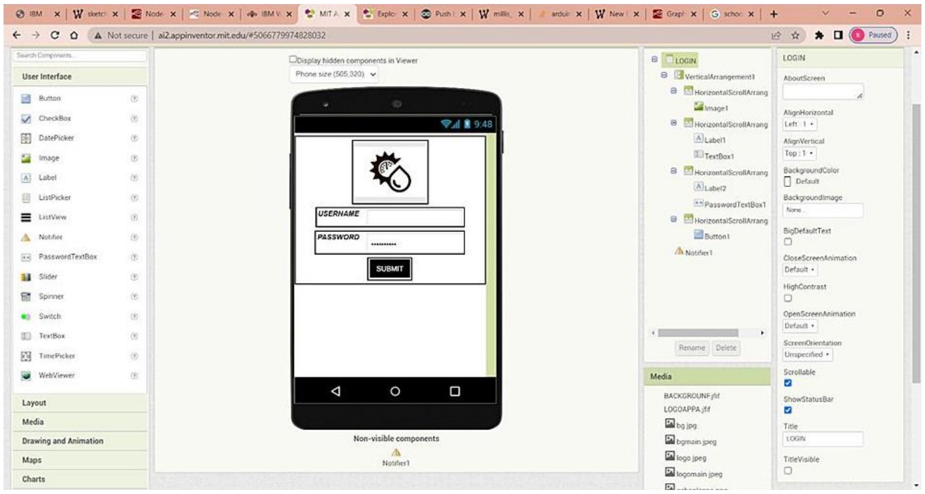
Icon

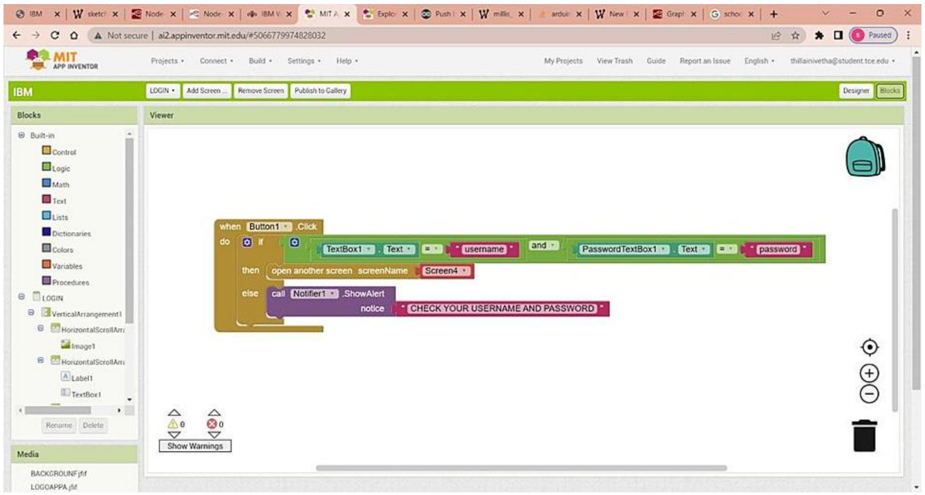


```
when Clock1 .Timer
do  set Clock1 . TimerEnabled to false
    open another screen screenName "LOGIN"
```

Screen 2:

The login scrren with username and password details

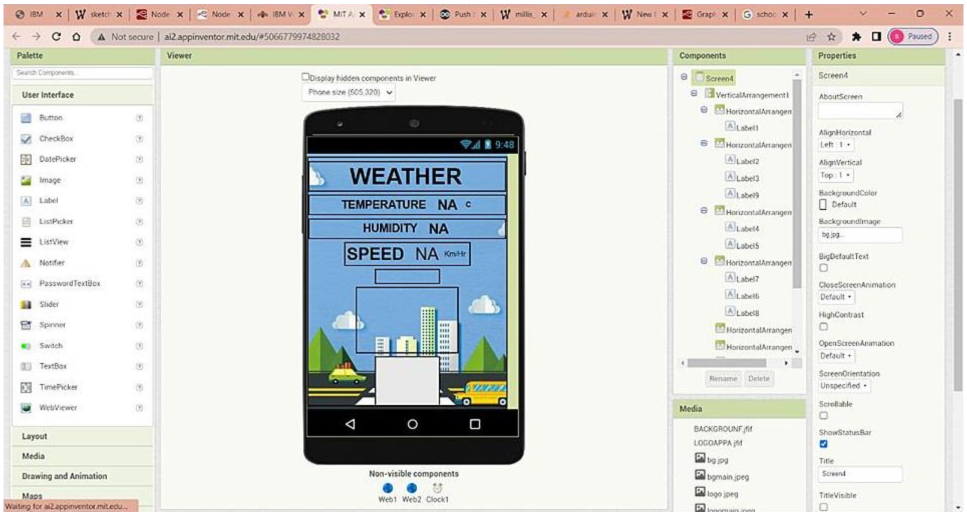


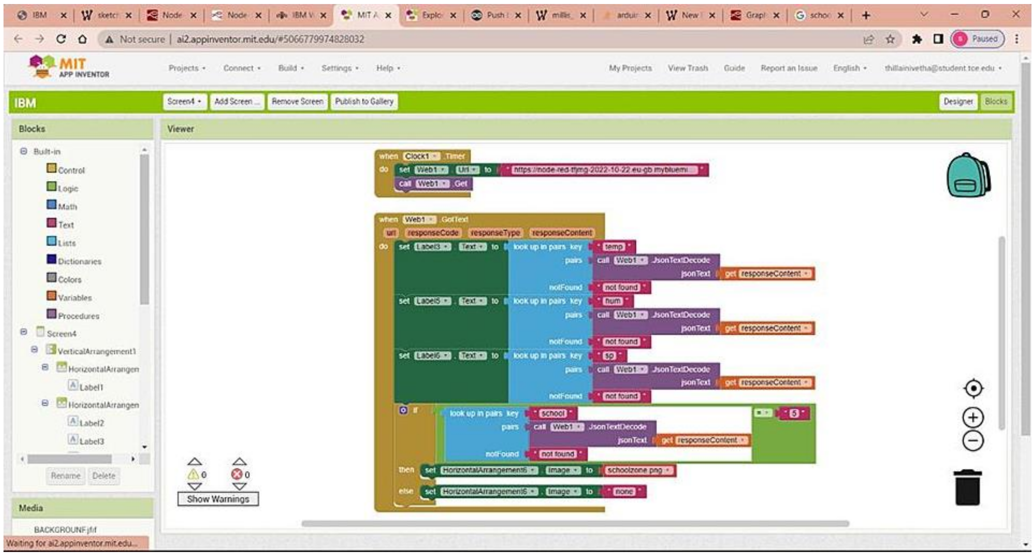


```
when Button1 .Click
do  if  TextBox1 . Text = " username " and PasswordTextBox1 . Text = " password "
    then open another screen screenName Screen4
    else call Notifier1 .ShowAlert
                        notice " CHECK YOUR USERNAME AND PASSWORD "
```

Screen 3:

This is the page where the temperature ,humidity ,speed limit ,school status are got from the node red url.if there is school display the sign in layout created.




MIT APP INVENTOR
Projects Connect Build Settings Help
My Projects View Trash Guide Report an Issue English
IBM
Screen4 Add Screen ... Remove Screen Publish to Gallery
Designer Blocks
Blocks
Viewer
Show Warnings

```
when Clock1 .Timer
do  set Web1 . Url to "https://node-red-tfjmg-2022-10-22.eu-gb.mybluemi..."
    call Web1 .Get

when Web1 .GotText
 url responseCode responseType responseContent
do  set Label3 . Text to look up in pairs key "temp"
                              pairs call Web1 .JsonTextDecode
                                          jsonText get responseContent
                              notFound "not found"
    set Label5 . Text to look up in pairs key "hum"
                              pairs call Web1 .JsonTextDecode
                                          jsonText get responseContent
                              notFound "not found"
    set Label6 . Text to look up in pairs key "sp"
                              pairs call Web1 .JsonTextDecode
                                          jsonText get responseContent
                              notFound "not found"
    if   look up in pairs key "school"
              pairs call Web1 .JsonTextDecode
                          jsonText get responseContent
              notFound "not found"           = "5"
    then set HorizontalArrangement6 . Image to schoolzone.png
    else set HorizontalArrangement6 . Image to "none"
```

8. TESTING

1. TEST CASES:

CASE 1: HIGH TEMPERATURE AND HIGH HUMIDITY

This relates to high temperature weather which doesnot restrict speed a lot.

CASE 2: LOW TEMPERATURE AND HIGH HUMIDITY

Where weather is not good so speed is limited

CASE 3: WHERE THERE ARE NEARBY SCHOOLS

When school are there nearby.set the sign board with the school nearby button ., display speed limitAccordinglywith the school ahead symbol

CASE 4:WHEN THERE ISABSENCE OF SCHOOLS

If No schools present reset the button .display none

8.2 User Acceptance Testing Dynamic

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

9. RESULTS

1. Performance Metrics

Based on the IBM pack we chose, the performance of the website varies. Built upon NodeJS, a light and high performance engine, Node RED is capable of handling up to 10,000 requests per second. Moreover, since the system is horizontally scalable, an even higher demand of customers can be served.

10.ADVANTAGES & DISADVANTAGES

ADVANTAGES

- Lower battery consumption since processing is done mostly by Node RED servers in the cloud.
- Cheaper and low requirement micro controllers can be used since processing requirements are reduced.
- Longer lasting systems.
- Dynamic Sign updating.
- School/Hospital Zone alerts

DISADAVNTAGES

- The size of the display determines the requirement of the micro controller
- Dependent on OpenWeatherMap API and hence the speed reduction is same

for a large area in the scale of cities.

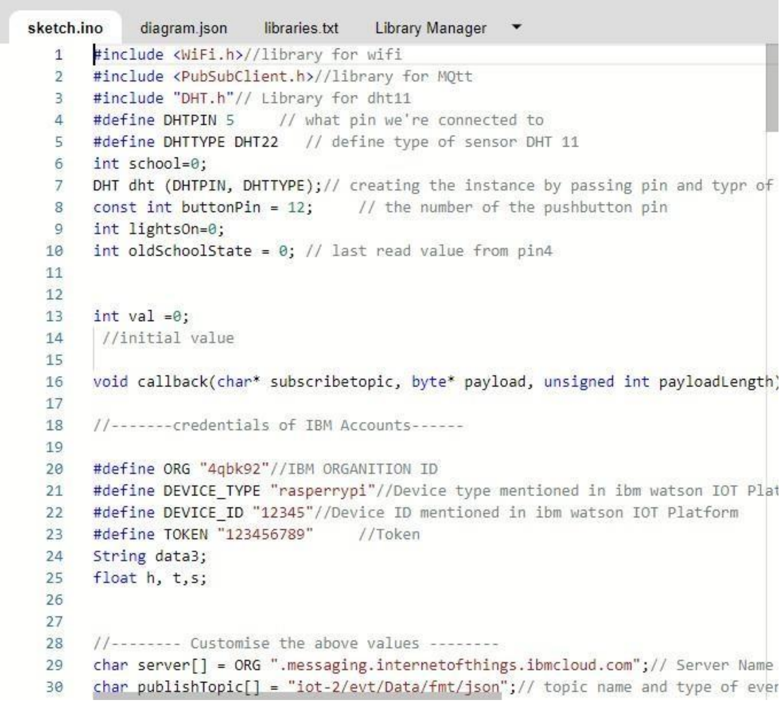
11. CONCLUSION

Our project is capable of serving as a replacement for static signs for a comparatively lower cost and can be implemented in the very near future. This will help reduce a lot of accidents and maintain a more peaceful trafficatmosphere in the country.

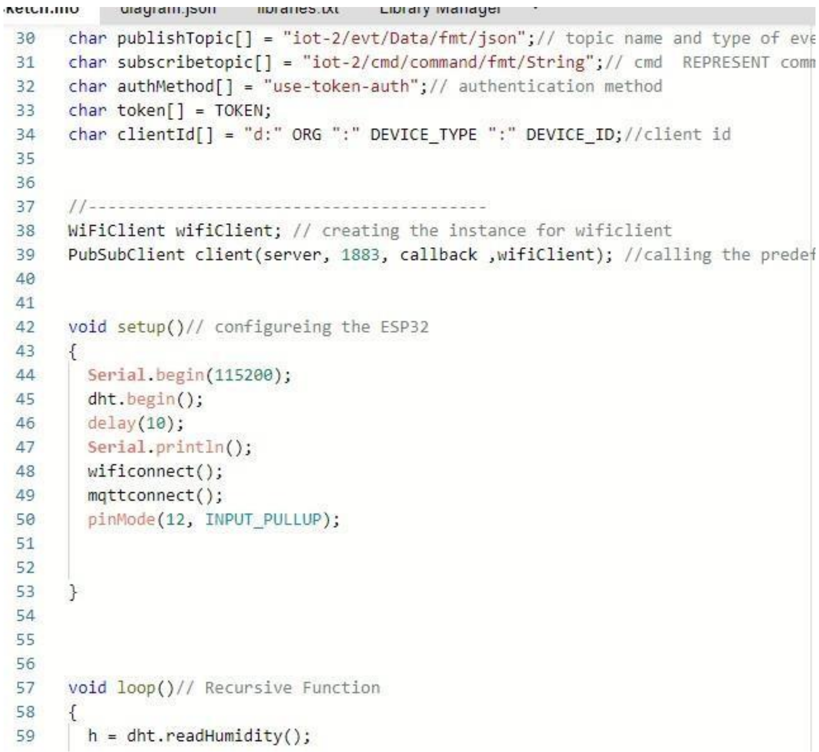
12. FUTURE SCOPE

Introduction of intelligent road sign groups in real life scenarios could have great impact on increasing the driving safety by providing the end-user (car driver) with the most accurate information regarding the current road and traffic conditions. Even displaying the information of a suggested driving speed and road surface condition (temperature, icy, wet or dry surface) could result in smoother traffic flows and, what is more important, in increasing a driver’s awareness of the road situation

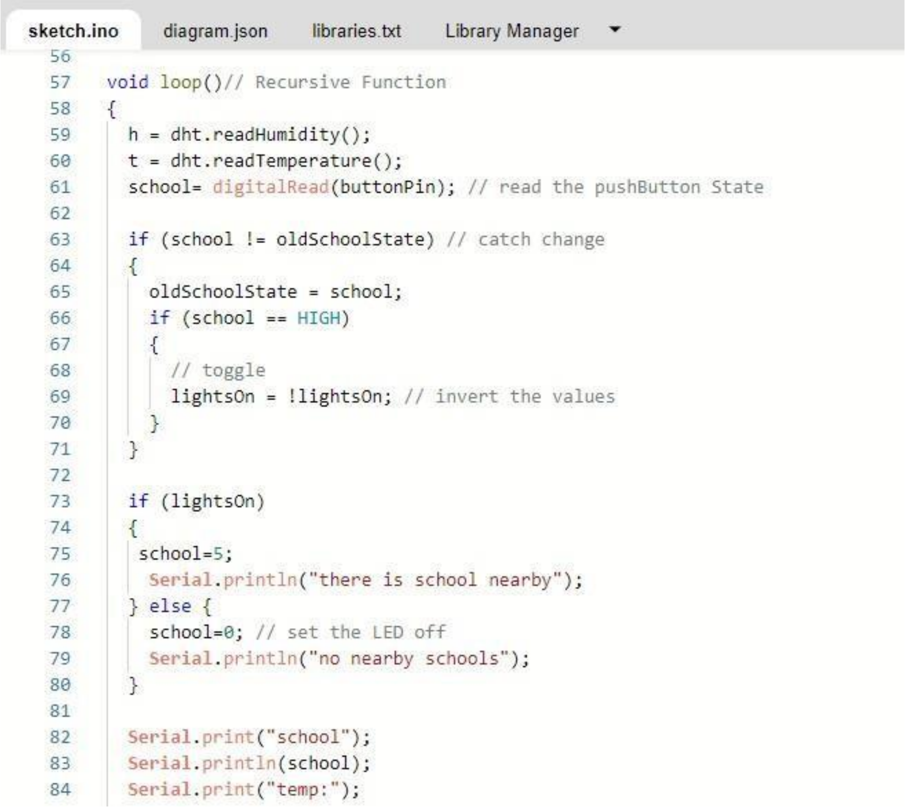
SOURCE CODE



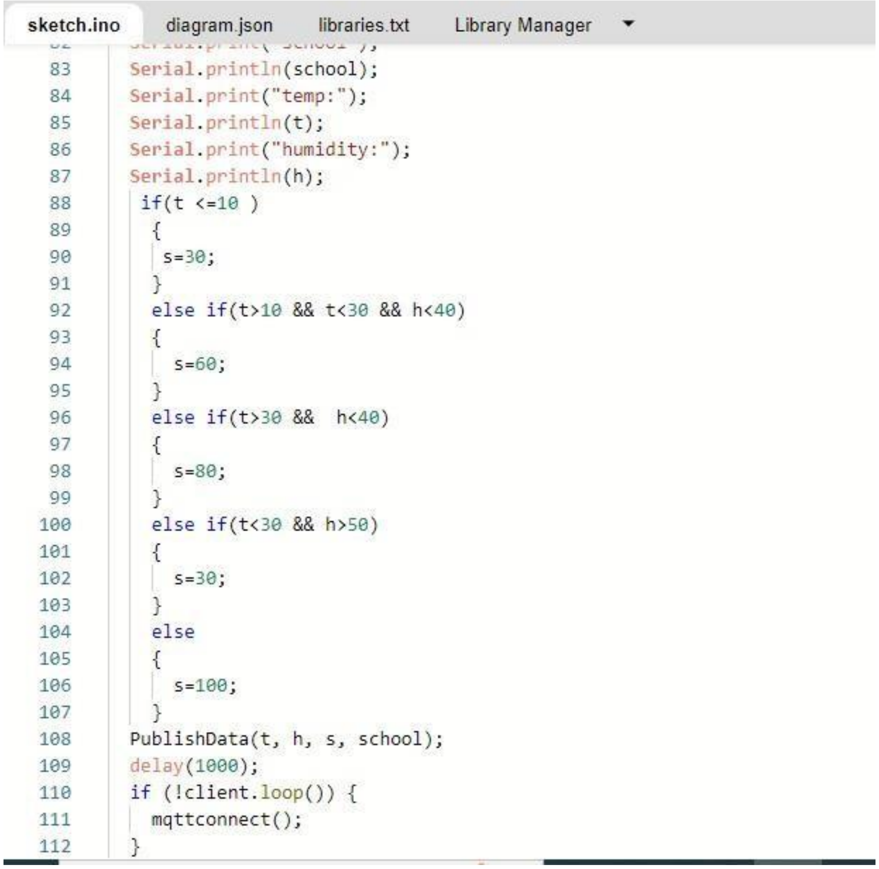
```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht11
#define DHTPIN 5     // what pin we're connected to
#define DHTTYPE DHT22   // define type of sensor DHT 11
int school=0;
DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of
const int buttonPin = 12;      // the number of the pushbutton pin
int lightsOn=0;
int oldSchoolState = 0; // last read value from pin4


int val =0;
 //initial value

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)

//-------credentials of IBM Accounts------

#define ORG "4qbk92"//IBM ORGANITION ID
#define DEVICE_TYPE "rasperrypi"//Device type mentioned in ibm watson IOT Plat
#define DEVICE_ID "12345"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "123456789"      //Token
String data3;
float h, t,s;


//-------- 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 ever
```



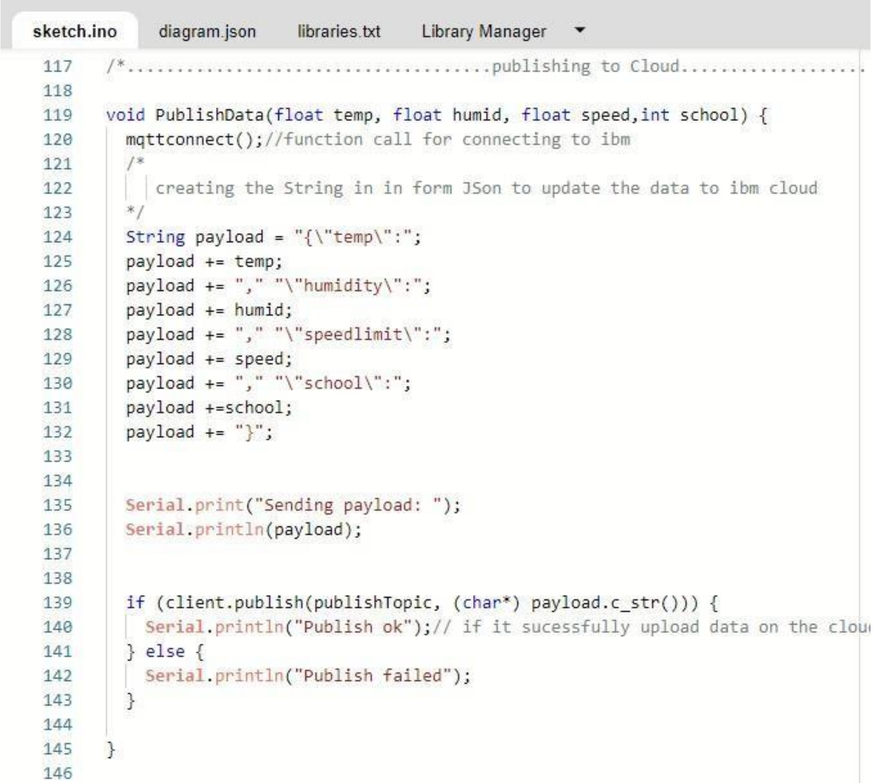
```
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of eve
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd  REPRESENT comm
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id


//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predef


void setup()// configureing the ESP32
{
  Serial.begin(115200);
  dht.begin();
  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
  pinMode(12, INPUT_PULLUP);


}



void loop()// Recursive Function
{
  h = dht.readHumidity();
```



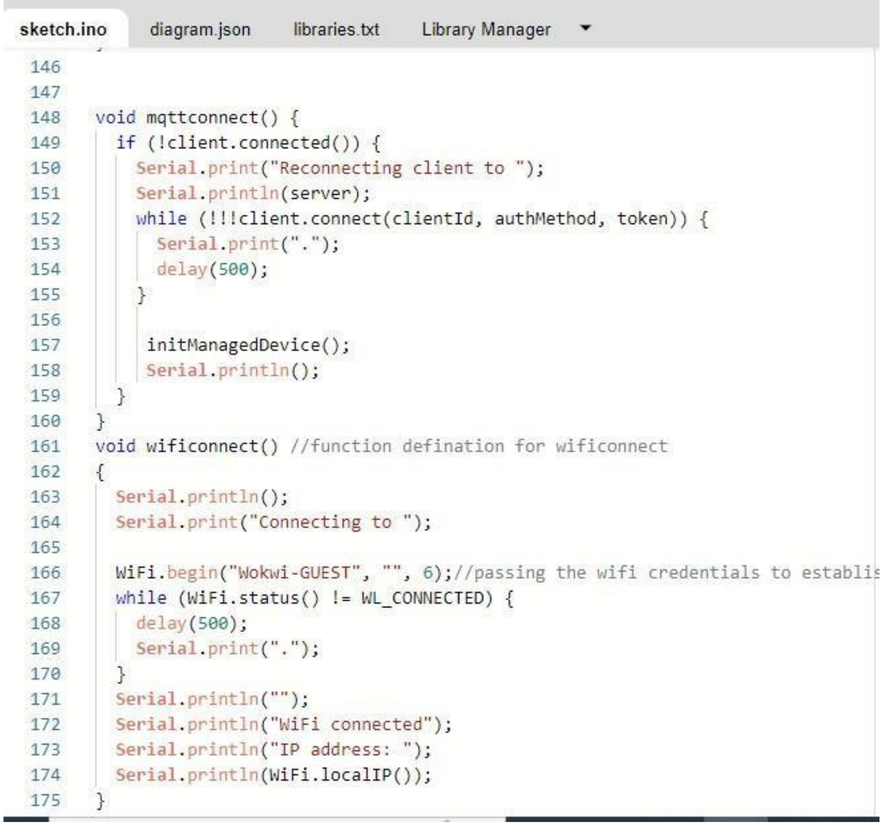
```
void loop()// Recursive Function
{
  h = dht.readHumidity();
  t = dht.readTemperature();
  school= digitalRead(buttonPin); // read the pushButton State

  if (school != oldSchoolState) // catch change
  {
    oldSchoolState = school;
    if (school == HIGH)
    {
      // toggle
      lightsOn = !lightsOn; // invert the values
    }
  }

  if (lightsOn)
  {
   school=5;
    Serial.println("there is school nearby");
  } else {
    school=0; // set the LED off
    Serial.println("no nearby schools");
  }

  Serial.print("school");
  Serial.println(school);
  Serial.print("temp:");
```



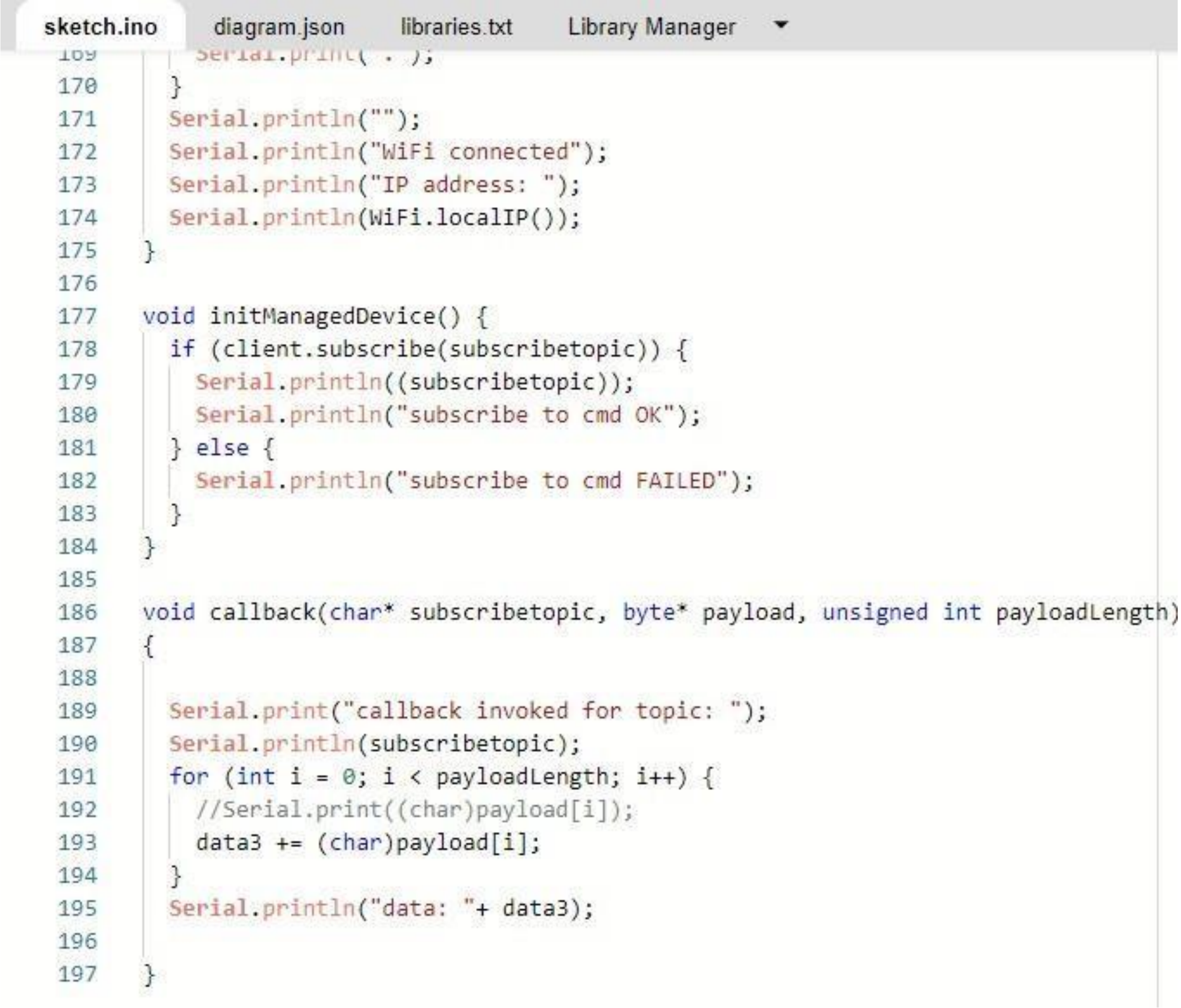
```
  Serial.println(school);
  Serial.print("temp:");
  Serial.println(t);
  Serial.print("humidity:");
  Serial.println(h);
   if(t <=10 )
    {
     s=30;
    }
    else if(t>10 && t<30 && h<40)
    {
      s=60;
    }
    else if(t>30 &&  h<40)
    {
      s=80;
    }
    else if(t<30 && h>50)
    {
      s=30;
    }
    else
    {
      s=100;
    }
  PublishData(t, h, s, school);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
```



```
/*...................................publishing to Cloud..................

void PublishData(float temp, float humid, float speed,int school) {
  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 += "," "\"speedlimit\":";
  payload += speed;
  payload += "," "\"school\":";
  payload +=school;
  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 clou
  } 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 establis
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
```



```
    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);

}
```