SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Submittedby

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CHAPTER-1

1. Introduction

Road signs provide details to drivers to help them operate their vehicles safety.To be efficient, road signs must be visible and legible at a sufficient distance to allow drivers to take particular actions. However, static road signs are frequently missed by drivers making it difficult for them to respond in time.

The purpose of this study was to develop a system that uses a web application to notify drivers about road signs ahead. The development of the web application was motivated by the fact that internets are widely used nowadays These web application can be used to provide details about the location of road signs, the vehicle's speed, and the time required to reach the road signs ahead. As a result, web application provide a golden opportunity for enhancing vehicle safety

1.1ProjectOverview

The goal of this project is to replace the static signboards with smart connected sign boards to get the speed limitations from a web app using weather API and update it automatically based on the weather conditions.This project is to help people automate the roads by providing them with a Web Application through which they can display the parameters of the road like temperature,speed limit, and Alert message, Weather Condition.

1.2Purpose

A lot of research is being carried out in the domain of accident avoidance and accident alarms by a large amount of researchers and practitioners. To avoid accidents, many approaches are utilized to enhance safety measurements.The Purpose of a system that has digital signboards on which the signs can be changed dynamically. If there is rainfall then the roads will be slippery and the speed limit would be decreased.

CHAPTER-2

LITERATURESURVEY

2.1Existingproblem

The Safe System (SS) approach to transport networks originated with the “Safe Road Transport System” model developed by the Swedish Transport Agency. In its essence, the approach migrates from the view that accidents are largely and 7 automatically the driver’s fault to a view that identifies and evaluates the true causes of accidents. Through the categorization of safety into the safety of three elements (vehicle, road, and road user), SS minimizes fatalities and injuries by controlling speeds and facilitating prompt emergency response. The model has been widely adopted since its introduction and is currently motivated by the WHO as a basis for road safety planning, policy-making, and enforcement

2.2References

1. “Open Street Maps, with New York Countyhighlighted,” https://www.openstreetmap.org/relation/2552485. View at: Google Scholar
2. United States Census Bureau, “TIGER/Line® Shapefiles: Roads,”https://www.census.gov/cgibin/geo/shapefiles/index.php?year=2018&layergroup=Roads. View at: Google Scholar
3. X. Wang, X. Wu, M. Abdel-Aty, and P. J. Tremont, “Investigation of road network features and safety performance,” Accident Analysis & Prevention, vol. 56, pp. 22–31,2013. View at: Publisher Site | Google Scholar
4. EuropeanRoadAssessmentProgram(EuroRAP),“EuropeanRoadSafetyAtlas,”http://atlas.eurorap.org/. View at: Google Scholar
5. Cairney and Gunatillake, 2000; Sisiopiku et al., 2015
6. Islam, 2015; Sisiopiku et al., 2015

2.3ProblemStatementDefinition

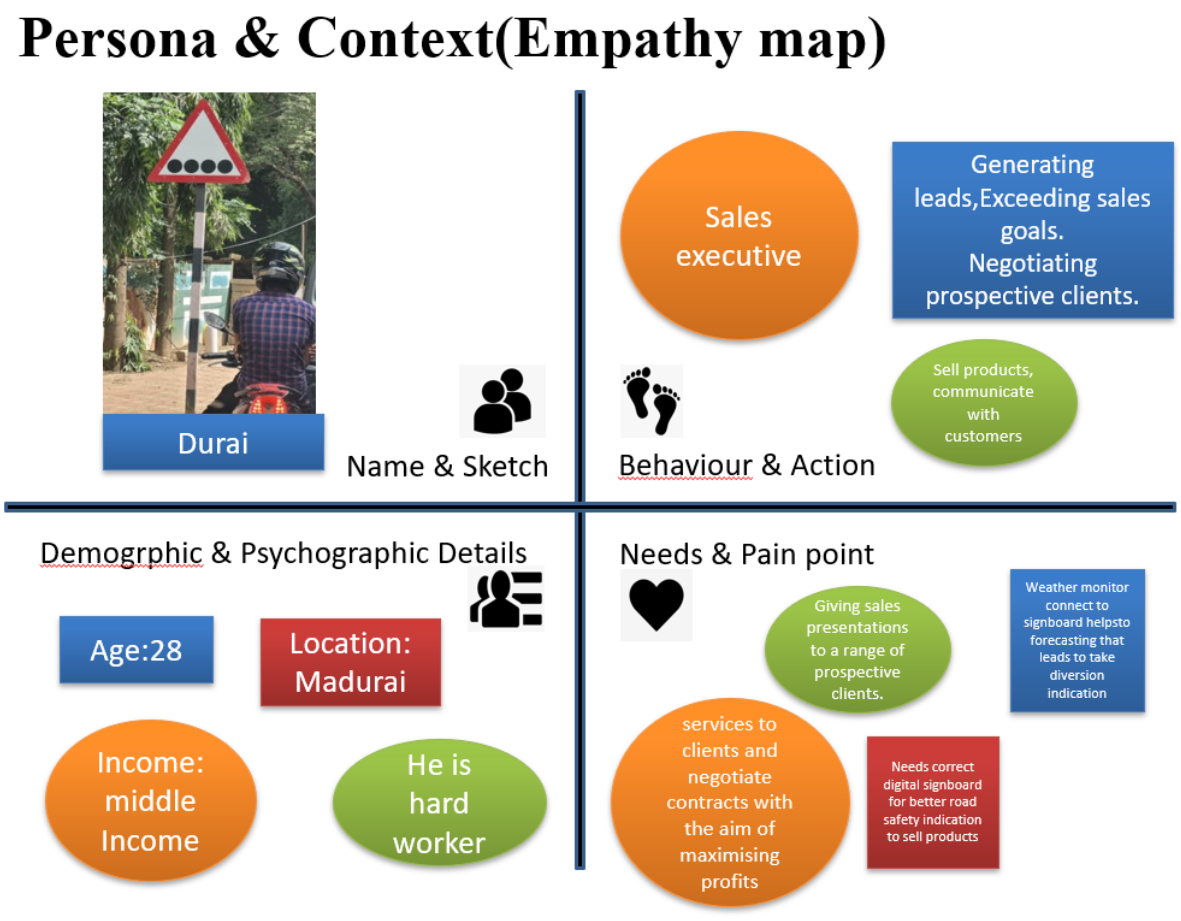
The Problem of present Systems is the road signs and the speed limits are Static. But the road signs can be changed in some cases.. If there is rainfall then the roads will be slippery So people can’t decrease the speed of the vehicle that leads to accidents or cause death

CHAPTER-3

IDEATIONANDPROPOSEDSOLUTION

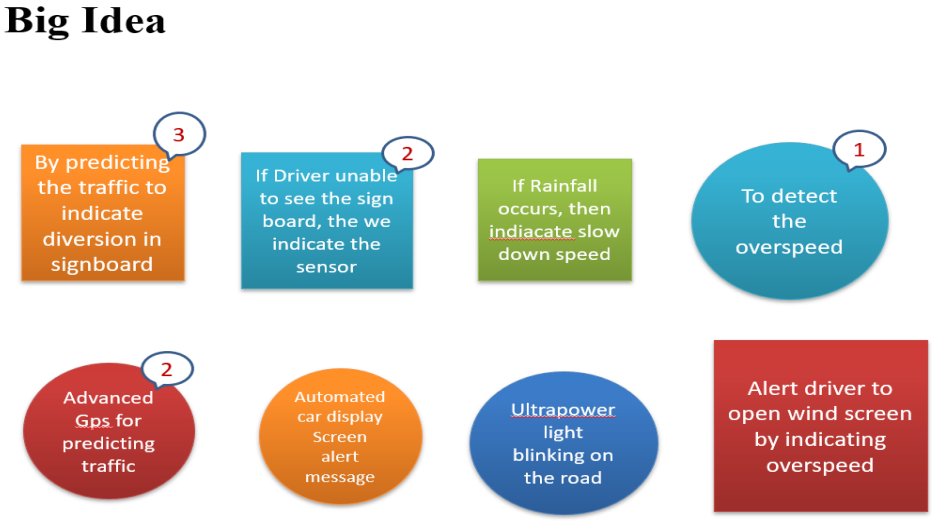
3.1EmpathyMapCanvas

An empathy map is a collaborative tool teams can use to gain a deeper insight into theircustomers. Much like a user persona, an empathy map can represent a group of users, such as acustomersegment.



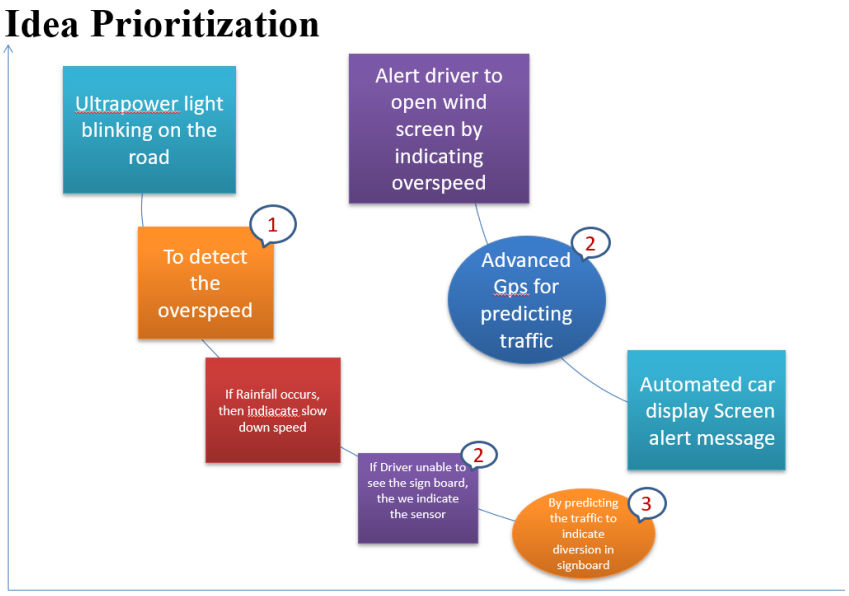
3.2.1BigIdeas

Itconsistsofalltheideasofinstrumentsandequipmentsthatwearegoingto implementinthisproject.

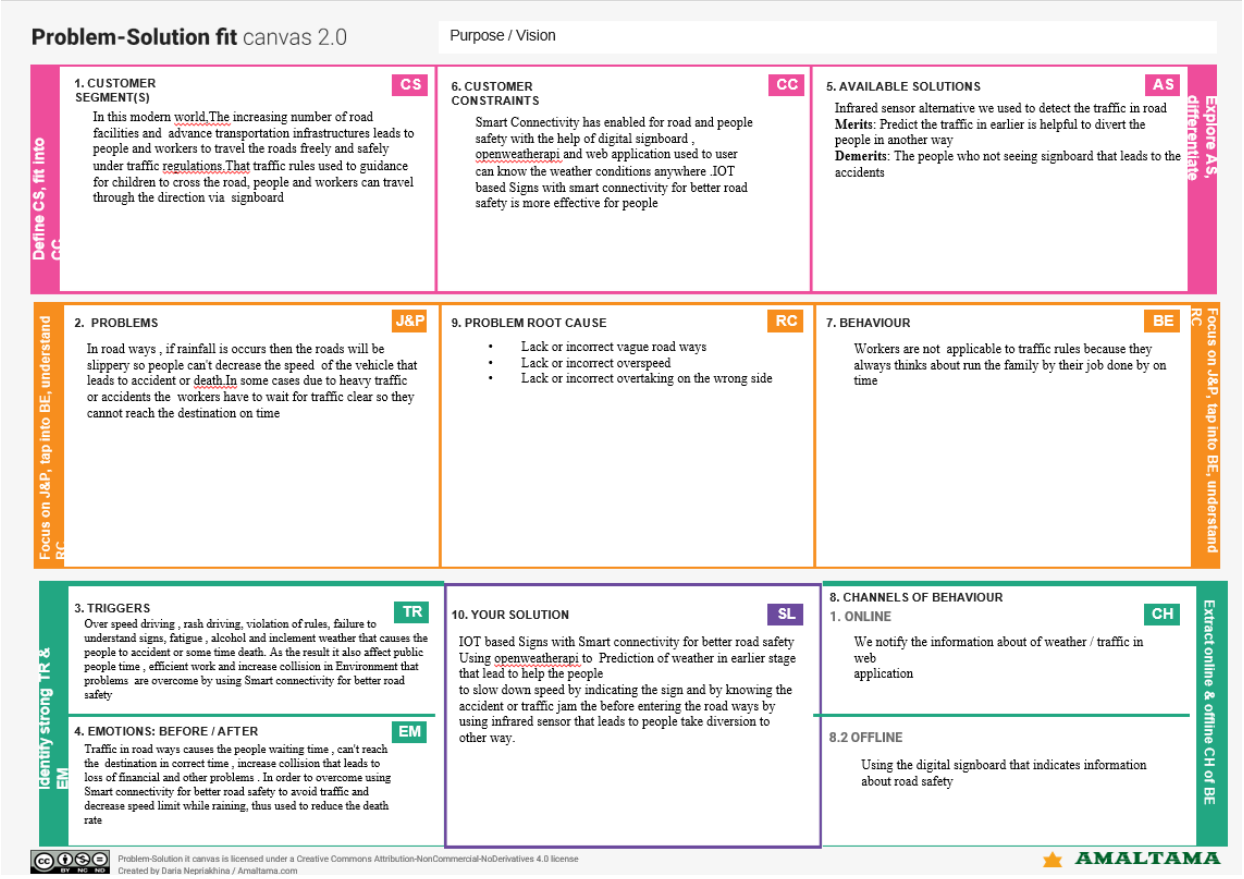


3.2.3IdeaPrioritization

Itdealswiththeprioritizingofthebigideasinorderofhighesttolowest



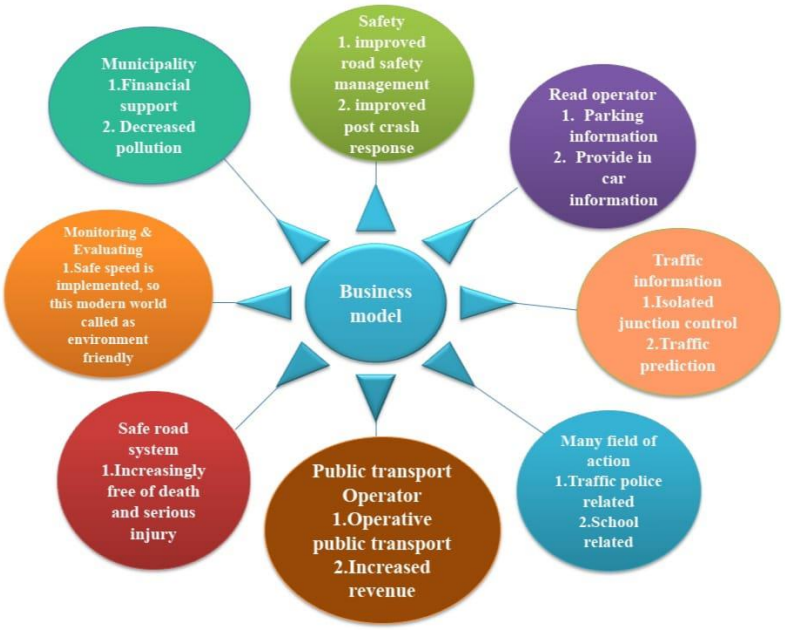
3.3ProblemSolutionFit



3.4Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	In the present system the road sign and the speed limits are static, In some cases due to heavy traffic or accidents then we can change the road signs accordingly if they are digitalized.
2.	**Idea / Solution description**	If there is rainfall then the roads will beslippery and the speed limit would be decreased by dynamically change signs.To avoid the traffic by prediction of traffic jam or accidents in earlier to take diversion of road.
3.	**Novelty / Uniqueness**	Traffic detection using IOT.

4.	**Social Impact / Customer Satisfaction**	The social impacts of road traffic can defined as notforenvironmentsafety as the effects of traffic creates air pollution,noise, which are linked with several health concerns ,it also Increases in traffic levels to increase collision risk for people's that problem are overcome by using Smart connectivity for better road safety it is environment friendly.
5.	**Business Model (Revenue Model)**	
6.	**Scalability ofthe Solution**	**IoT Sensor , weather prediction and Guide sign** The prediction of weather in the early of rain is used to reduce speed limit by indicate the sign, to identify the traffic or accident to not to wait in traffic jam by diversion indication and Guide for school and hospital in signboard indication.

CHAPTER-4

REQUIREMENTANALYSIS

4.1 FunctionalRequirements:

Followingarethefunctionalrequirementsoftheproposedsolution.

FRNo.	FunctionalRequirement(Epic)	SubRequirement(Story/Sub-Task)
FR-1	Userregistration	RegistrationthroughGmail Createanaccount Followtheinstructions
FR-2	UserConfirmation	ConfirmationviaEmail ConfirmationviaOTP
FR-3	Infrared sensor	Predict the traffic in earlier is helpful to divert the people in another way
FR-4	Accessingdatasets	DatasetsareretrievedfromCloudant DB
FR-5	Web Application	Signboard and infrared sensor in the road can be controlled by web application

4.2 Non-functionalRequirements:

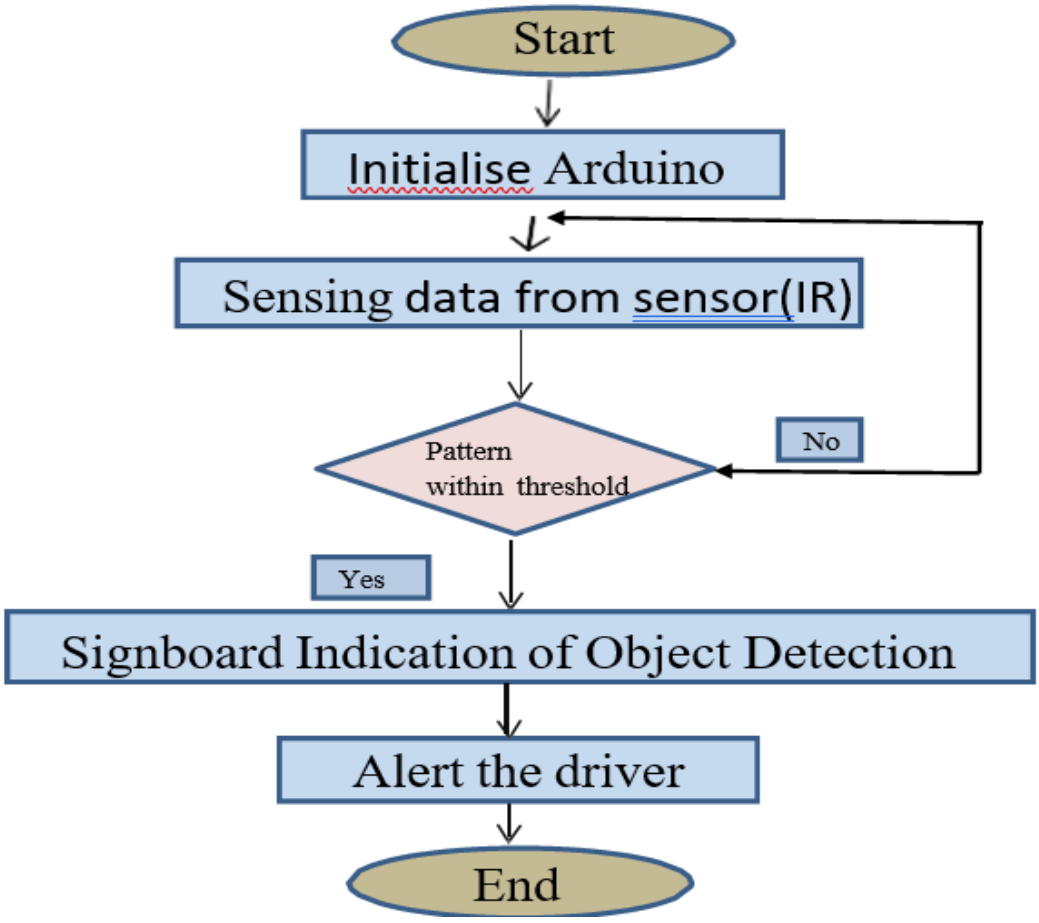
Followingarethenon-functionalrequirementsoftheproposedsolution.

FRNo.	Non-FunctionalRequirement	Description
NFR-1	**Usability**	The road safety system defines that this project helps people to free from accident and traffic
NFR-2	**Security**	It should have good security system so that no other person is able to hack and display their own direction.
NFR-3	**Reliability**	It should be able to display to information correctly anderror-free.
NFR-4	**Performance**	It should be able to automatically update itself when certain weather or traffic problem occurs.
NFR-5	**Availability**	It should be available 24/7 so that it can be beneficial tothe customer i.e the driver.
NFR-6	**Scalability**	Using weather Prediction in earlier stage that lead to help the people to slow down speed by indicating the sign and by knowing the accident or traffic jam before that leads to people take diversion other way. This solution will help to decrease the death rate up to 80%

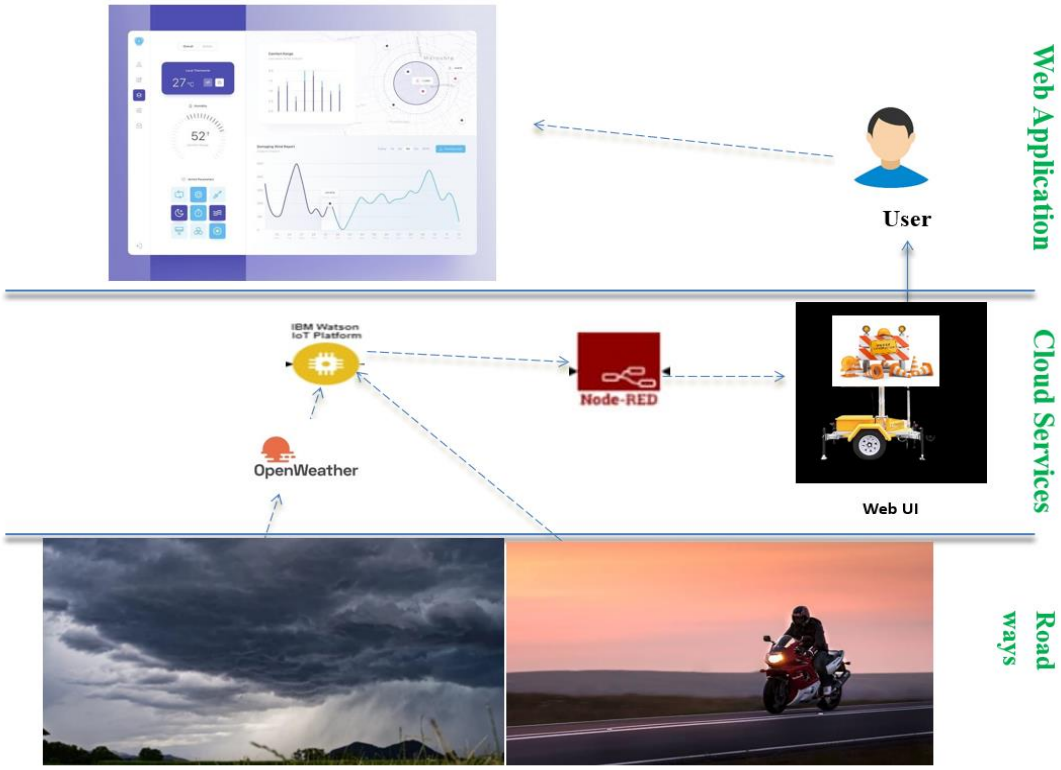
CHAPTER-5

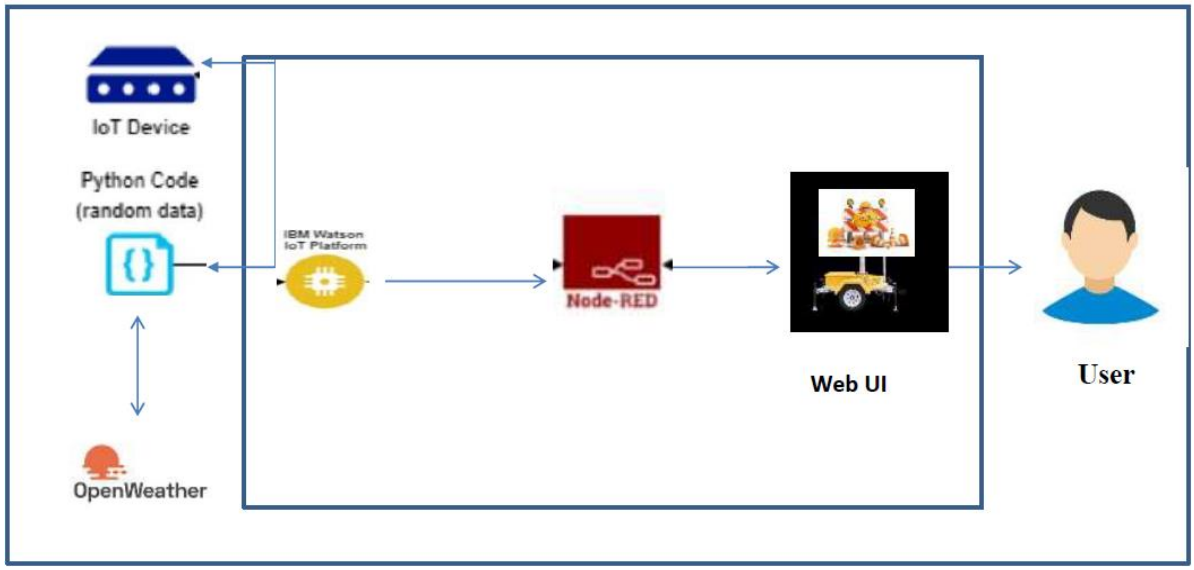
PROJECT DESIGN

5.1DataFlowDiagram:



5.2 Solution&TechnicalArchitecture





5.3 CustomerJourneyMap

Phases High-level steps your user needs to accomplish from start to finish	Travelling	Traffic	Change route	Arrived Destination
Steps Detailed actions your user has to perform	Pack the things as your required	Stuck while middle of the traffic	Find the new path	Reach the place
Feelings What your user might be thinking and feeling at the moment	 Travelling gives us a new perpectives	 Saving fuel while in traffic	 Learn new shortcuts	 Using our system, people arrived safety at th destination
Pain point Problems your user runs into	Lose consciousness accident happens	Delay every meeting we have to face that day	Difficult road path	Delay happens while road is not good
Opportunities Potential improvements or enhancements to the experience	My system provides flexilibity traveling in implementation	Our system predict traffic earlier	More accurae deliverance	More visibility and accurate to delivery tim

CHAPTER-6

PROJECTPLANNINGPHASE

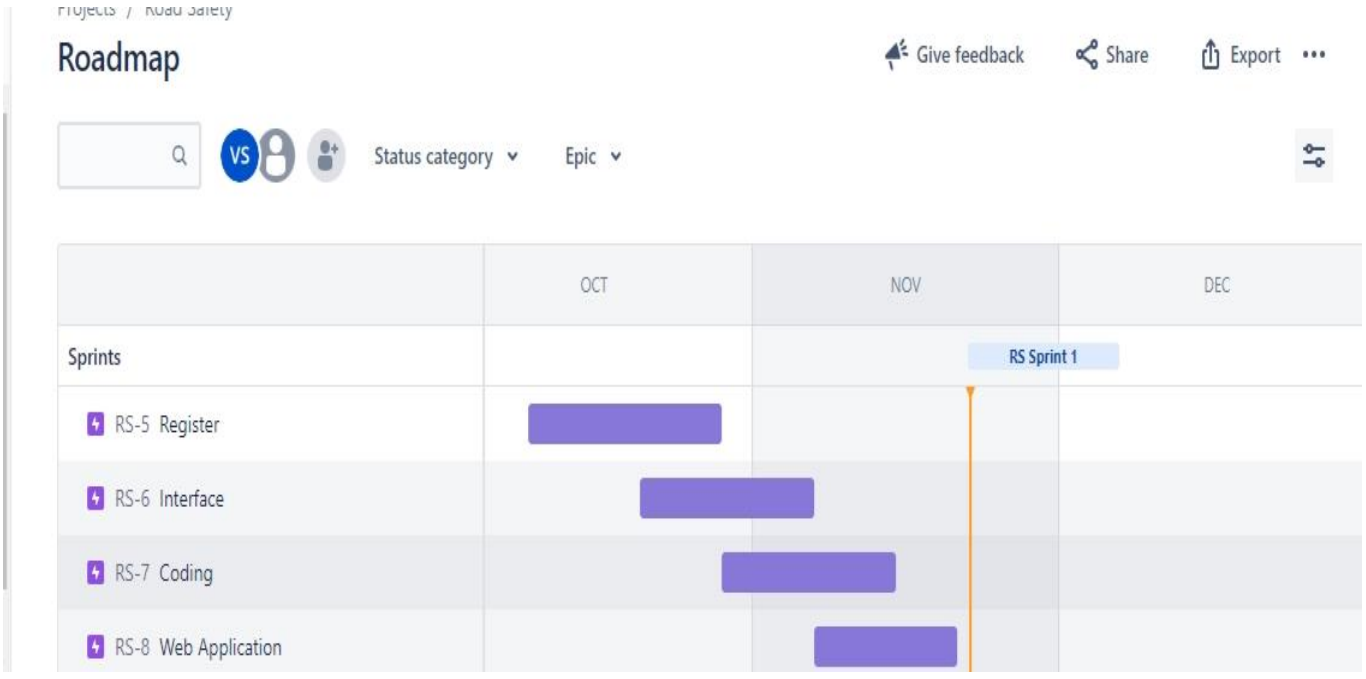
6.1 SprintPlanning,Schedule&Estimation

Sprint	Functional Requirement (Epic)	User Story Number	UserStory/Task	Story Points	Priority	TeamMembers
Sprint-1	Registration	USN-1	As a Driver, I canregisterfor the Applicationby enteringmyemail, password, andconfirming my password	2	High	UdhayanithiS
Sprint-1	User Confirmation	USN-2	As a Driver, I will receive confirmation email once I have registered for the application	1	Medium	Shanmugasundaram P
Sprint-1	Login	USN-3	As a Driver, I can log into the application by entering email & password	2	High	Vijayasiva M
Sprint-2	InterfaceSensor	USN-1	A sensor interface is a bridge between a device and any attached sensor. The interface Takes data collected by sensor and output it to the attached device	2	High	Vijayasiva M Sivaprakash M
Sprint-3	Coding (Accessing datasets)	USN-1	Coding is a set of instructions used to manipulate information so that a certain input results in a particular output	2	High	Vijayasiva M Sivaprakash M Shanmugasundaram P Udhayanithi S
Sprint-4	Web Application	USN-1	As a Driver, I will display the current weather & Automatic diversion for road traffic & Accident	1	Medium	Shanmugasundaram P Udhayanithi S

6.2 SprintDeliverySchedule

Sprint	Total StoryPoints	Duration	Sprint StartDate	SprintEndDate (Planned)	Story Points Completed (asonPlanned EndDate)	Sprint ReleaseDate(Actual)
Sprint-1	20	4Days	24Oct2022	27Oct2022	20	29Oct2022
Sprint-2	20	5Days	28Oct2022	01Nov2022	20	04Nov2022
Sprint-3	20	8Days	02Nov2022	09Nov2022	20	11Nov2022
Sprint-4	20	9Days	10Nov2022	18Nov2022	20	19Nov2022

6.3 ReportsFromJIRA



CHAPTER-7

CODING AND SOLUTION

7.1 Feature

```
import time import sys
import ibm iot f.application
import ibm iot f.device
import random
#Provide your IBM Watson Device Credentials organization = "dm86e1"
deviceType = "raspberrypi" deviceId = "demo333" authMethod = "token" authToken = "12345678"
# Initialize GPIO #print(cmd)
try:
deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-
method": authMethod, "auth-token": authToken} deviceCli = ibmiotf.device.Client(deviceOptions)
#.....

except Exception as e:
print("Caught exception connecting device: %s" % str(e)) sys.exit()

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

while True:
#Get Sensor Data from DHT11
speed=random.randint(50,100); data = { 'speed' : speed }
#print data
defmyOnPublishCallback():
print ("Published Driver Speed = %s km" % speed, "to IBM Watson")
```

success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,

on_publish=myOnPublishCallback)

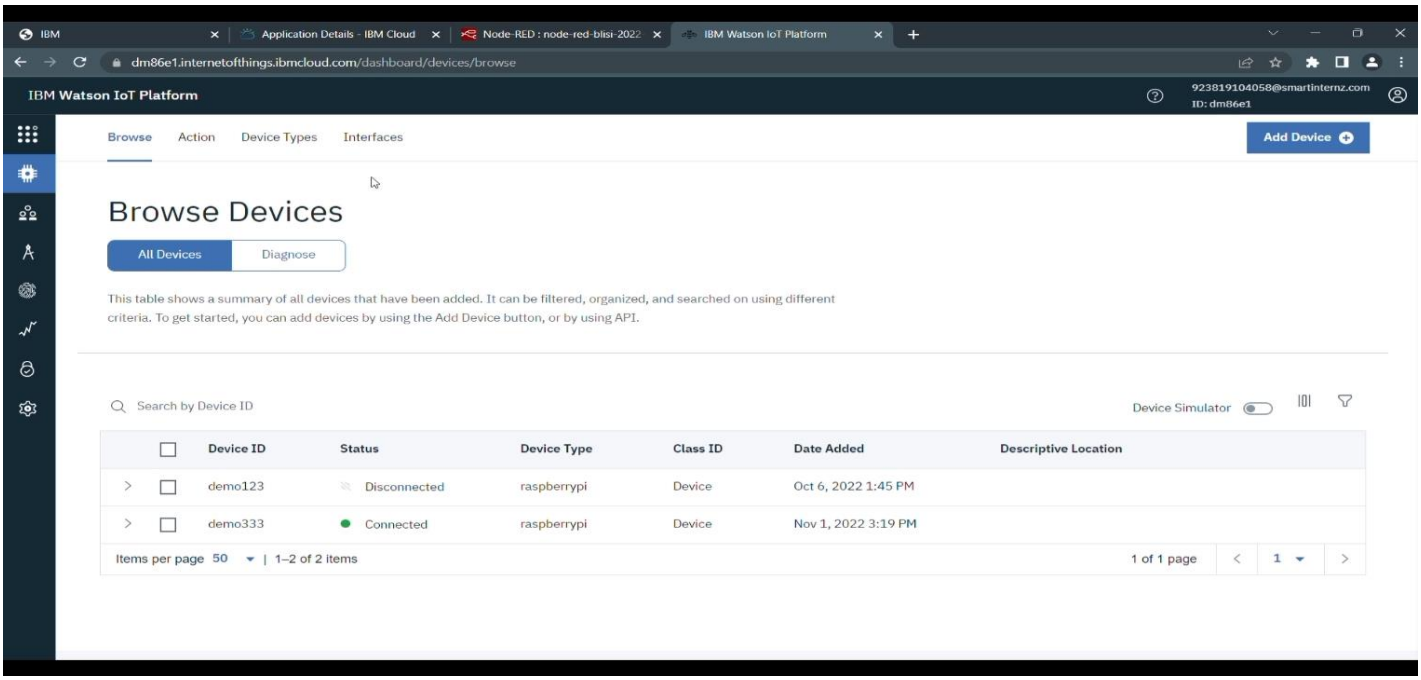
if not success:

print("Not connected to IoTF") time.sleep(5)

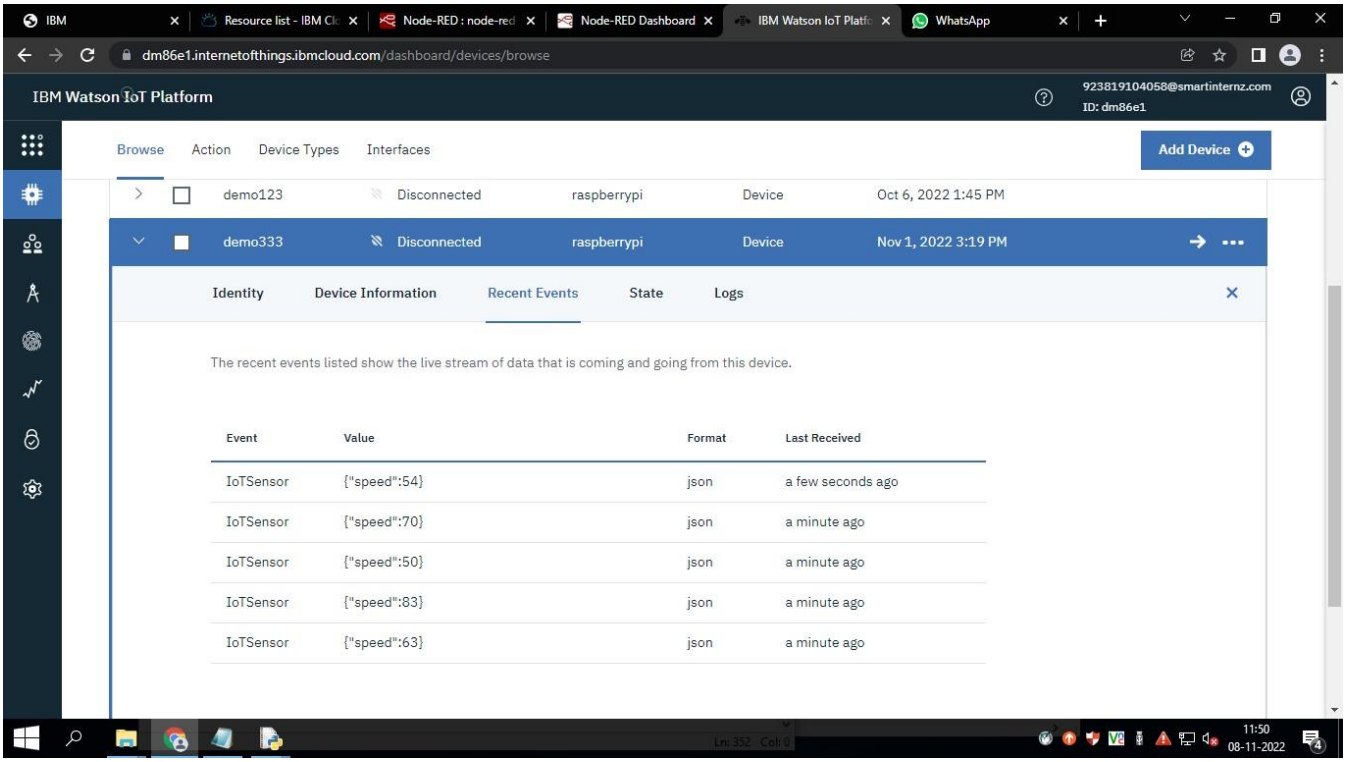
deviceCli.commandCallback = 'myCommandCallback'

Disconnect the device and application from the cloud deviceCli.disconnect()

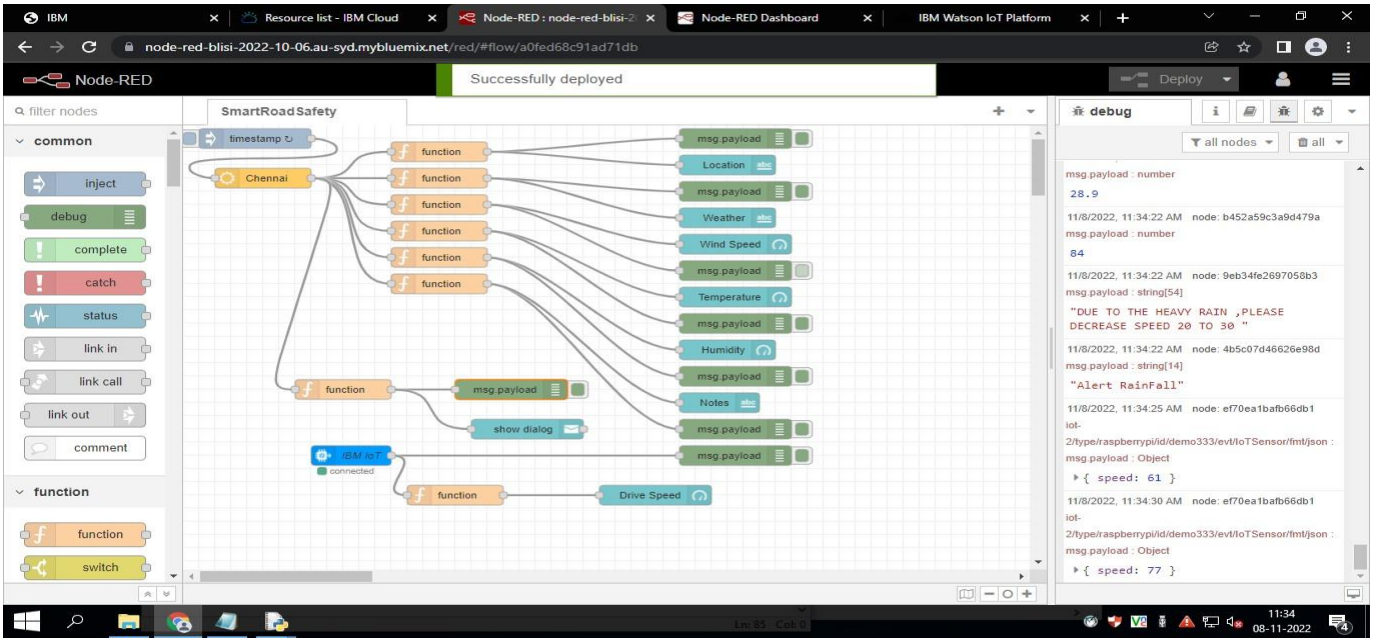
DeviceDetails:

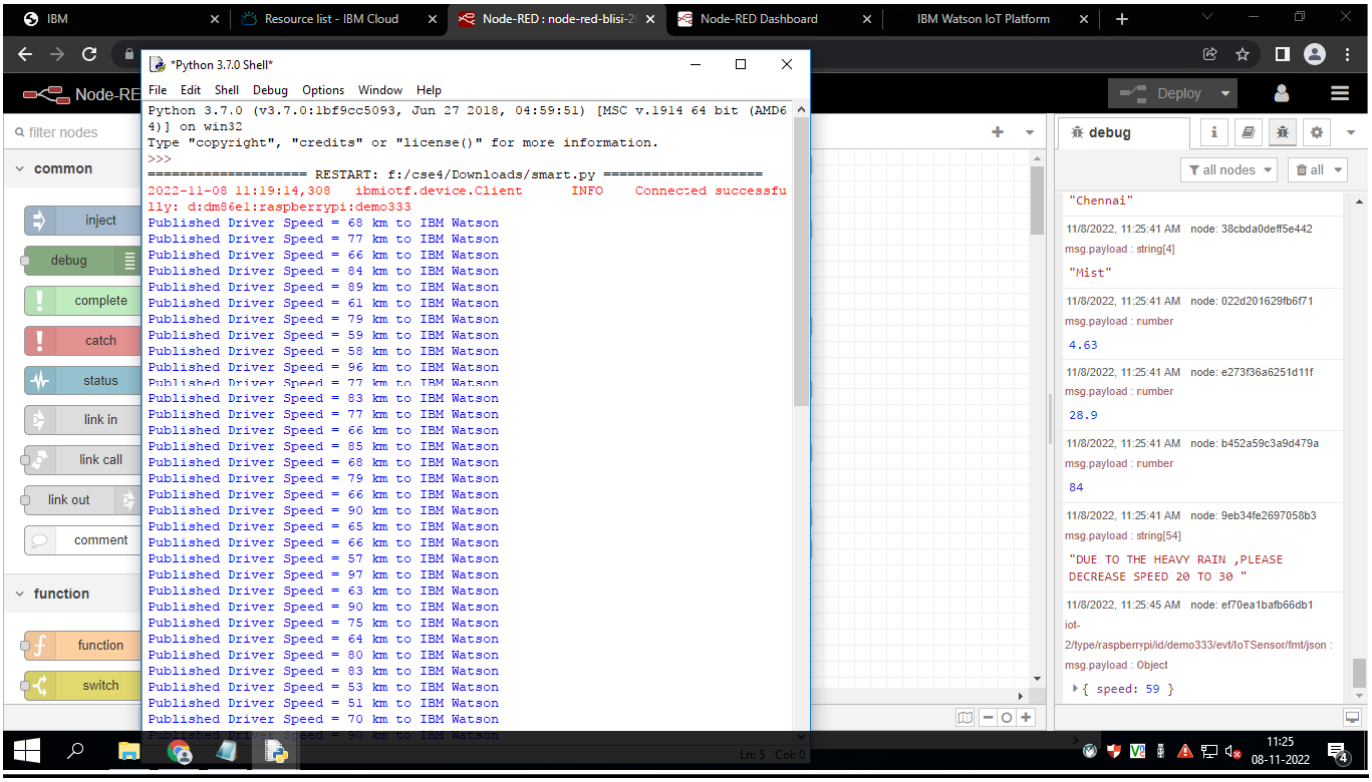


RecentEvents:



Node-RedConnectionandDashboardDesign:




IBM
Resource list - IBM Cloud
Node-RED : node-red-blisi-2
Node-RED Dashboard
IBM Watson IoT Platform
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD64)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: f:/cse4/Downloads/smart.py ==========
2022-11-08 11:19:14,308 ibmiotf.device.Client INFO Connected successfully: d:dm86e1:raspberrypi:demo333
Published Driver Speed = 68 km to IBM Watson
Published Driver Speed = 77 km to IBM Watson
Published Driver Speed = 66 km to IBM Watson
Published Driver Speed = 84 km to IBM Watson
Published Driver Speed = 89 km to IBM Watson
Published Driver Speed = 61 km to IBM Watson
Published Driver Speed = 79 km to IBM Watson
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Node-RED
Deploy
filter nodes
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complete
catch
status
link in
link call
link out
comment
function
function
switch
debug
all nodes
all
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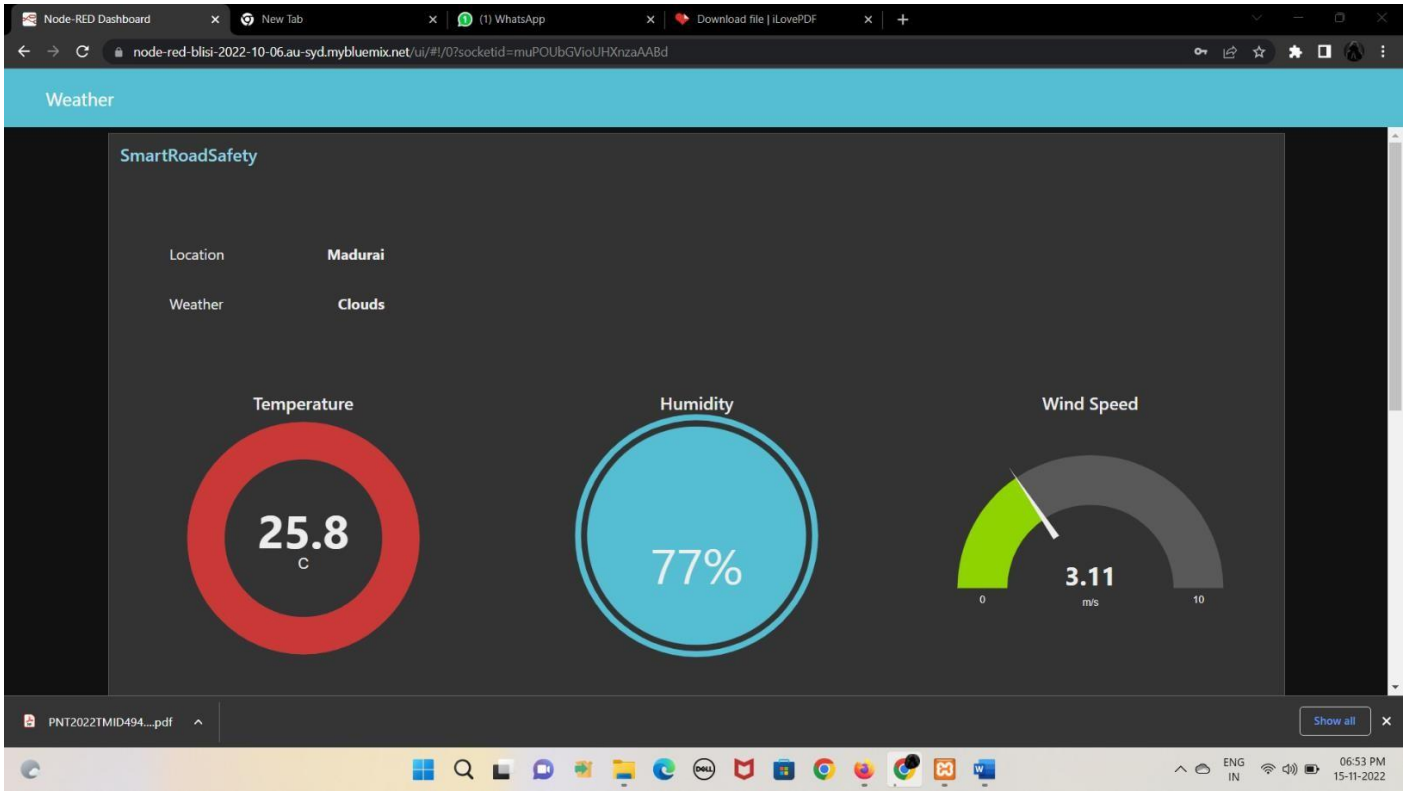
msg.payload : string[4]
"Mist"
11/8/2022, 11:25:41 AM node: 022d201629fb6f71
msg.payload : number
4.63
11/8/2022, 11:25:41 AM node: e273f36a6251d11f
msg.payload : number
28.9
11/8/2022, 11:25:41 AM node: b452a59c3a9d479a
msg.payload : number
84
11/8/2022, 11:25:41 AM node: 9eb34fe2697058b3
msg.payload : string[54]
"DUE TO THE HEAVY RAIN ,PLEASE DECREASE SPEED 20 TO 30 "
11/8/2022, 11:25:45 AM node: ef70ea1bafb66db1
iot-2/type/raspberrypi/id/demo333/evt/IoTSensor/fmt/json :
msg.payload : Object
{ speed: 59 }
11:25
08-11-2022


File Edit Format Run Options Window Help
#Provide your IBM Watson Device Credentials
organization = "dm86e1"
deviceType = "raspberrypi"
deviceId = "demo333"
authMethod = "token"
authToken = "12345678"
# Initialize GPIO
#print(cmd)
try:
deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
deviceCli = ibmiotf.device.Client(deviceOptions)
#.....
except Exception as e:
print("Caught exception connecting device: %s" % str(e))
sys.exit()
# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()
while True:
#Get Sensor Data from DHT11
speed=random.randint(50,100);
data = { 'speed' : speed }
#print data
def myOnPublishCallback():
print ("Published Driver Speed = %s km" % speed, "to IBM Watson")
success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
if not success:
print("Not connected to IoTF")
time.sleep(5)
deviceCli.commandCallback = 'myCommandCallback'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Weather
SmartRoadSafety
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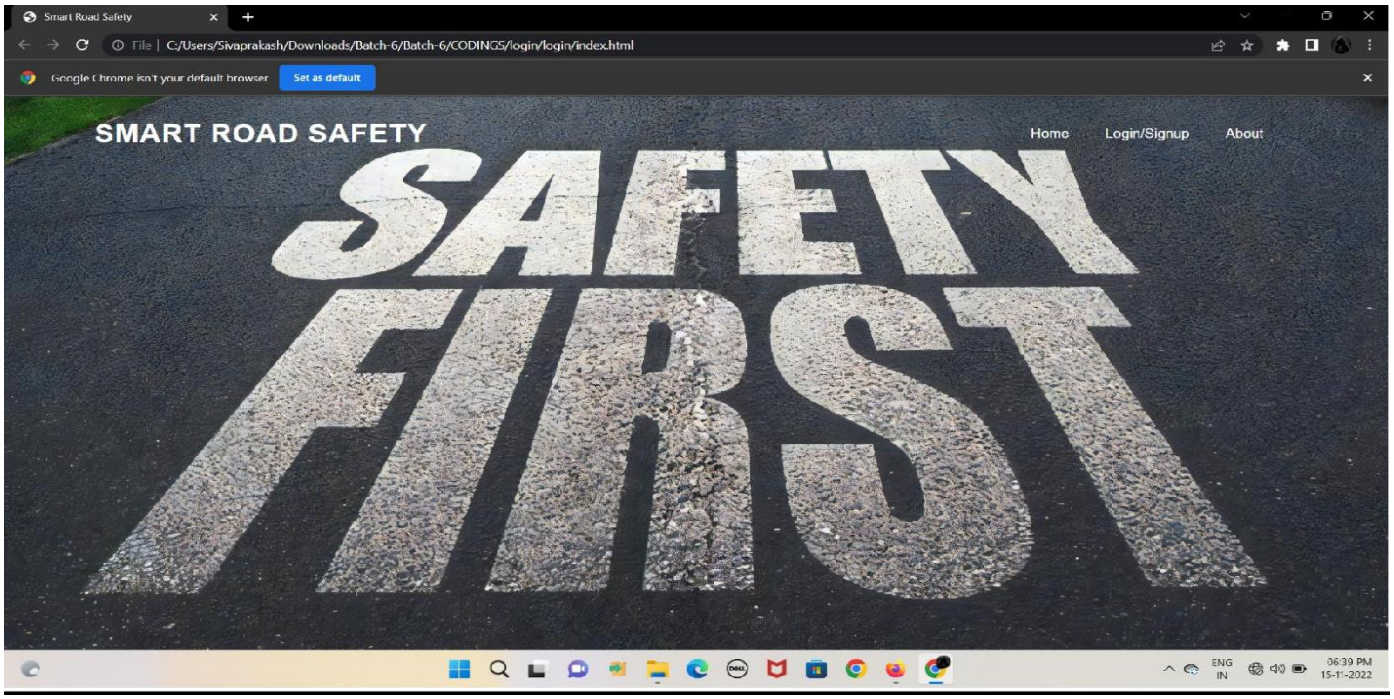
Smart Road Safety
File | C:/Users/Sivaprakash/Downloads/Batch-6/Batch-6/CODINGS/login/login/index.html
Google Chrome isn't your default browser
Set as default
SMART ROAD SAFETY
Home
Login/Signup
About
SAFETY
FIRST
ENG
IN
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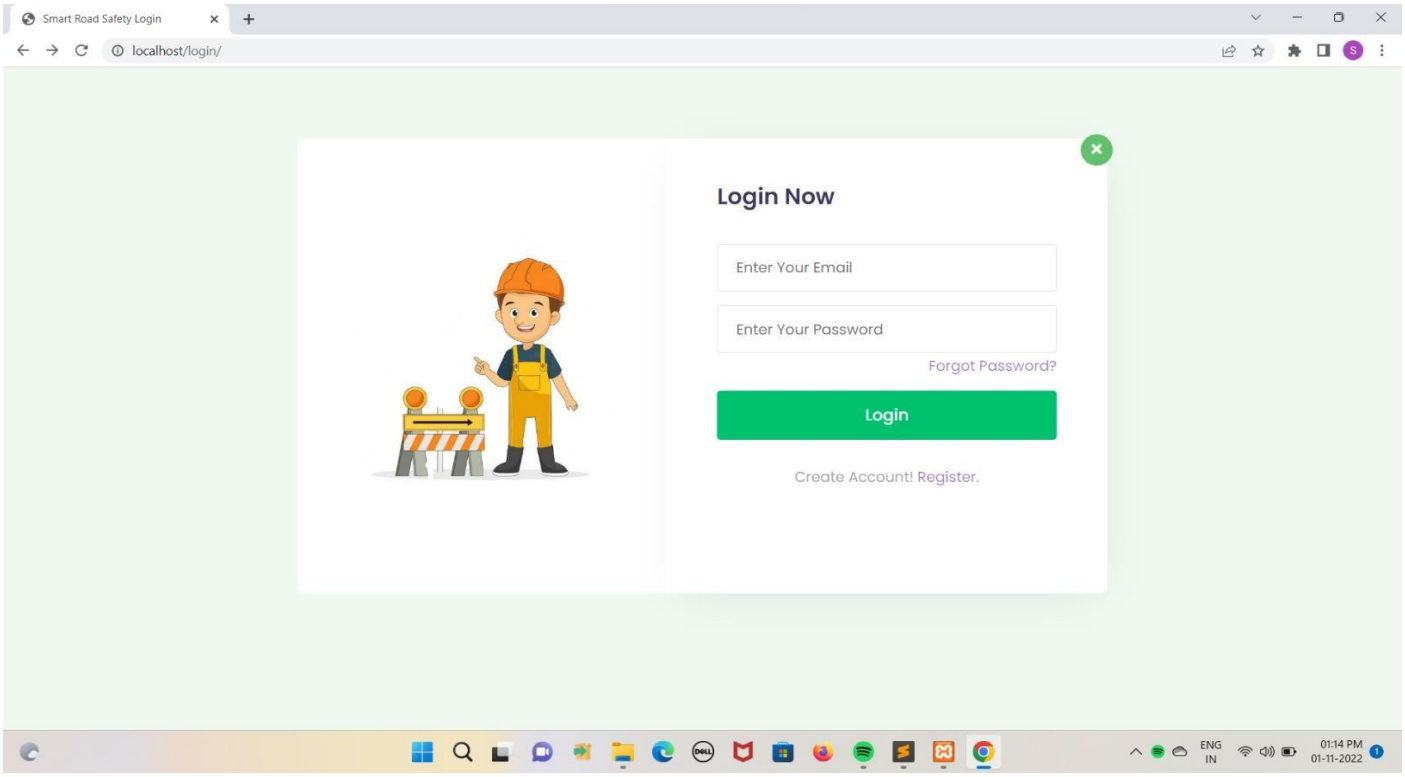
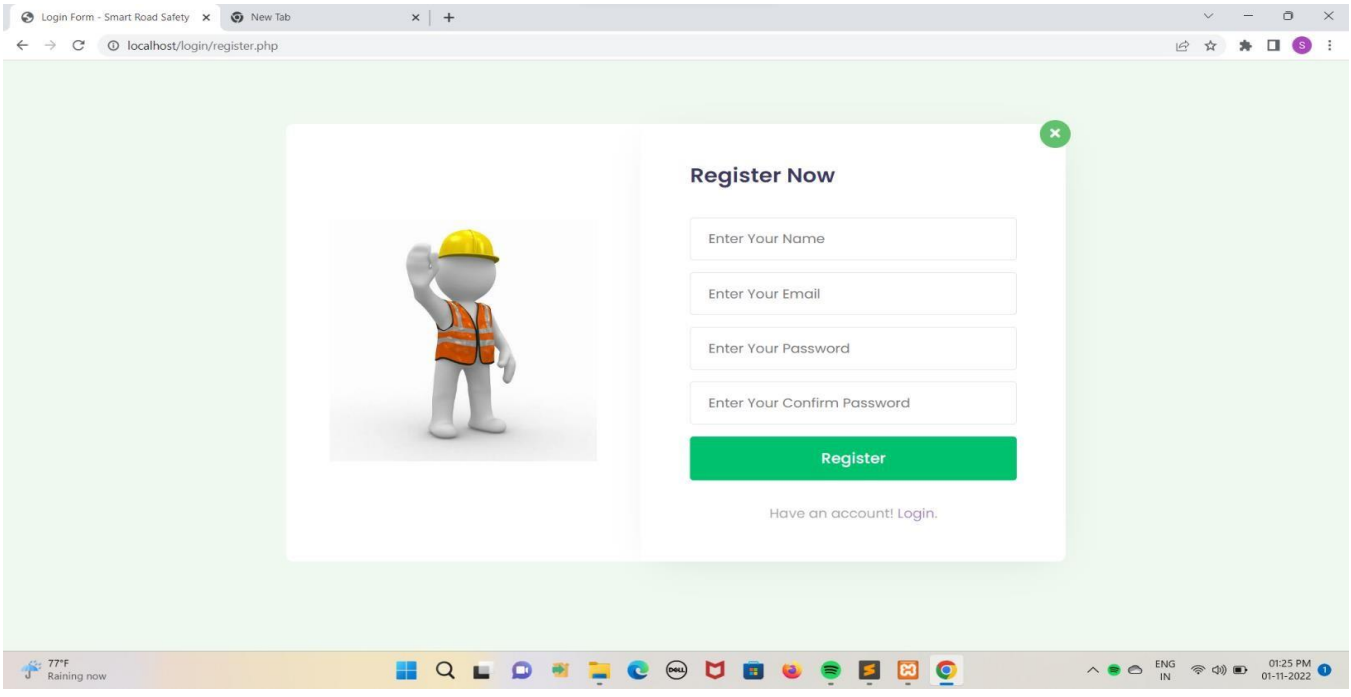

Smart Road Safety Login
localhost/login/
Login Now
Enter Your Email
Enter Your Password
Forgot Password?
Login
Create Account! Register.


Login Form - Smart Road Safety
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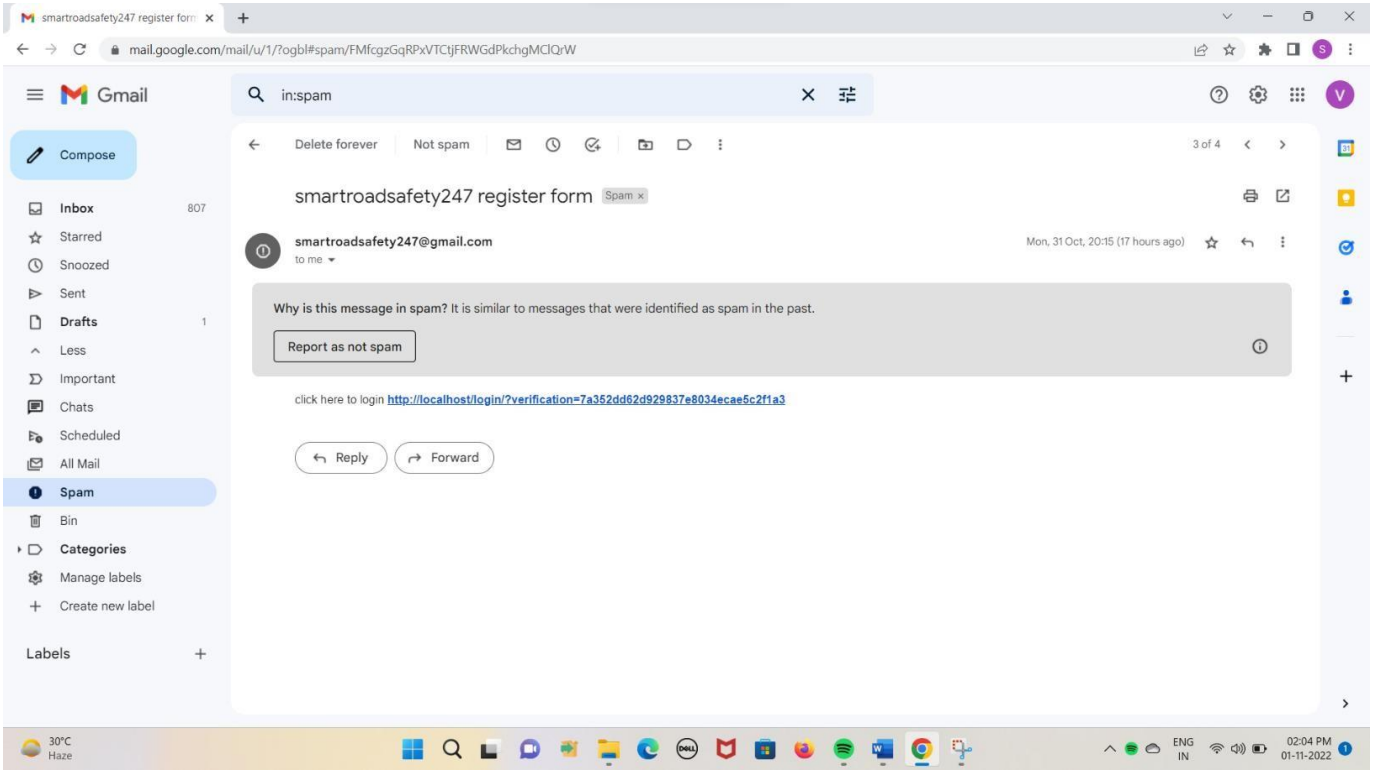
Register Now
Enter Your Name
Enter Your Email
Enter Your Password
Enter Your Confirm Password
Register
Have an account! Login.


smartroadsafety247 register form
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Sent
Drafts 1
Less
Important
Chats
Scheduled
All Mail
Spam
Bin
Categories
Manage labels
Create new label
Labels
Delete forever
Not spam
3 of 4
smartroadsafety247 register form
Spam
smartroadsafety247@gmail.com
to me
Mon, 31 Oct, 20:15 (17 hours ago)
Why is this message in spam? It is similar to messages that were identified as spam in the past.
Report as not spam
click here to login http://localhost/login/?verification=7a352dd62d929837e8034ecae5c2f1a3
Reply
Forward
30°C
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IN
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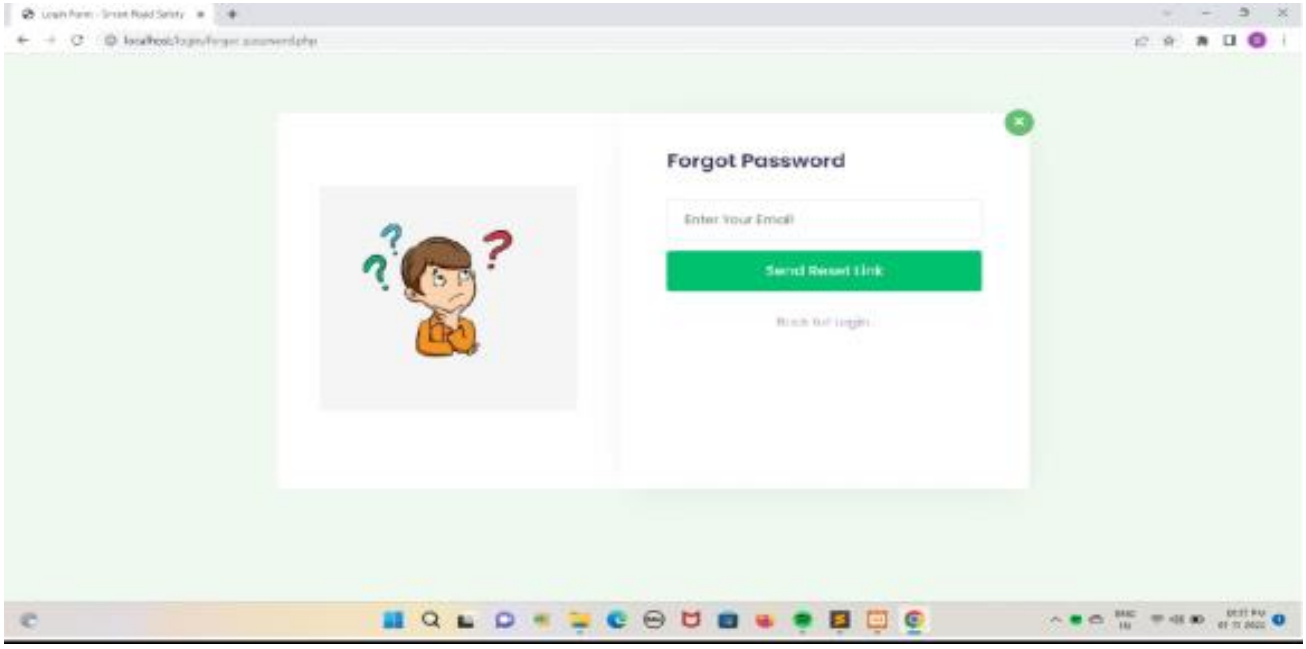
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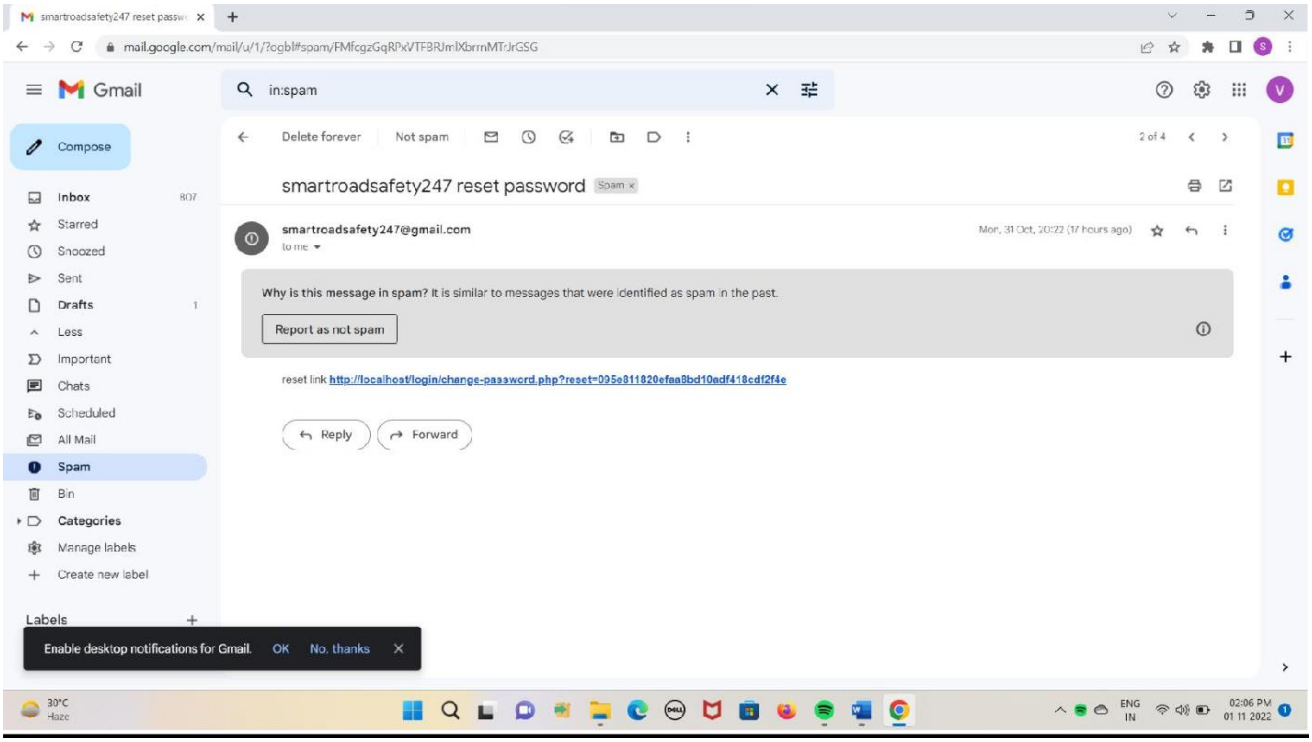
Enter Your Email
Send Reset Link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Snoozed
Sent
Drafts 1
Less
Important
Chats
Scheduled
All Mail
Spam
Bin
Categories
Manage labels
Create new label
Labels
Delete forever
Not spam
2 of 4
smartroadsafety247 reset password
Spam
smartroadsafety247@gmail.com
to me
Mon, 31 Oct, 2022 (17 hours ago)
Why is this message in spam? It is similar to messages that were identified as spam in the past.
Report as not spam
reset link http://localhost/login/change-paaaword.php?reset=035e811820efaa8bd10adf418cdf2f4e
Reply
Forward
Enable desktop notifications for Gmail.
OK
No, thanks
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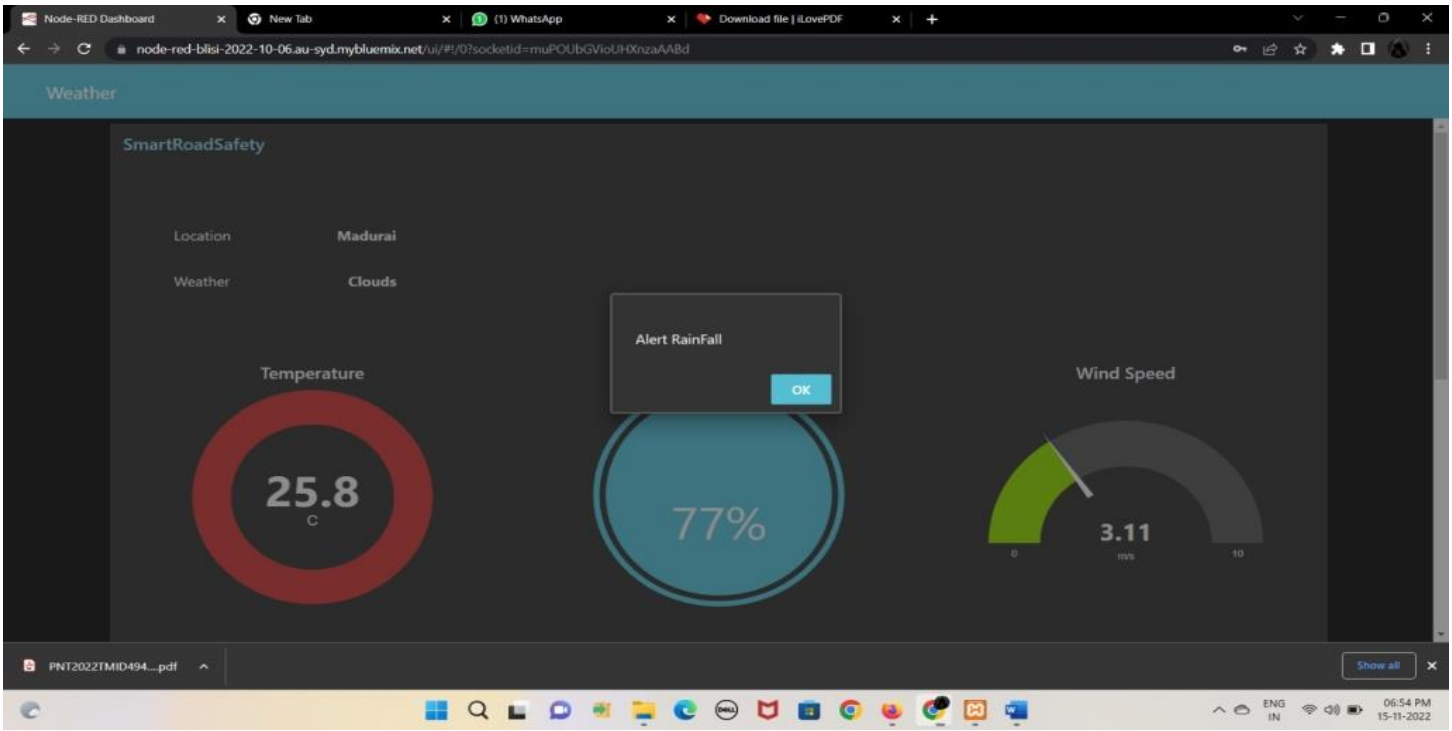
Haze
ENG
IN
02:06 PM
01 11 2022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SmartRoadSafety
Location
Madurai
Weather
Clouds
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Temperature
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C
77%
Wind Speed
3.11
m/s
0
10
PNT2022TMID494....pdf
Show all
ENG
IN
06:54 PM
15-11-2022

CHAPTER-8

TESTING

8.1 Testcases

Test Case	Test Scenario	Test Data	Status	Comments	Executed by
TC_001	Create the IBM Cloud services which are being used in this project	https://cloud.ibm.com /login	Pass	Results verified	**Udhayanithi S**
TC_002	Configure the IBM Cloud services which are being used in completing this project.	https://cloud.ibm.com /login	Pass	Results verified	Udhayanithi S
TC_003	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform	https://dm86e1.internetofthings. ibmcloud.com/dashboard/device s/browse	Pass	Results verified	Vijayasiva M
TC_004	In order to connect the IoT device to the IBM cloud create a device in the IBM Watson IoT platform	Temperature, Humidity , Wind Speed values are generated randomly in simulation	Pass	Results verified	Vijayasiva M
TC_005	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT platform	https://cloud.ibm.com /developer/appservice /create- app?starterKit=59c9d5 bd-4d31-3611-897a- f94eea80dc9f&default	Pass	Results verified	Sivaprakash M
TC_006	Create a Node-RED service.	Values of sensors	Pass	Results verified	Sivaprakash M
TC_007	such as temperature , humidity,wind speed values to IBM IoT platform	https://www.python.org/ downloads/release /python-370/	Pass	Results verified	Shanmugasundaram p

8.2 UserAcceptanceTesting

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the[Signs With Smart Connectivity for Better Road Safety] project at the time of the releasetoUserAcceptance Testing(UAT).

2. Defect Analysis

Thisreportshowsthenumberofresolvedorclosedbugsat eachseveritylevel,andhow they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	7	3	6	5	21
Duplicate	4	0	3	0	7
External	1	2	0	1	4
Fixed	14	1	3	8	26
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	4	2	0	6
Totals	26	11	18	19	67

3. Test Case Analysis

Thisreportshowsthenumber of testcasesthathavepassed,failed,and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
Client Application	30	0	0	30
Security	2	0	0	2
Outsource Shipping	1	0	0	1
Exception Reporting	7	0	0	7
Final Report Output	9	0	0	9
Version Control	1	0	0	1

CHAPETR-9

RESULTS

9.1Performance Metrics

1. Requirement Identification
    - Functional Requirements
    - Non-Functional Requirements
2. Implementationresult
    - System Implementationresults
    - Results of webapplication Implementation
3. Resource utilization results
    - Foregroundactivitiesresults
    - Memoryusage
    - Energyusage
4. Background activities results

CHAPTER-10

ADVANTAGES & DISADVANTAGES

10.1 ADVANTAGE:

- ✓ 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 updation Most Accurate

10.2 DISADVANTAGE:

- ✓ Dependent on the Open Weather API and hence the speed reduction is same for a large area in the scale of cities.
- ✓ The Display consumes more power.
- ✓ Dependent on API which is dependent on the servers, so it is vulnerable to a server blackout.

CHAPTER-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 traffic atmosphere in the countryAt a far reduced cost, our project can take the place of static signs, and it can be put into use right away. This will lessen many accidents and provide a calmer traffic environment across the nation.

CHAPTER-12
FUTURESCOPE

Introduction of intelligent road sign groups in real life scenarios could have great impact on increasing the driving safety by providing the enduser (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.

CHAPTER-13

APPENDIX

Github:http://bitly.ws/wVxu

DemoLink :http://bitly.ws/wYnA