SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

TEAM ID: PNT2022TMID48096

PROJECT REPORT

SUBMITTED BY

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SHANMUGANATHAN ENGINEERING COLLEGE

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ABSTRACT

Road accident nowadays has become a national catastrophe for over populated developing countries. One of the main cause of accident in the sensitive public zones like school, college, hospitals etc. and sharp turning points is the over speed of vehicles avoiding the speed limit indicated in the traffic sign board. Drivers endanger the lives of passengers, pedestrians and fellow drivers not limiting their vehicle speed in these sensitive public zones. The main objective of the proposed system is to operate the vehicles in a safe speed at critical zones minimizing the possible risk of unwitting accidents and casualties.This project paves a system to alert the driver about the speed limits in specific areas and reduce the speed of the vehicles in sensitive public zones without any interference of the drivers.The controls are taken automatically by the use of a wireless local area network. The system operates in such way that the accident information is passed to the vehicles entering the same zone to take diversion to avoid traffic congestion.

CHAPTER 1

CHAPTER 1

INTRODUCTION

In present systems the road signs and the speed limits are Static. Road traffic accident is a major problem worldwide resulting in significant morbidity and mortality. Advanced driver assistance systems are one of the salient features of intelligent systems in transportation. They improve vehicle safety by providing real-time traffic information to the driver. Road signs play an important role in road safety. To be effective, road signs must be visible at a distance that enables drivers to take the necessary actions. However, static road signs are often seen too late for a driver. 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 digitalized. Based on current research & development efforts, we can all be fairly certain that smart road signs will be broadly utilized in the years to come. They serve as one of the major components of an emerging system designed to enhance the current infrastructure.

Traveling is one of the basic needs of every person who lives in cities or villages. There are several ways to travel from one place to another by air, water, rail, and road in various types of vehicles, e.g., cars, motorbikes, buses, and trucks. Roads are the foremost source of linking between cities and villages. Due to the ease in traveling by road, vehicles have become the main way people travel. The chances of vehicular accidents (Vas) have increased with the growing number of vehicles on the roads. During a journey, one does not know what will happen on the next road, particularly during bad weather conditions (BWC). In such a situation, driving can be difficult due to bad visibility, which can lead to an accident. It was also noticed that in BWC, multiple vehicle collisions (MVCs) can occur owing to delays in receiving information about an incident. According to one study by the Islamabad police, there were 9582 accidents from 2016 to 2017 all over Pakistan, involving 11,317 vehicles, leading to 5047 fatalities and 12,696 persons injured.

Vehicles can be divided into two main groups: equipped vehicles (Evs) and non-equipped vehicles (nEVs). Evs have sensing capabilities to avoid or detect accidents. Evs include vehicles equipped with a smartphone-based application or a microcontroller with different sensors. It uses GSM, LTE, or 5G to send messages; a GPS for finding locations; and GPRS, LTE, or 5G for internet connectivity. All old vehicles with no capability for sensing an accident are nEVs. Thus, the benefits from accident detection and alerts are not provided in nEVs. A question arises about why we rely on vehicle sensors or smartphone-based systems. The GSM signal is weak in many distant areas, and communication links might be unstable in those areas. On the other hand, a GPS requires 10 to 15 min to fix a location for the first time, which leads to late broadcasts. The main goal of this research is to:

1.Introduce a new framework of smart road based on multiple sensors to save the lives of people injured in an accident, and protect people and vehicles against MVCs;

2.Detect Vas autonomously without using vehicular sensors;

3.Alert drivers of approaching vehicles about an accident, even without vehicular communications;

4.Inform an Emergency Operations Center (EOC) about an accident and its location without needing a GPS.

1.1PROJECT OVERVIEW

- To replace the static signboards, smart connected sign boards are used.
- These smart connected sign boards get the speed limitations from a web app using weather API and update automatically.
- Based on the weather changes the speed may increase or decrease.
- Based on the traffic and fatal situations the diversion signs are displayed Guide (Schools), Warning and Service (Hospitals, Restaurant) signs are also displayed accordingly.
- Different modes of operations can be selected with the help of buttons.
- The Safe System approach to road safety emphasizes safety-by-design through ensuring safe vehicles, road networks, and road users.
- With a strong motivation from the World Health Organization, this approach is increasingly adopted worldwide.
- Considerations in SS, however, are made for the medium-to-long term. Our interest in this work is to complement the approach with a short-to-medium term dynamic assessment of road safety.
- Toward this end, we introduce a novel, cost-effective Internet of Things (IoT) architecture that facilitates the realization of a robust and dynamic computational core in assessing the safety of a road network and its elements.
- In doing so, we introduce a new, meaningful, and scalable metric for assessing road safety.
- We also showcase the use of machine learning in the design of the metric computation core through a novel application of Hidden Markov Models (HMMs).
- Finally, the impact of the proposed architecture is demonstrated through an application to safety-based route planning.

1.2PURPOSE

- ✓ This project proposes a system which has digital sign boards 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.
- ✓ There is a web app through which you can enter the data of the road diversions, accident prone areas and the information sign boards can be entered through web app.
- ✓ This data is retrieved and displayed on the sign boards accordingly.
- ✓ Thus, safety of the drivers and the people using the roads can be increased.
- ✓ Lives can be saved by alerting or giving information about the roads.
- ✓ Provide real-time traffic updates on traffic congestion and unusual traffic incidents through roadside message units and thereby improve mobility.
- ✓ They improve vehicle safety by providing real-time traffic information to the driver. Road signs play an important role in road safety.
- ✓ To be effective, road signs must be visible at a distance that enables drivers to take the necessary actions.

CHAPTER 2

CHAPTER 2

LITERATURE SURVEY

2.1EXISTING PROBLEMS

Road traffic injury is a major global public health problem. Rapid motorisation in low and middle-income countries (LMICs) along with the poor safety quality of road traffic systems and the lack of institutional capacity to manage outcomes contribute to a growing crisis.The road network is inadequate, keeping in view the volume of traffic and passengers.Roadways are highly congested in cities and most of the bridges and culverts are old or narrow.About half of the roads are unmetalled and this limits their usage during the rainy season. Road traffic injury is a major global public health problem. Rapid motorisation in low and middle-income countries (LMICs) along with the poor safety quality of road traffic systems and the lack of institutional capacity to manage outcomes contribute to a growing crisis. More than 1.24 million people die each year on the world's roads. Many more suffer permanent disability, and between 20 and 50 million suffer non-fatal injuries. These are mainly in LMICs, amongst vulnerable road users and involve the most socio-economically active citizens.

2.2REFERENCES

[1] World Health Organization, "Global status report on road safety 2015," https://www.who.int/violence injury prevention/road safety status/2015/en/.

[2] World Health Organization, "Decade of Action for Road Safety 2011-2020 seeks to save millions of lives," http://www.who.int/ roadsafety/decade of action/en/.

[3] F. Wegman, "Te future of road safety: A worldwide perspec-tive," IATSS Research, vol. 40, no. 2, pp. 6671, 2017.

[4] World Health Organization, "Save LIVES - A road safety technical package," 2017.

[5] W. E. Marshall, "Understanding international road safety dis-parities:Why is Australia so much safer than the United States?" Accident Analysis & Prevention, vol. 111, pp. 251–265, 2018.

[6] "Open Street Maps, with New York County highlighte," https:// www.openstreetmap.org/relation/2552485.

[7] United States Census Bureau, "TIGER/Line-Shapefles:Roads," https://www.census.gov/cgi-bin/geo/shapefles/index.php? year=2018&layergroup=Roads.

[8] 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.

[9] European Road Assessment Program (EuroRAP), "European Road Safety Atlas," http://atlas.eurorap.org/.

[10] European Road Assessment Programme (EuroRAP), "Star Rat-ings," http://www.eurorap.org/protocols/star-ratings/.

[11] International Road Assessment Programme (iRAP), "iRAP," https://www.irap.org/.

[12] H. M. Hassan and H. Al-Faleh, "Exploring the risk factorsassociated with the size and severity of roadway crashes in Riyadh," Journal of Safety Research, vol. 47, pp. 67–74, 2013.

[13] E. Ahmed, I. Yaqoob, A. Gani, M. Imran, and M. Guizani, "Internet-of-things-based smart environments: State of the art, taxonomy, and open research challenges," IEEE Wireless Communications Magazine, vol. 23, no. 5, pp. 10–16, 2016.

[14] Y. Mehmood, F. Ahmad, I. Yaqoob, A. Adnane, M. Imran, and S. Guizani, "Internet-of-Tings-Based Smart Cities: Recent Advances and Challenges," IEEE Communications Magazine, vol. 55, no. 9, pp. 16–24, 2017.

[15] AARONIA, "GPS Logger including Gyro / Tilt / Compass & Accelerometer," https://www.aaronia.com/products/spectrum- analyzers/gps-logger/.

[16] M. Farsi, K. Ratclif, and M. Barbosa, "Overview of controller area network," Computing and Control Engineering Journal, vol. 10, no. 3, pp. 113–120, 1999.

[17] MUNIC (company website), https://www.munic.io/.

[18] Torque Pro (OBD 2 & Car), "Torque Pro (OBD2 & Car) Google

[19] J.-S. Jhou, S.-H. Chen, W.-D. Tsay, and M.-C. Lai, "Te imple- mentation of OBD-II vehicle diagnosis system integrated with cloud computation technology," in Proceedings of the 2013 2nd International Conference on Robot, Vision and Signal Processing, RVSP 2013, pp. 9–12, Japan, December 2013.

[20] A. Mednis, A. Elsts, and L. Selavo, "Embedded solution for road condition monitoring using vehicular sensor networks," in Proceedings of the 2012 6th International Conference on Application of Information and Communication Technologies, AICT 2012, Georgia, October 2012.

[21] M. Yamada, K. Ueda, I. Horiba, and N. Sugie, "Discrimination of the Road Condition Toward Understanding of Vehicle Driving Environments," IEEE Transactions on Intelligent Trans- portation Systems, vol. 2, no. 1, pp. 26–31, 2001.

[22] J. Eriksson, L. Girod, B. Hull, R. Newton, S. Madden, and H. Balakrishnan, "Te pothole patrol: using a mobile sensor network for road surface monitoring," in Proceedings of the 6th International Conference on Mobile Systems, Applications, and Services (MobiSys '08), pp. 29–39, Breckenridge, Colo, USA, June 2008.

[23] A. S. El-Wakeel, J. Li, M. T. Rahman, A. Noureldin, and H. S. Hassanein, "Monitoring road surface anomalies towards dynamic road mapping for future smart cities," in Proceedings of the 2017 IEEE Global Conference on Signal and Information Processing (GlobalSIP), pp. 828–832, Montreal, QC, Canada, November 2017.

2.2PROBLEM STATEMENT DEFENITION

Added to the losses in human lives and wellbeing, considerable monetary losses are incurred in medical expenses, infrastructure repair, and production downtime. While the worldwide figures have plateaued, the Global Status Report does indicate higher road fatalities and injuries in low-income countries. Such disparity, as noted in, signals a barring-limitation in low-income countries to improve road-safety by adopting solutions implemented in high-income countries. Added to the losses in human lives and wellbeing, considerable monetary losses are incurred in medical expenses, infrastructure repair, and production downtime. While the worldwide figures have plateaued, the Global Status Report does indicate higher road fatalities and injuries in low-income countries. Such disparity, as noted in [3], signals a barring-limitation in low-income countries to improve road-safety by adopting solutions implemented in high-income countries.

CHAPTER 3

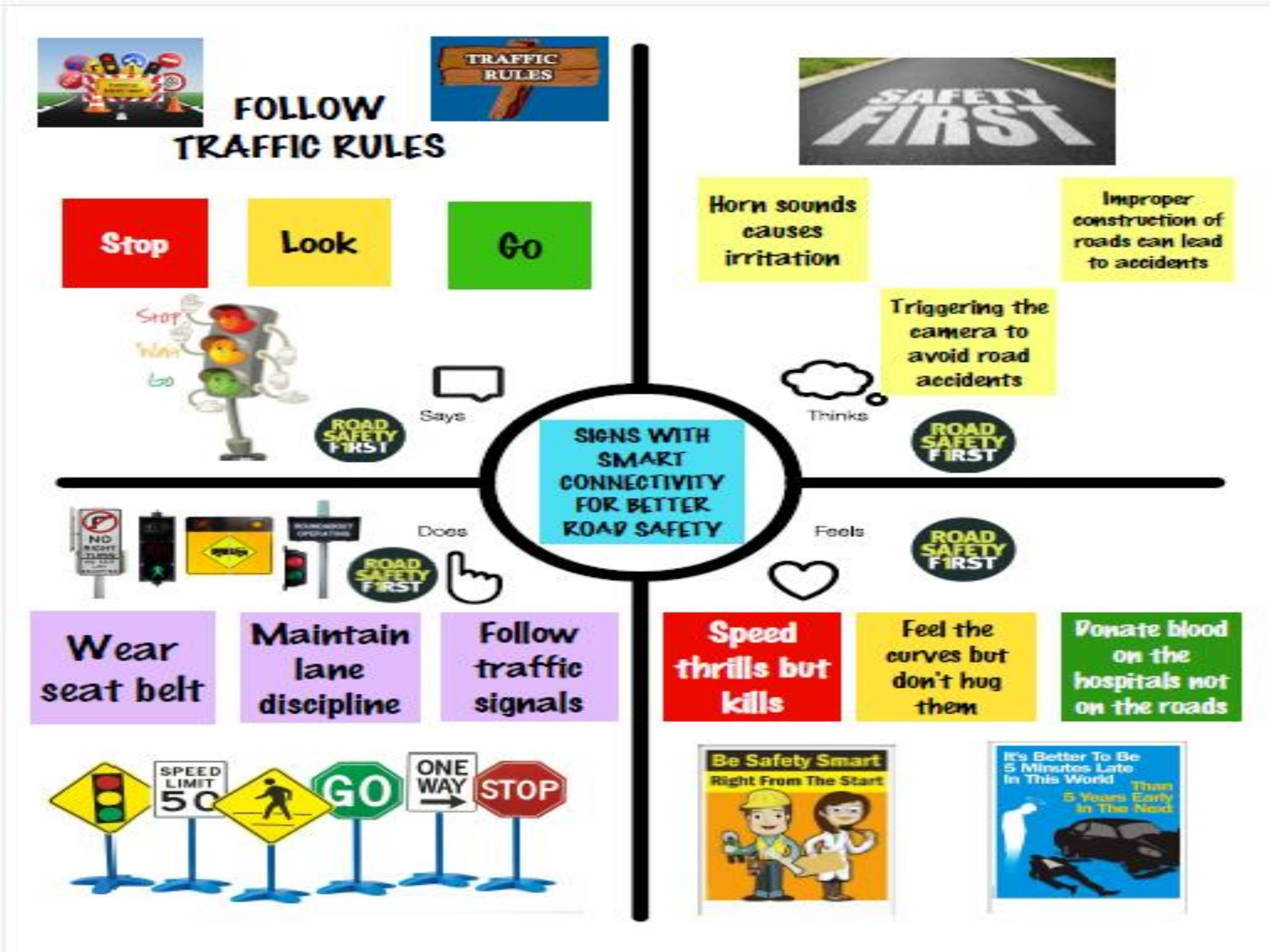
CHAPTER 3

IDEATION AND PROPOSED SOLUTION

3.1.EMPATHY MAP CANVAS

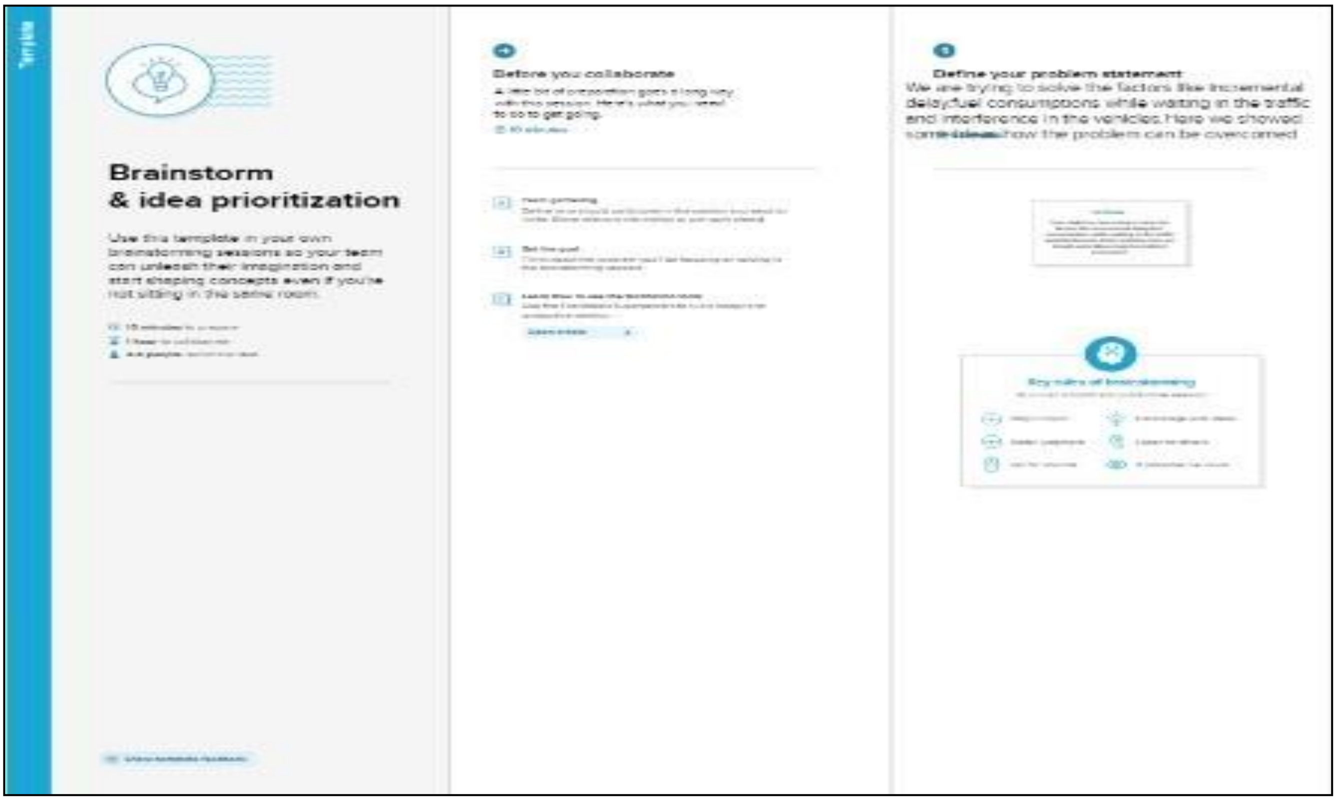
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users.

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.

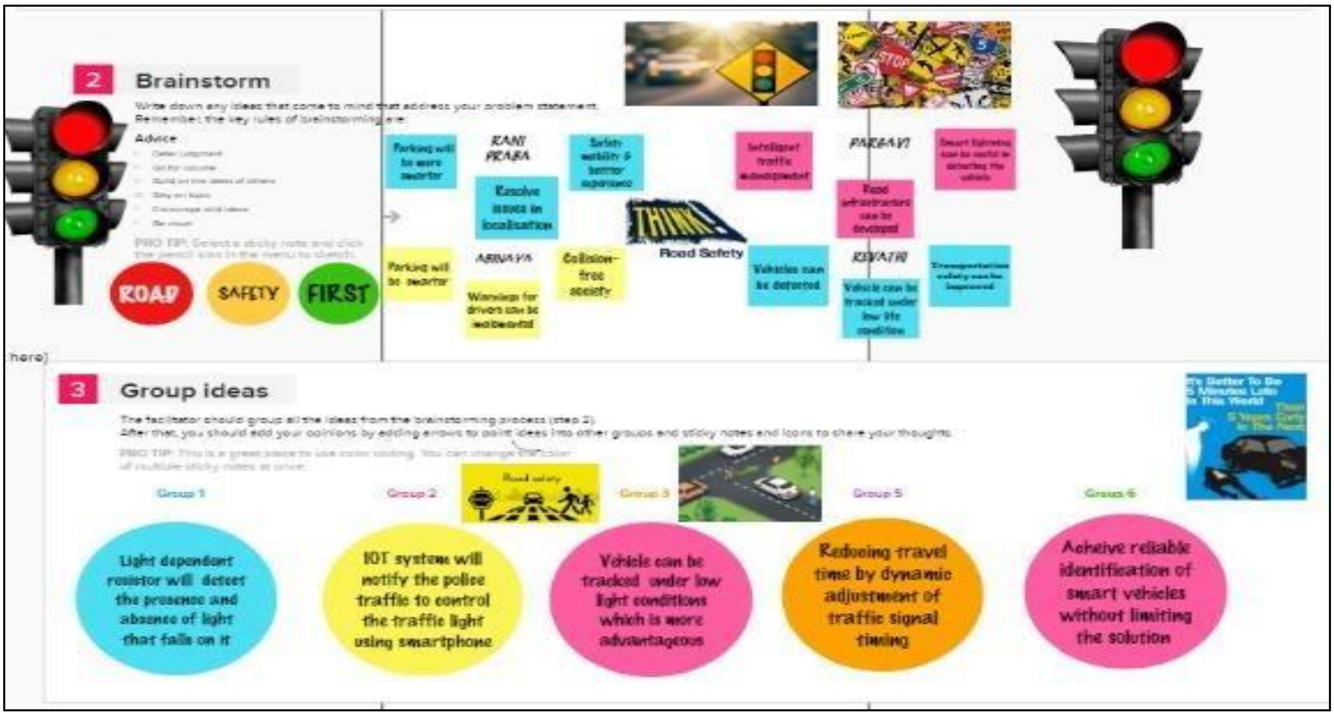


3.2 IDEATION AND BRAINSTORMING

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



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization

3.3 PROPOSED SOLUTION

S.No	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	We are trying to solve the factors like incremental delay, fuel consumptions while waiting in the traffic and interference in the vehicles. Here we showed some ideas how the problem can be overcome.
2.	**Idea / Solution description**	In the future, smart road signs combined with state-ofthe-art vision-based road sign recognition algorithms can provide both reliable and effective recognition by smart vehicles.
3.	**Novelty / Uniqueness**	Vehicles can be tracked under low light conditions which are more advantageous.
4.	**Social Impact / Customer Satisfaction**	Many lives can be saved due to this idea so customer is very satisfied
5.	**Business Model (Revenue Model)**	Policy makes and private companies are willing to use innovative solution to decrease road – related fatalities and injuries amidst populations.
6.	**Scalability of the Solution**	There is a need to develop a protocol to avoid or prevent traffic accident and extreme level in order to reduce human loss.

3.4 PROBLEM SOLUTION FIT

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Motorist,passenger,public transportation operator or User, truck driver bicyclist, Motorcyclist, or pedestrians including a Person with disabilities are considered as Customers.

6. CUSTOMER CONSTRAINTS CC

5. AVAILABLE SOLUTIONS AS

Drive in the prescribed speed limits on the Various roads. Always remember that "speed Thrills but kills". Always put on helmets, seat belts and other safety equipments before driving a bicycle/ motor /vehicle.

Explore AS, differentiate

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

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Customer poses risks to each other. Young people Faces the largest risk in traffic. Pedestrians, cyclists, Moped riders and motorcyclists have a higher injury Rate per kilometer of travel than other road Users.

9. PROBLEM ROOT CAUSE RC

- WORK STRESS /TIME PRESSURE
- NEW TECHNOLOGY
- OVER CONFIDENCE

7. BEHAVIOUR BE

- ALWAYS WEAR A HELMET
- DRIVE WITHIN THE SPEED LIMITS ALWAYS GIVE AN INDICATOR WHILE
- CHANGING LANES.

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

Identify strong TR & EM

3. TRIGGERS TR

1. Frequent traffic jams.
2. Too many vehicles on the roads.
3, Medle of traffic on the roads.

4.EMOTIONS :

BEFORE	AFTER
Aggressiveness	Enabling the driver to be more productive
Anger	Happy
Stress	More comfort & safety

10. YOUR SOLUTION SL

- USE NEW TECHNOLOGY SUCH AS SMART TRAFFIC AND TRAFFIC CONTROL SYSTEMS
- ARTIFICIAL INTELLIGENCE
- USE OF AUTOMATIC

8. CH ANNELS OF BEHAVIOUR CH

ONLINE	OFFLINE
NEW TECHNOLOGY	DON'T DRINK AND DRIVE
INEFFECTIVE SUPERVISION	DON'T USE MOBILE WHILE DRIVING

Identify strong TR & EM

CHAPTER 4

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through FormRegistration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via EmailConfirmation via OTP
FR-3	User approval	Approval through Gmail Approval through phone call
FR-4	User transaction	Transaction through online modeTransaction through debit card
FR-5	Testing	Testing through component Testing via API and UI
FR-6	End result	End result through product features

4.2 NON-FUNCTIONAL REQUIREMENTS

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

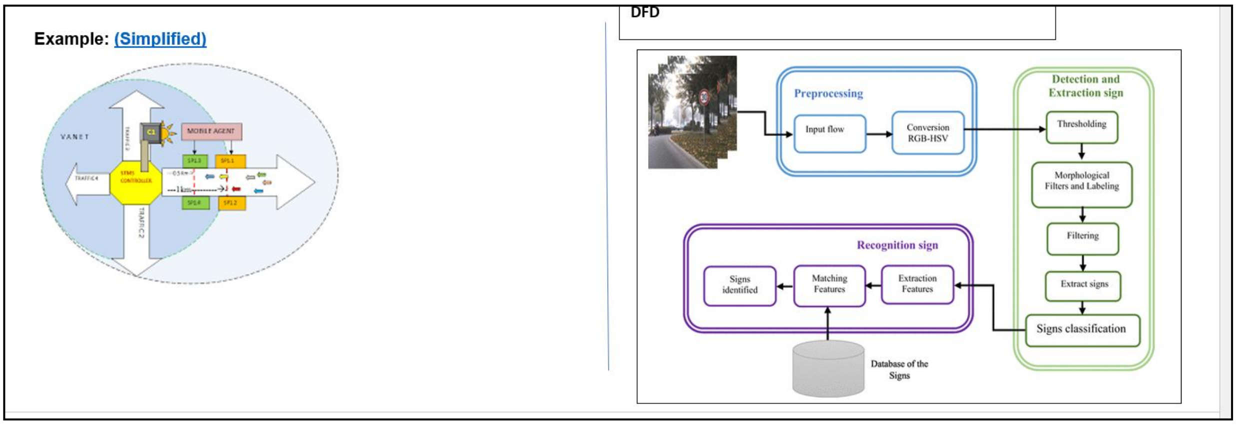
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	It refers to the average time it takes toaccomplish a user's goals.
NFR-2	**Security**	To ensure the user that the software is protected from unauthorized access to the system and its stored data.
NFR-3	**Reliability**	It describes how likely it is for the software to work without failure for a given period oftime.
NFR-4	**Performance**	Quality attribute that describes the responsiveness of the system to various userinteractions with it for users efficiency.
NFR-5	**Availability**	It is the period of time that the system's functionality and services are available foruse with all operations.
NFR-6	**Scalability**	To show how the system must grow without negative influence on its performance.

CHAPTER 5

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

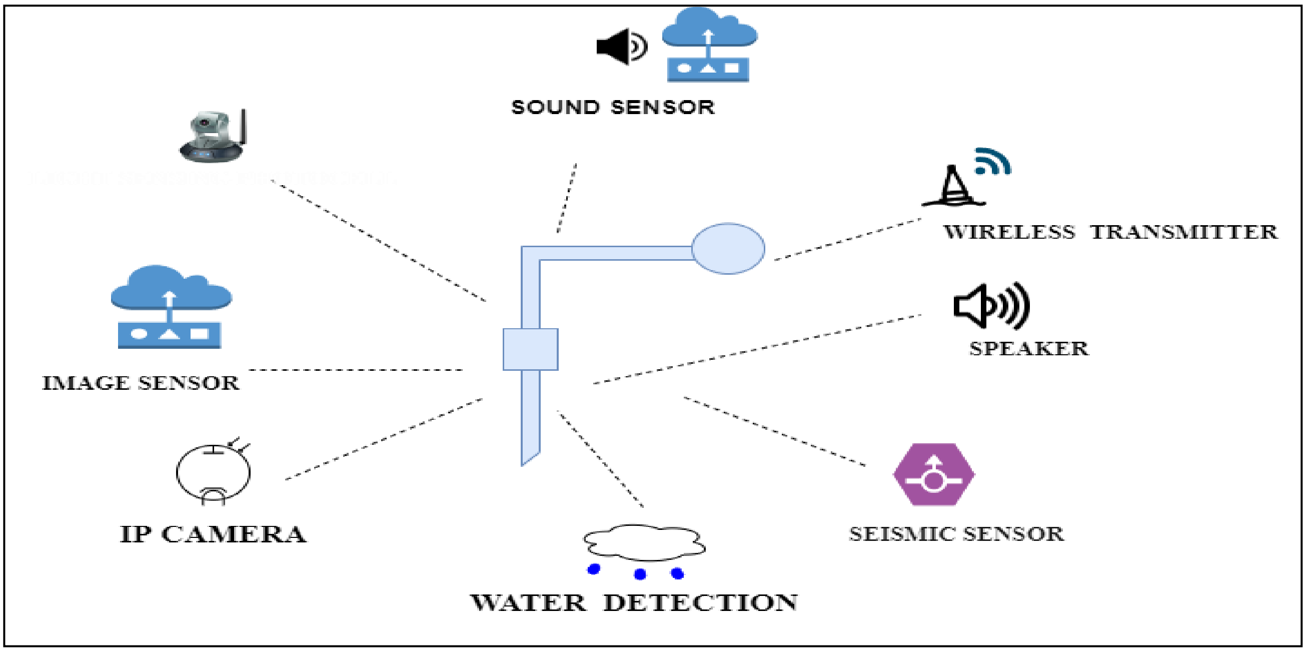


5.2 SOLUTION AND TECHNICAL ARCHITECTURE

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, behaviour, 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:



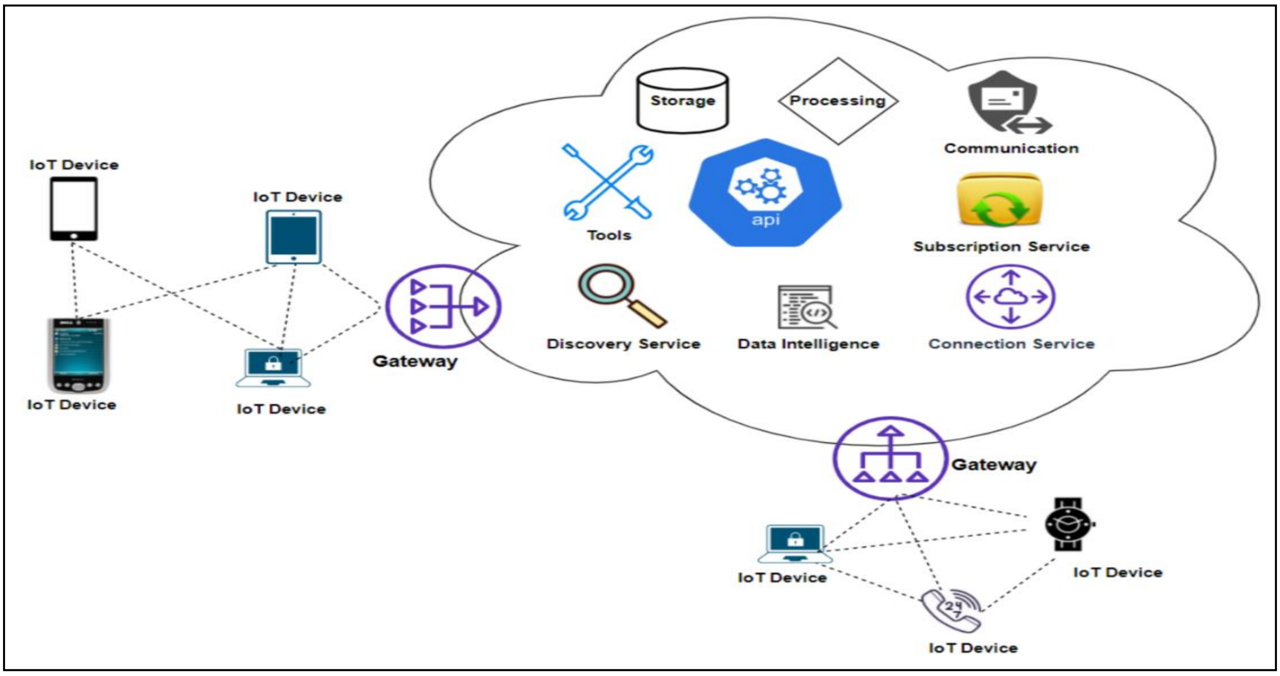


FIGURE: ARCHITECTURE AND DATA FLOW OF SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Example: Order processing during pandemics for offline mode

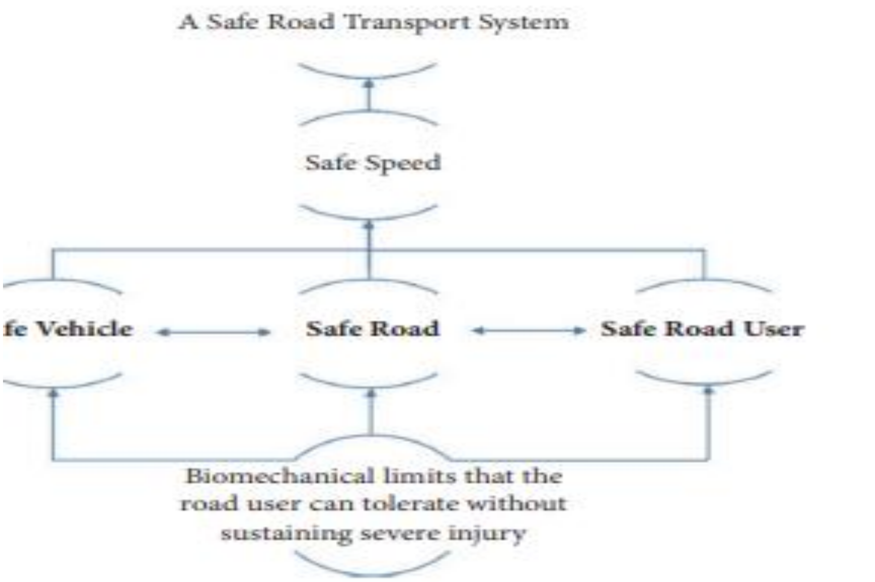


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
	User Interface	INTERACTIONS through Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
	Application Logic-1	Login with user password	Java / Python
	Application Logic-2	Login of dashboard	IBM Watson STT service
	Application Logic-3	Using the available template complete the project	IBM Watson Assistant
	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
	External API-2	Purpose of External API used in the application	Aadhar API, etc.
	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration.	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
	Open-Source Frameworks	Arduino, tinkercad,python	Technology of Opensouce
	Security Implementations	Encryption and decryptions	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
	Scalable Architecture	3 – tier, Micro-services	Technology used
	Availability	Use of load balancers, distributed servers,traffic signals etc.)	Technology used
	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used

5.3USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard		We can take templates and session of previous classes	I can access my dashboard	High	Sprint-1
Customer (Web user)	Organising skill	USN-1	By browsing about our title we become a good trainer in web using	I can access my account	Medium	Sprint-2
Customer Care Executive	Task	USN-2	It is professional responsible for communicating the how's and why's regarding service expectations within a company	We can get the ability to lead a team	High	Sprint-1
Administrator	Responsibilities	USN-3	Administrator supports the smooth running of customer service by carrying out clerical task & projects.	As a administrator we develop the agile development project	High	Sprint-1

CHAPTER 6

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Initialization of the resources	USN-1	Create and open some accounts like Open weather API etc..	2	Low	A.Rani praba G.Pargavi R.Abinaya A.Revathi
Sprint-1	Software used	USN-2	Write a Python program that outputs results given the inputs like weather and location.	1	High	A.Rani praba G.Pargavi R.Abinaya A.Revathi
Sprint-2	Push the server to cloud	USN-3	We use IBM cloud for project deployment	2	High	A.Rani praba G.Pargavi R.Abinaya A.Revathi
Sprint-3	Hardware -sensor	USN-4	To sense the obstacles or to measure the parameters we need	2	Medium	A.Rani praba G.Pargavi R.Abinaya A.Revathi
Sprint-3	Buzzer		It gives alarm when the vehicle's speed is above the limited speed	1	High	A.Rani praba G.Pargavi R.Abinaya A.Revathi
Sprint-4	Optimization and debugging	USN-5	Enhance the performance and provide better user experience		High	A.Rani praba G.Pargavi R.Abinaya A.Revathi

6.2 SPRINT DELIVERY SCHEDULE

Project Tracker, Velocity & Burndown Chart: (4 Marks)

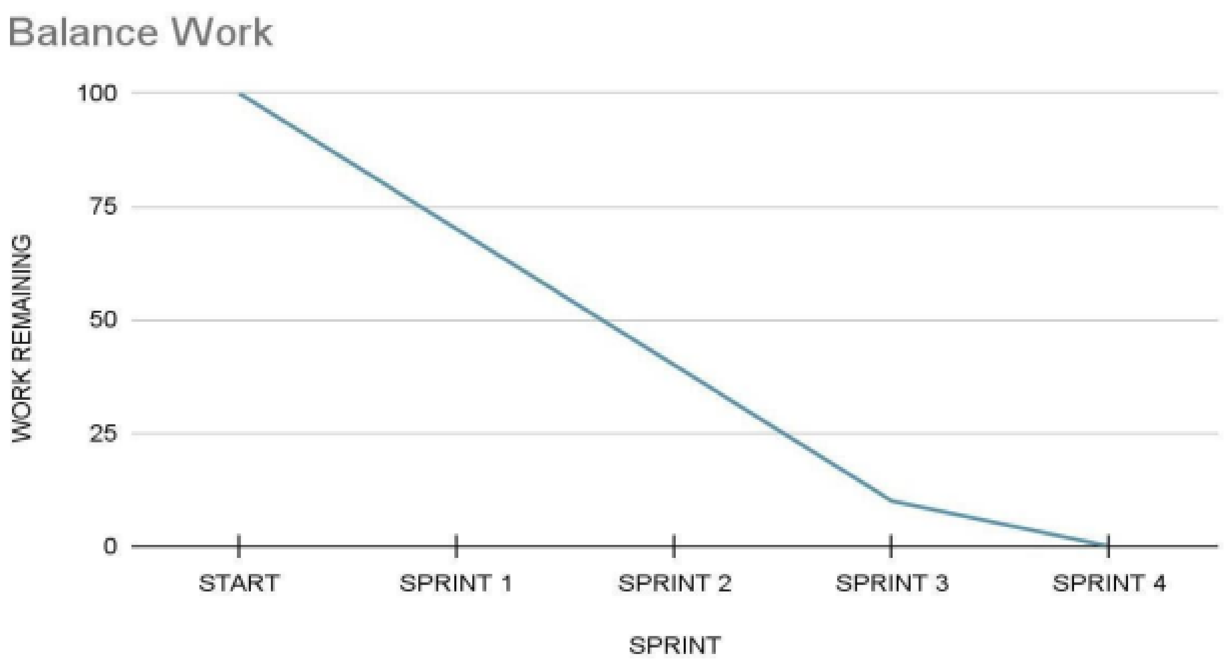
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:

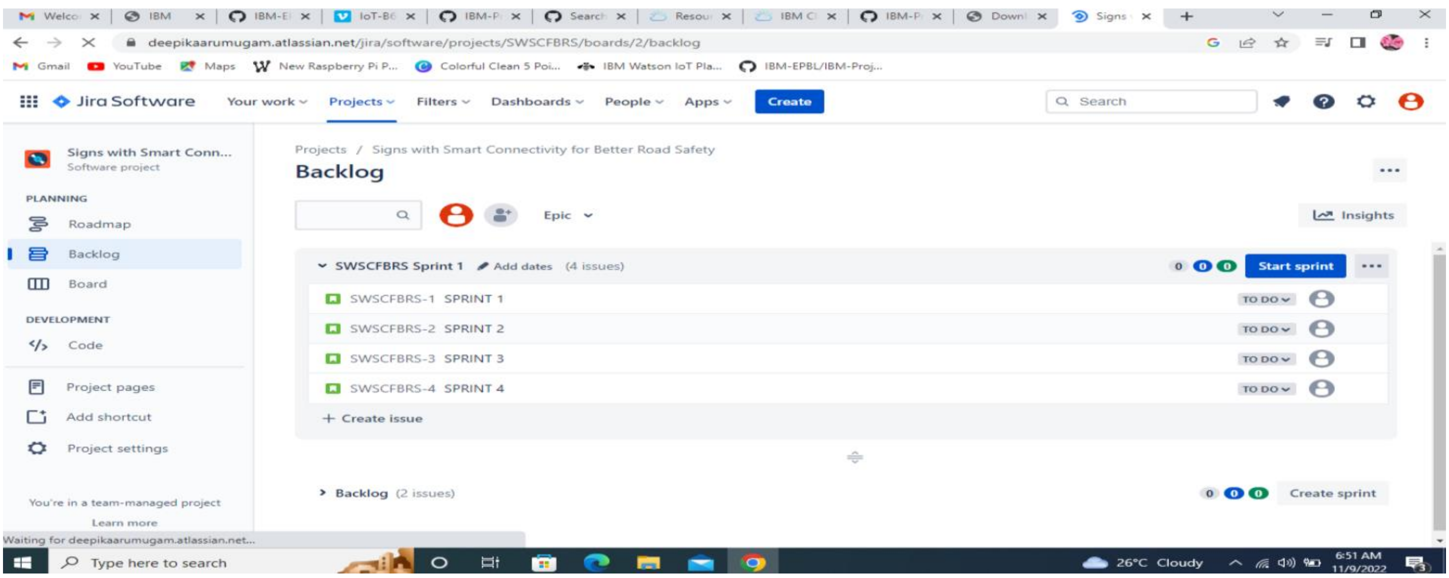
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:



6.3 REPORT FROM JIRA



CHAPTER 7

CHAPTER 7

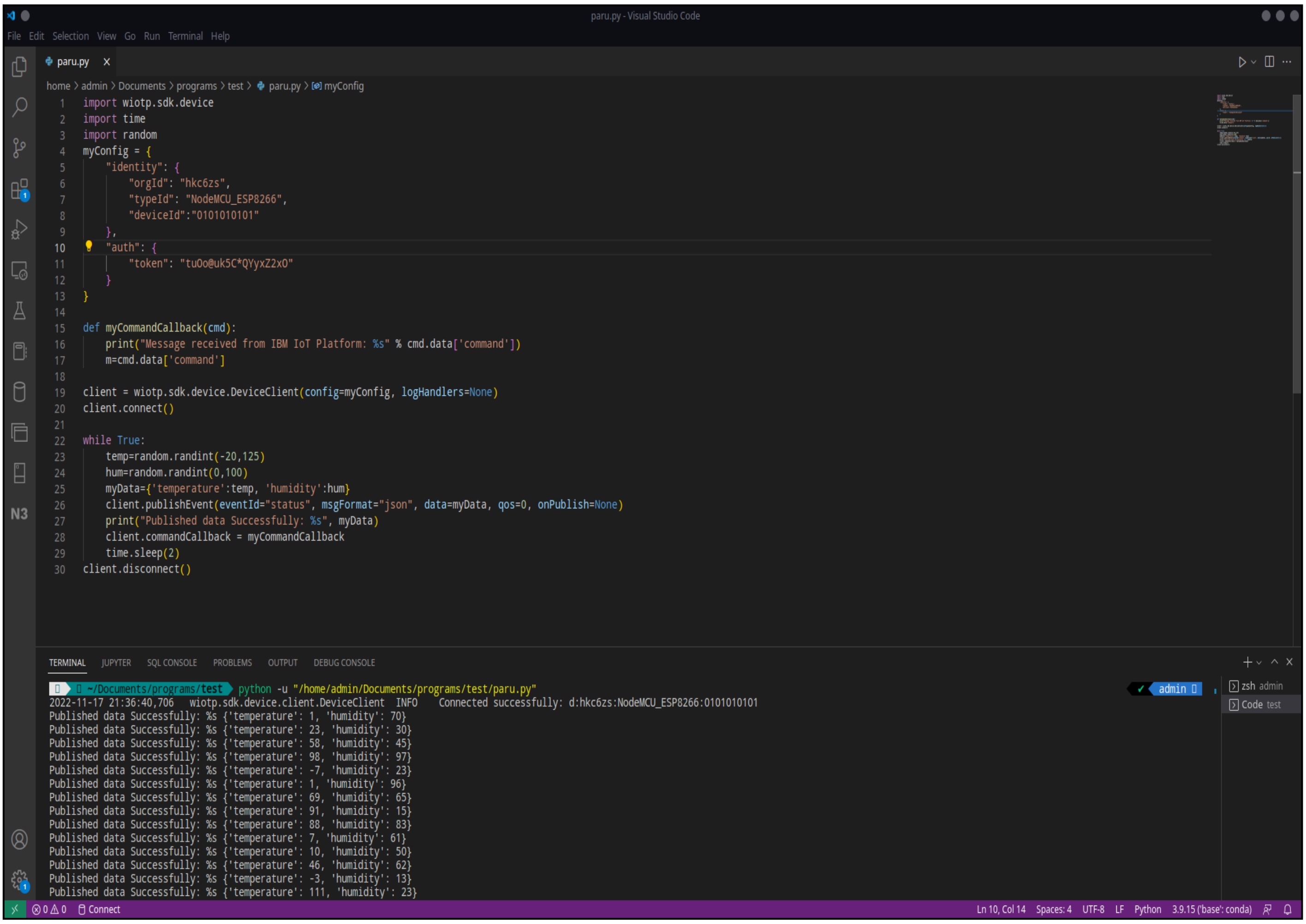
CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 FEATURE

```
import wiotp.sdk.device

import time

import random

myConfig = {

   "identity": {

      "orgId": "hkc6zs",

      "typeId": "NodeMCU_ESP8266",

      "deviceId":"0101010101"

   },

   "auth": {

      "token": "tuOo@uk5C*QYyxZ2xO"

   }

}


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()
```

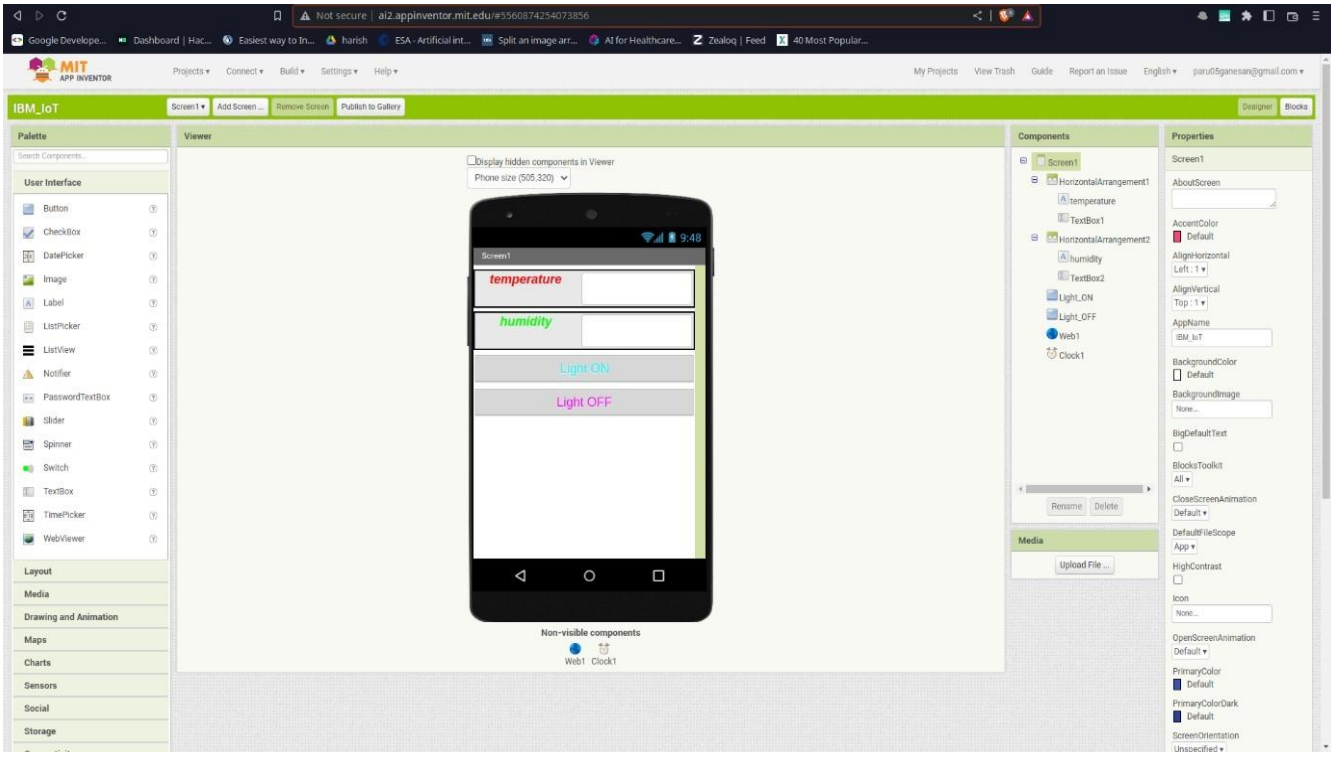
```
while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    myData={'temperature':temp, 'humidity':hum}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

7.2 FEATURE

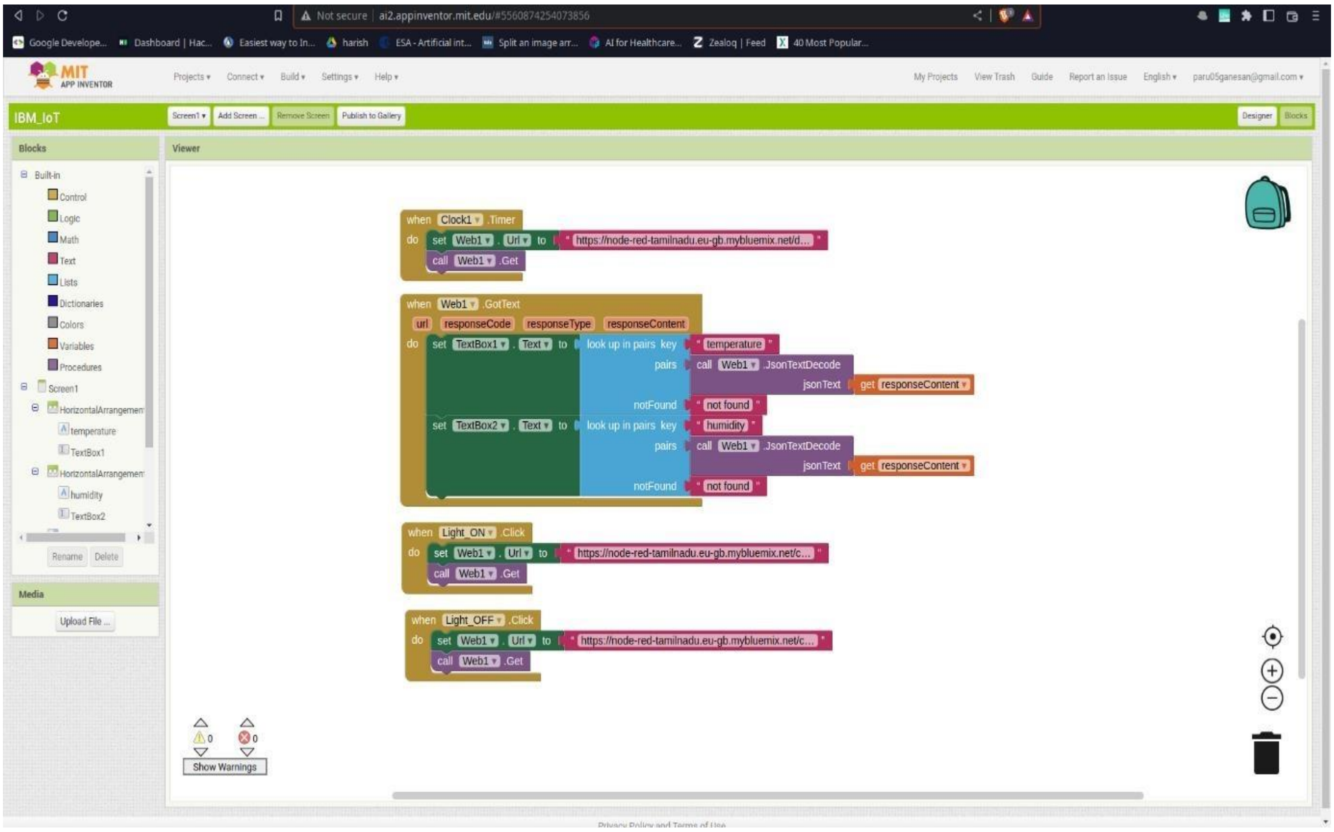


7.3 Database Schema (if Applicable)

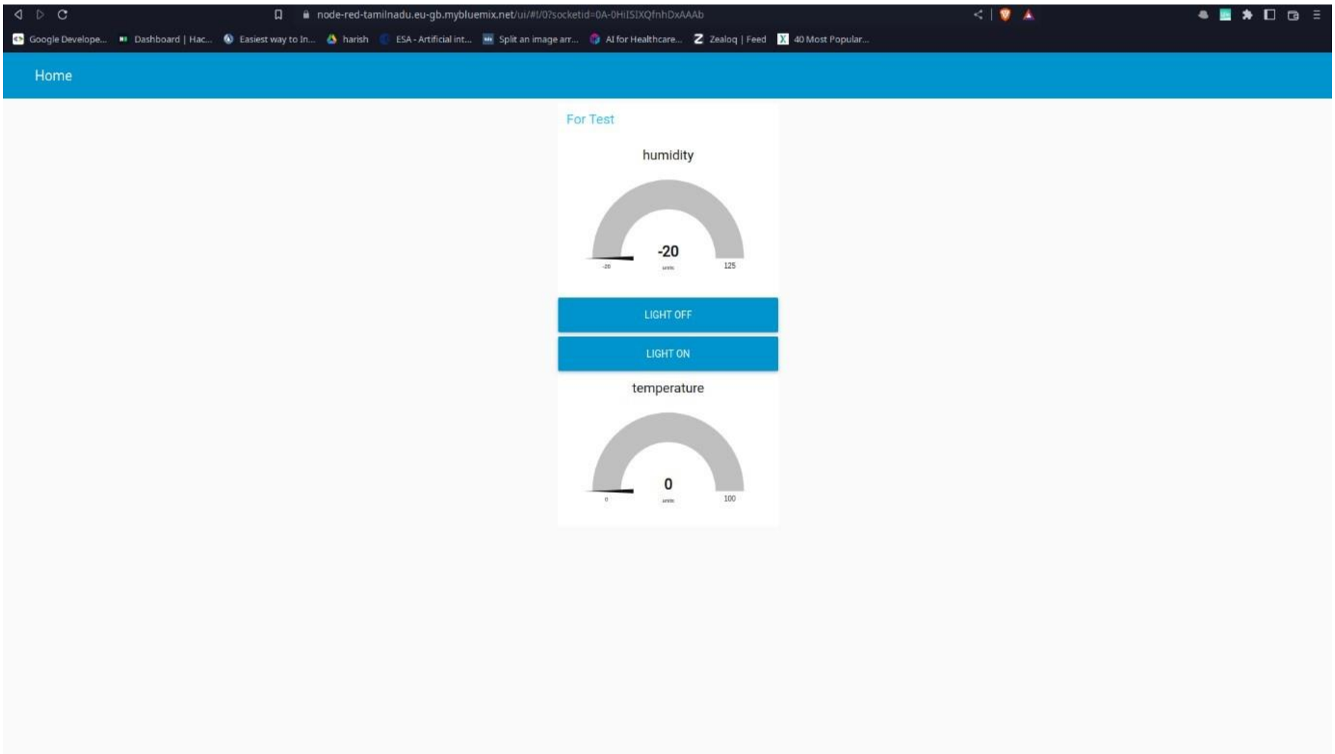
MIT App



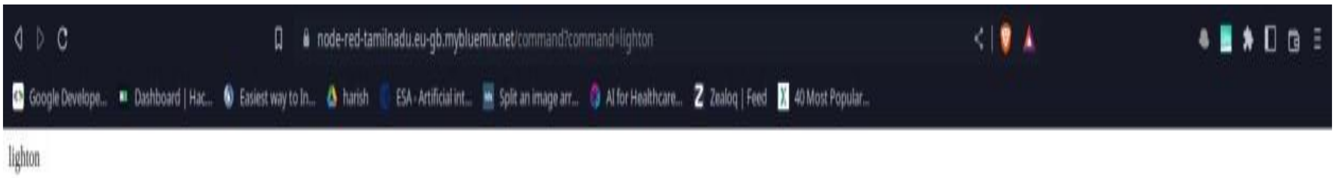
MIT App Code



Node Red UI



Node red command light ON



Node red command light OFF

CHAPTER 8

CHAPTER 8

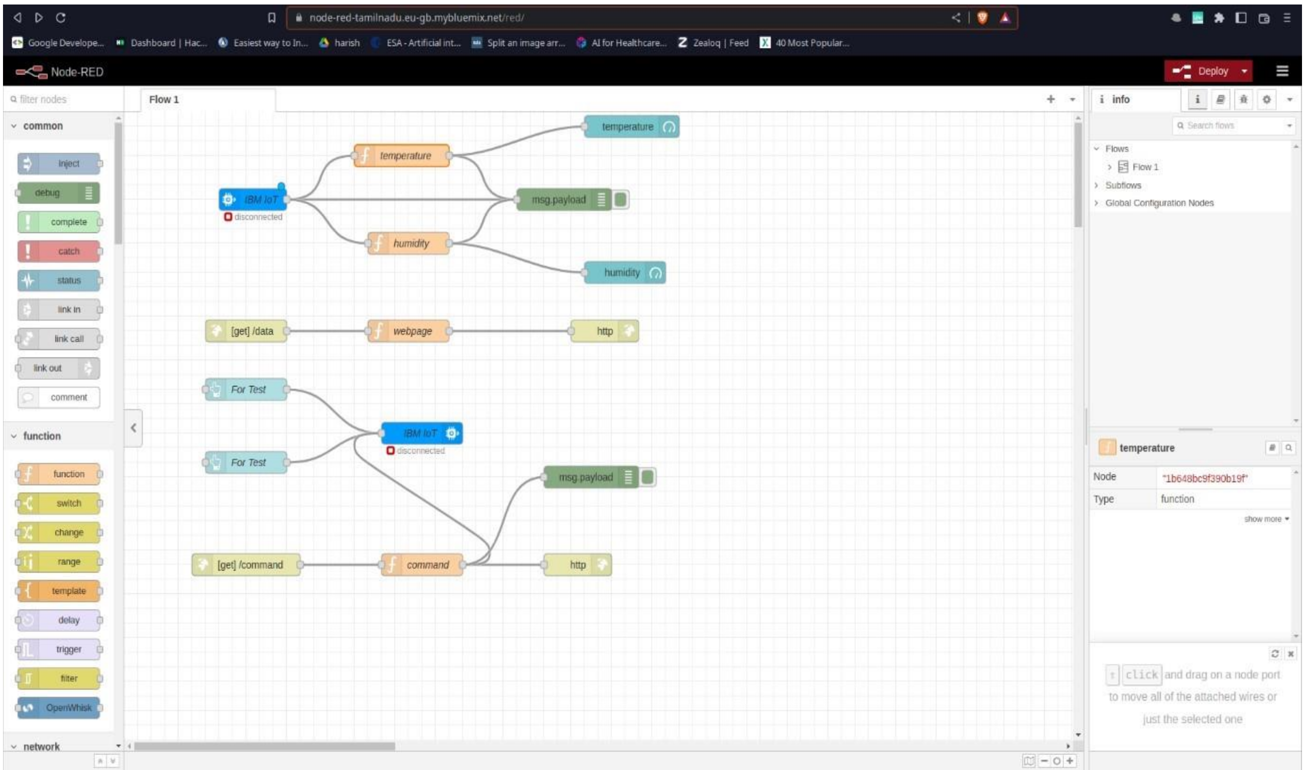
TESTING

8.1 Test Cases

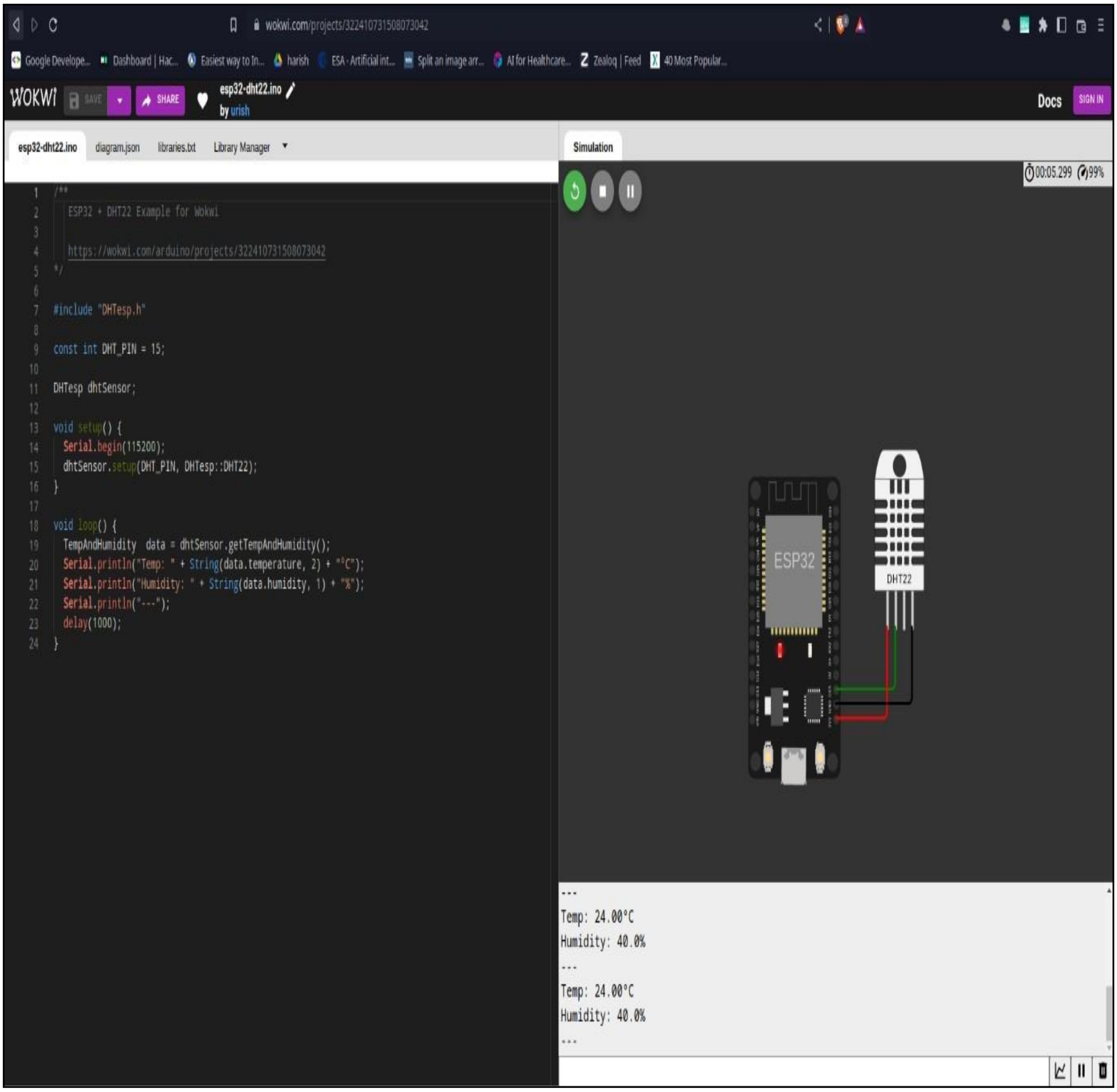
- **TEST CASE 1**
  Clear weather – Usual speed limit.
- **TEST CASE 2**
  Foggy weather – Reduced speed limit.
- **TEST CASE 3**
  Rainy weather – Further reduced speed limit.

Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

Nod Red Connection



Nodemcu ESP32 with DHT22 sensor in simulation



8.2 User Acceptances 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.

Acceptance Testing UAT Execution & Report Submission

SESSION	TOTAL CASES	UNTETED	FAIL	PASS
Print Engine	6	0	0	5
Client Application	32	0	0	21
Security	2	0	0	2
Outsource Shipping	2	0	1	0
Exception Reporting	4	0	0	4
Final Report Output	4	0	0	4
Version Control	2	0	0	2

Purpose of Document

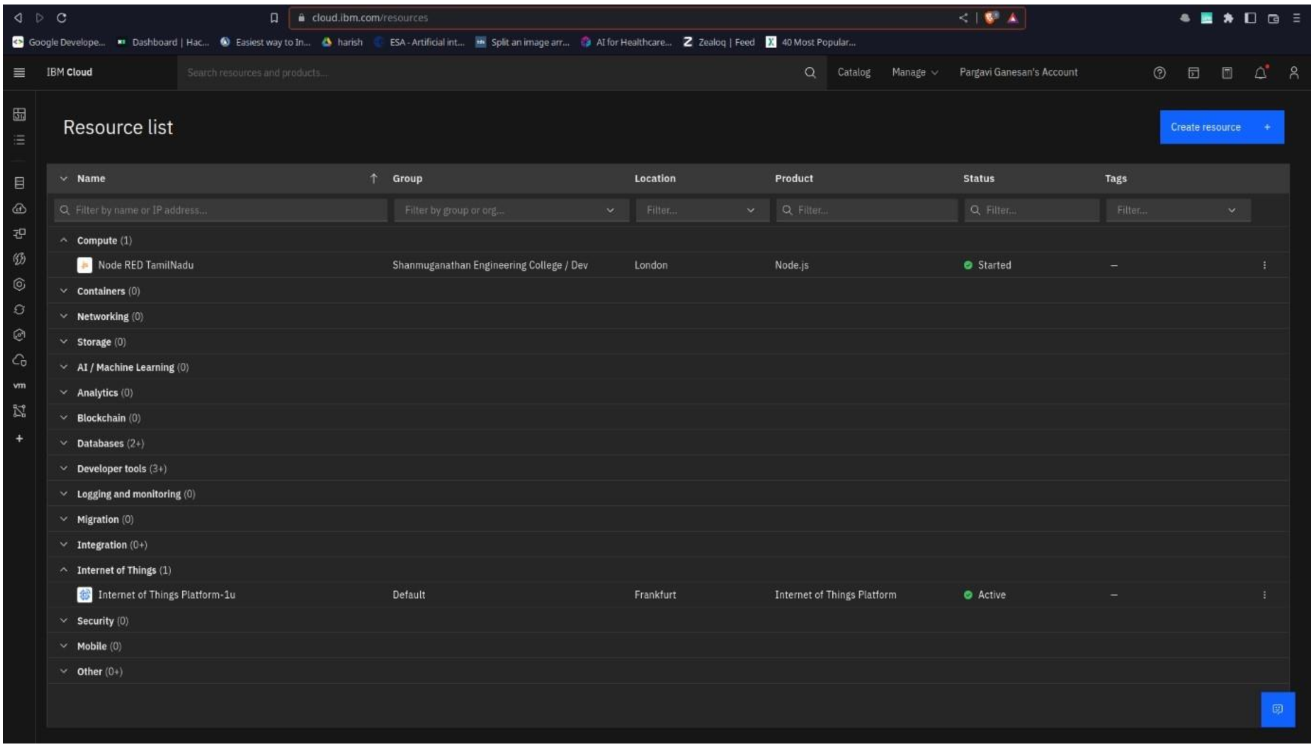
The purpose of this document is to briefly explain the test coverage and open issues of the [Product Name] project at the time of the release to User Acceptance Testing (UAT).

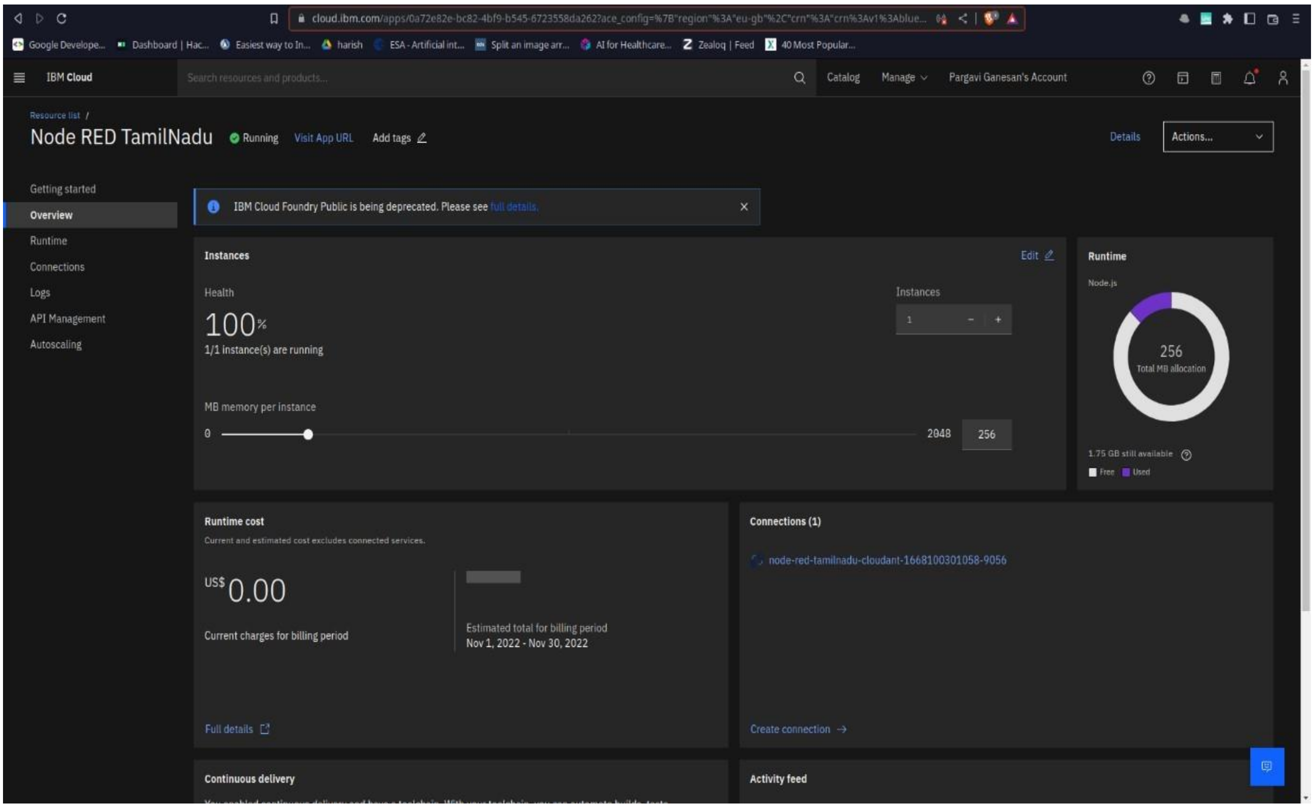
CHAPTER 9

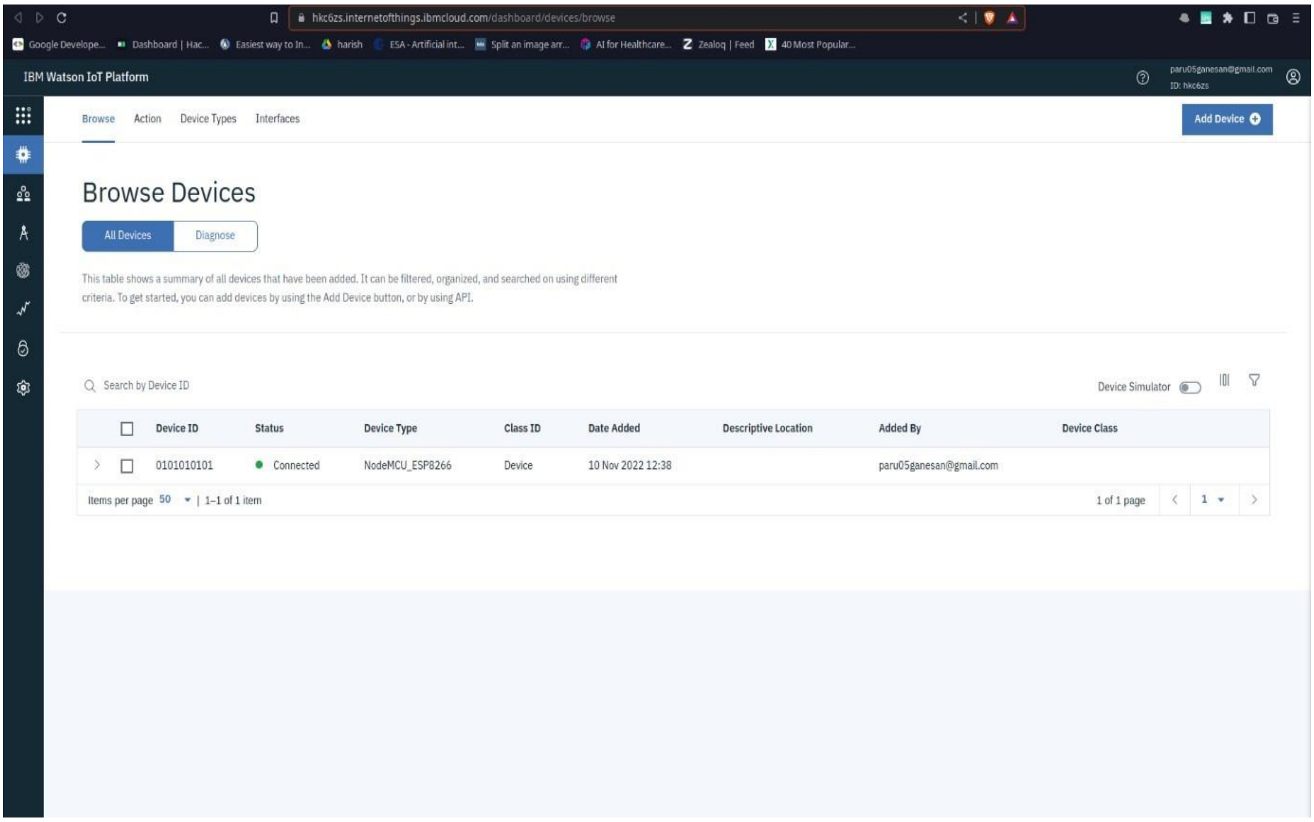
CHAPTER 9

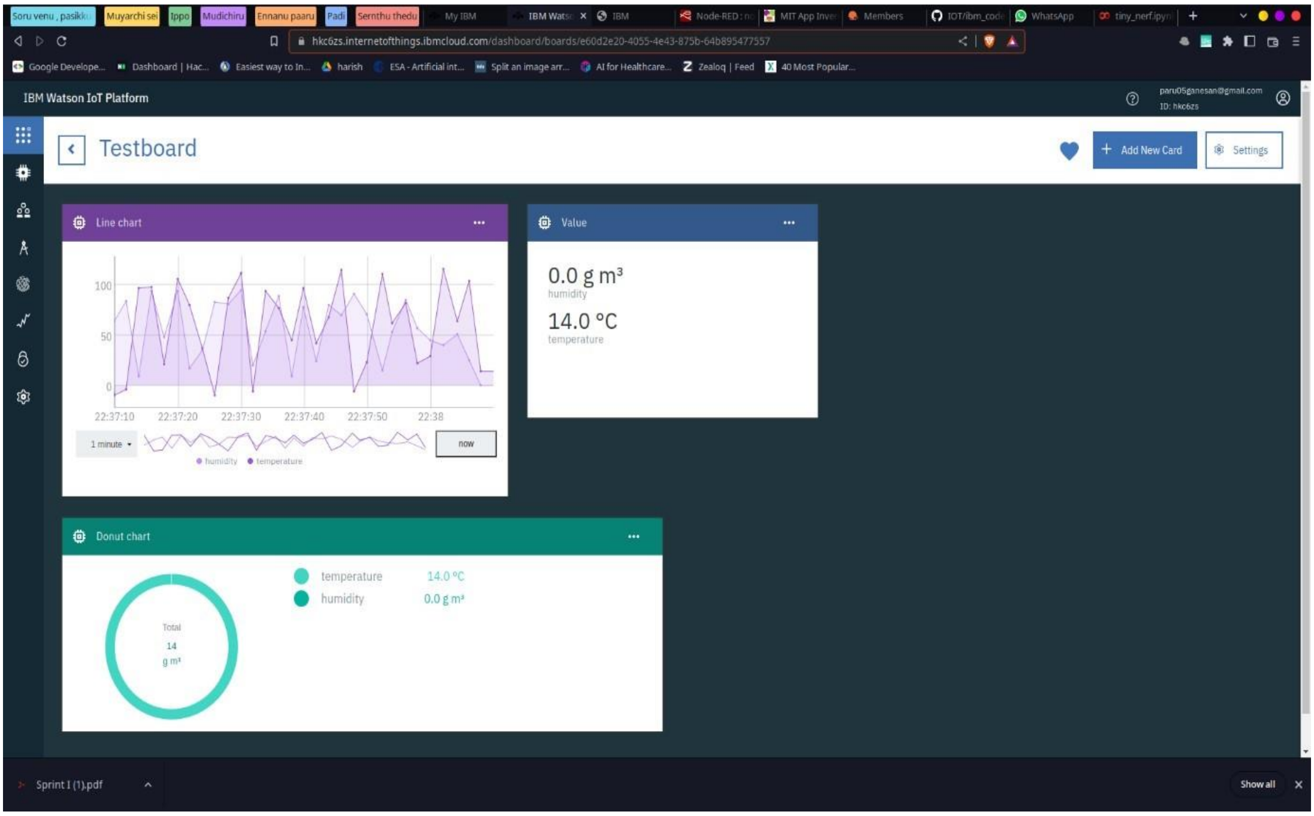
RESULT

9.1 Performance Metrics






IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Browse Devices
All Devices
Diagnose
This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
Added By
Device Class
0101010101
Connected
NodeMCU_ESP8266
Device
10 Nov 2022 12:38
paru05ganesan@gmail.com
Items per page 50
1–1 of 1 item
1 of 1 page


IBM Watson IoT Platform
Testboard
Add New Card
Settings
Line chart
Value
0.0 g m³
humidity
14.0 °C
temperature
Donut chart
temperature
14.0 °C
humidity
0.0 g m³
Total
14
g m³

CHAPTER 10

CHAPTER 10

ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- Ensuring safe driving experience with real-time assistance, navigation, and even monitoring driving patterns and any emergency situation. Additionally, along with the state of the traffic, IoT drivers can receive updated information on the state of the roads, i.e., potholes, ice, grade changes, black spots, etc.
- IoT based system model is to collect, process, and store real-time traffic data for such a scenario. The objective is to provide real-time traffic updates on traffic congestion and unusual traffic incidents through roadside message units and thereby improve mobility.
- It can assist in the smarter control of homes and cities via mobile phones. It enhances security and offers personal protection.
- By automating activities, it saves us a lot of time.
- Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real time.
- Electric Devices are directly connected and communicate with a controller computer, such as a cell phone, resulting in efficient electricity use. As a result, there will be no unnecessary use of electricity equipment.
- Personal assistance can be provided by IoT apps, which can alert you to your regular plans.

DISADVANTAGES:

- Keeping the data gathered and transmitted by IoT devices safe is challenging, as they evolve and expand in use. ...
- Technical complexity. ...
- Connectivity and power dependence. ...
- Integration. ...
- Higher costs
- Hackers may gain access to the system and steal personal information. Since we add so many devices to the internet, there is a risk that our information as it can be misused.
- They rely heavily on the internet and are unable to function effectively without it.
- With the complexity of systems, there are many ways for them to fail.
- We lose control of our lives—our lives will be fully controlled and reliant on technology.
- Overuse of the Internet and technology makes people unintelligent because they rely on smart devices instead of doing physical work, causing them to become lazy.

CHAPTER 11

CHAPTER 11

CONCLUSION

This work illustrates the viability of an economic road safety monitoring and assessment solution through exploiting advances in the Internet of Things (IoT) within the context of smart cities. The introduced architecture facilitates robust and dynamic road safety assessment that complements the Safe System

approach motivated by the World Health Organization (WHO), which has been increasingly adopted worldwide. An application of the dynamic assessment framework for route planning is also demonstrated.

Future work involves exploring further applications, especially in the context of raising driver awareness of the road safety conditions during their trips.

The future of the transport industry looks pretty optimistic with digital traffic solutions. Therefore, we advise you to take advantage of the already apparent technological and organizational breakthroughs.

Relevant Software specializes in solving business problems using software solutions, including IoT for transportation projects. So, if you want to hire IoT developers to create a custom-made IoT app or improve an existing one.

CHAPTER 12

CHAPTER 12

FUTURE SCOPEs

Pilot-1: Improving driving behaviour using AI to detect drowsiness and track driving behaviour to incentivize by rewarding good driving scores.

Pilot-2: Improving School Zones by training children and creating social awareness through children.

Pilot-3: Improving enforcement system by detecting traffic violations using IoT, AI, cameras and automated penalty tickets on PPP model.

Pilot-4: Improving emergency service availability within golden hours using IoT, AI, QR codes for emergency help services and alerting before blackspot.

CHAPTER 13

CHAPTER 13

APPENDIX

DEMO LINK:

https://drive.google.com/file/d/1SPYf4jD1FNi7z9KefhpWxT4qtY44EWjK/view?usp=drivesdk

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-6477-1658829887