PROJECT REPORT FORMAT

1.INTRODUCTION

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

Despite the presence of road signs on most Tanzanian highways, currently there is no information and communication technology (ICT)-based system in place to alert drivers in advance and real time about the location of those road signs. As a result, drivers encounter road signs at a short distance, making them unable to take the necessary precautions in time. This could lead them to apply the brakes abruptly, an action that may cause an accident. Advanced driver assistance systems (ADASs) improve road safety by informing drivers about upcoming road conditions such as curves, bumps, speed humps, pedestrian crossings, and speed limits. To be effective, the alerts must be given at the farthest possible distance so that the driver has enough time to decide timely.

1.1 Project Overview

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

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.

1.2 Purpose

To improve vehicle safety by providing real-time trafficinformationto the driver. Roadsigns 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.

A system for alerting drivers about road signs has been developed and tested using a smart mobile phone. The application provides amessage alert to a needed action that enhances driver's attention.

To develop a system that uses a smartphone to notify drivers about road signs ahead. The development of the smartphone application was motivated by the fact that smartphones are widely used nowadays.

2. LITERATURE SURVEY

Cyberabad Traffic Police (2017) Data from the official website about Nehru Outer Ring Road:

It reveals some guidelines like, the maximum speed on Lane 1 and Lane 2 of theORR will be 120 KM per hour and minimum speed will be 80 KM per hour. (Lane1 is the one closest to the central median) The maximum speed on Lane 3 and Lane 4 of the ORR will be 80 KM per hour and minimum speed will be 40 KM per hour. The minimum speedon ORR will be 40 KM per hour. No vehicle is permitted to travel on ORR below this speed. Fastermoving vehicles shouldmove in Right Lanes (Lane1 and 2) and slow-moving vehicles should move in Left lanes (Lane 3 and 4) within the above speed ranges. Heavy vehicles should move in Lane 3 or Lane4 only. All vehicles which change their speed shall have to go to the lane having the concerned speed range and No Zig – Zagmovement between the lanes is permitted. All vehicles wanting to change lanes as per the above speeds should do so only after using indicator lights and all precautions shall be taken while changing lanes. No Vehicle shall stop on any of the 4 lanes of ORR.ZarulazhamEusofe et al. Assessmentof Road Safety Management at Institutional Level in Malaysia, IATSS Research This paper had examined the current institutional arrangements for the management of road safety in Malaysia in a systematic manner. It focused on road safety funding and seemed to provide an insight into how funding factors may affect both the effectiveness and the efficiency or road safety management. The study followed an exploratory approach based on semistructured interviews targeting key stakeholders in road safety management such as policy makers from various government agencies, private sector representatives and academia. The analysis revealed that the efficiency and effectiveness of the road safety management system in Malaysia may be sustainably improved by addressing the current dependence of funding solely on government sources, the fragmentation of the decision-making process of this de facto multi-disciplinary area, the road safety legislative framework,

public awareness, local needs and institutional capacity. An institutional model based on 2nd generation road funds is tentative suggested to this effect. The paper presented a systematic analysis for the assessment of road safety management applicable in countries where financial resources are limited or reduced, focusing on road safety funding and seeking to provide an insight into how appropriately designed funding mechanisms may affect both the effectiveness and the efficiency of road safety management.

Francis John Gichagaetal. Road Safety and Road Safety Audit in India:

A Review. ISSN:2347 - 4718 This paperhad reviewed the concept of the roadsafety audit and its stages. Objective of the RSA is to evaluate ventures for potential mishaps end/lessening on the premise of road client learning, characteristics and aptitudes, day/night, wet/dry road conditions. It suggested on outline and before planning of agreement archives, to evaluate itemized intersection design, markings, signs, signals, lighting points of interest, Detail Design of junctions, Design of geometrics, Cross-fall Marking and Signs, Side drains, Embankment slopes, Presence of clear zone, Traffic Signals Lighting.

Shalini Kanugantietal. Road Safety Analysis Using Multi Criteria Approach, A Case Study in India:

World Conference on Transport Research - WCTR 2016 Shanghai. 10-15 July 2016 In this paper a study was carried out to determine the priority of safety requirements of a certain category of rural roads, viz., Pradhan Mantri Gram Sadak Yojana(PMGSY) roads in the Jhunjhunu district of Rajasthan, India. Multi-criteria techniques were used to quantify the safety levels. Further analysis was done on the road having the worst safety features to rank various stretches. The parameters vital for safety have been selected and quantified using three multi- criteria decision making analysis tools: Simple AdditiveWeightage (SAW), Analytical Hierarchy Process (AHP) and Fuzzy AHP methods andresults are compared. Analysis has been done in two phases. In the first phase the prioritization of roads for safety provision was carried out considering the total length of each road as an alternative and the most critical road was identified. The parameters in theroad were measured and rated (on a scale of 1-5). In the second phase, the road found critical from the first phase was considered for detail analysis. The entire stretch of the road was divided into stretches of 1 km and the stretch-wise prioritization of roads for safety provision was determined. The average values per km for the severity score of the parameters were obtained like the first phase. The methodology suggested can be used to determine the level of contribution of parameters towardssafety hazard.

2.1 Existing problem

The main problems of the existing Signs with Smart Connectivity for better Road Safety System are as follows:

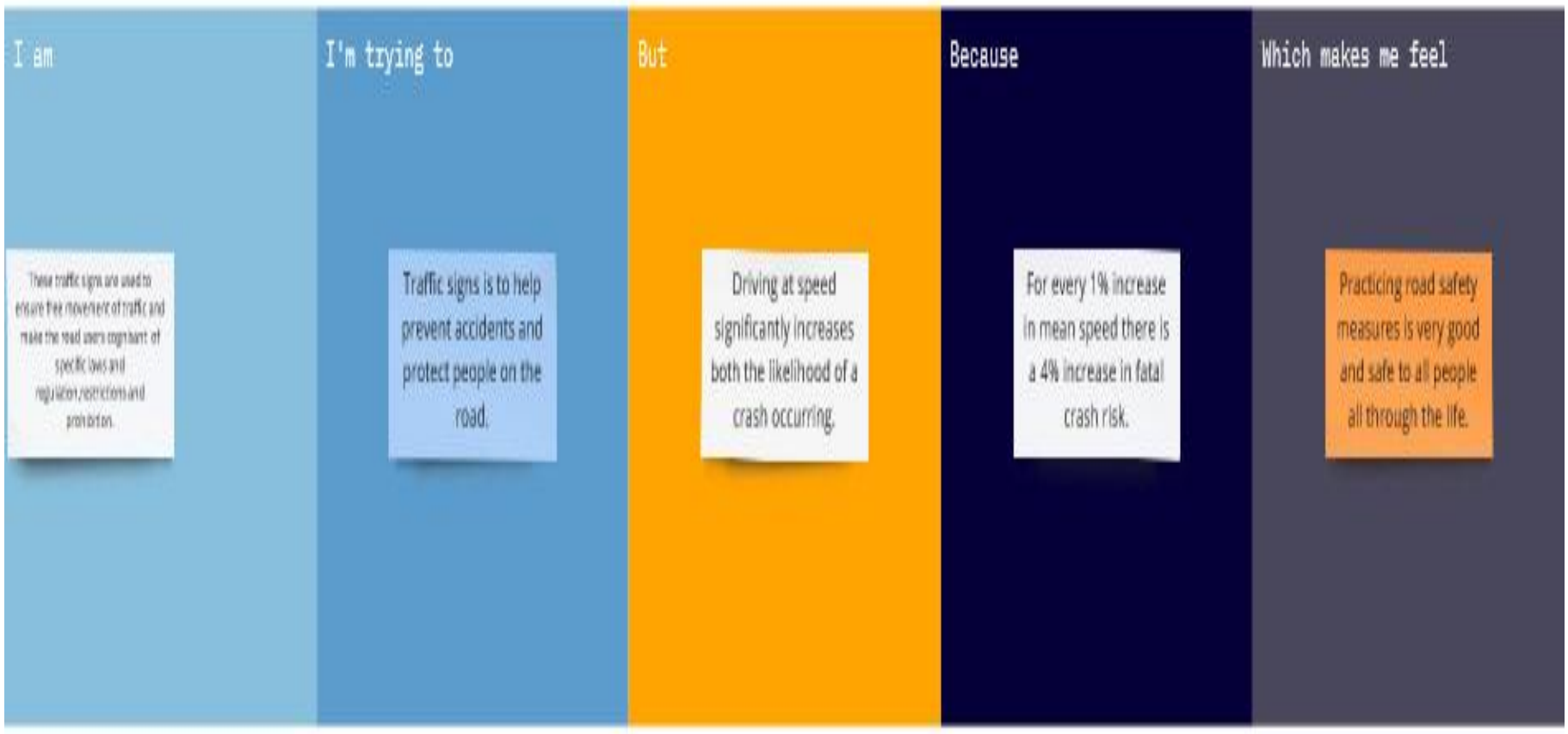
- **Increased Cost Efficiency**
- **Combating Poor Visibility**

2.2 References

- ✓ **Cyberabad Traffic Police (2017)**
- ✓ **Francis John Gichaga, The Impact of Road Improvements on Road Safety and Related Characteristics. IATSS Research(2016), University of Nairobi, Kenya**
- ✓ **Shalini Kanugantietal. Road Safety Analysis Using Multi Criteria Approach: A Case Study in India. World Conference on Transport Research- WCTR 2016 Shanghai. 10-15 July 2016**

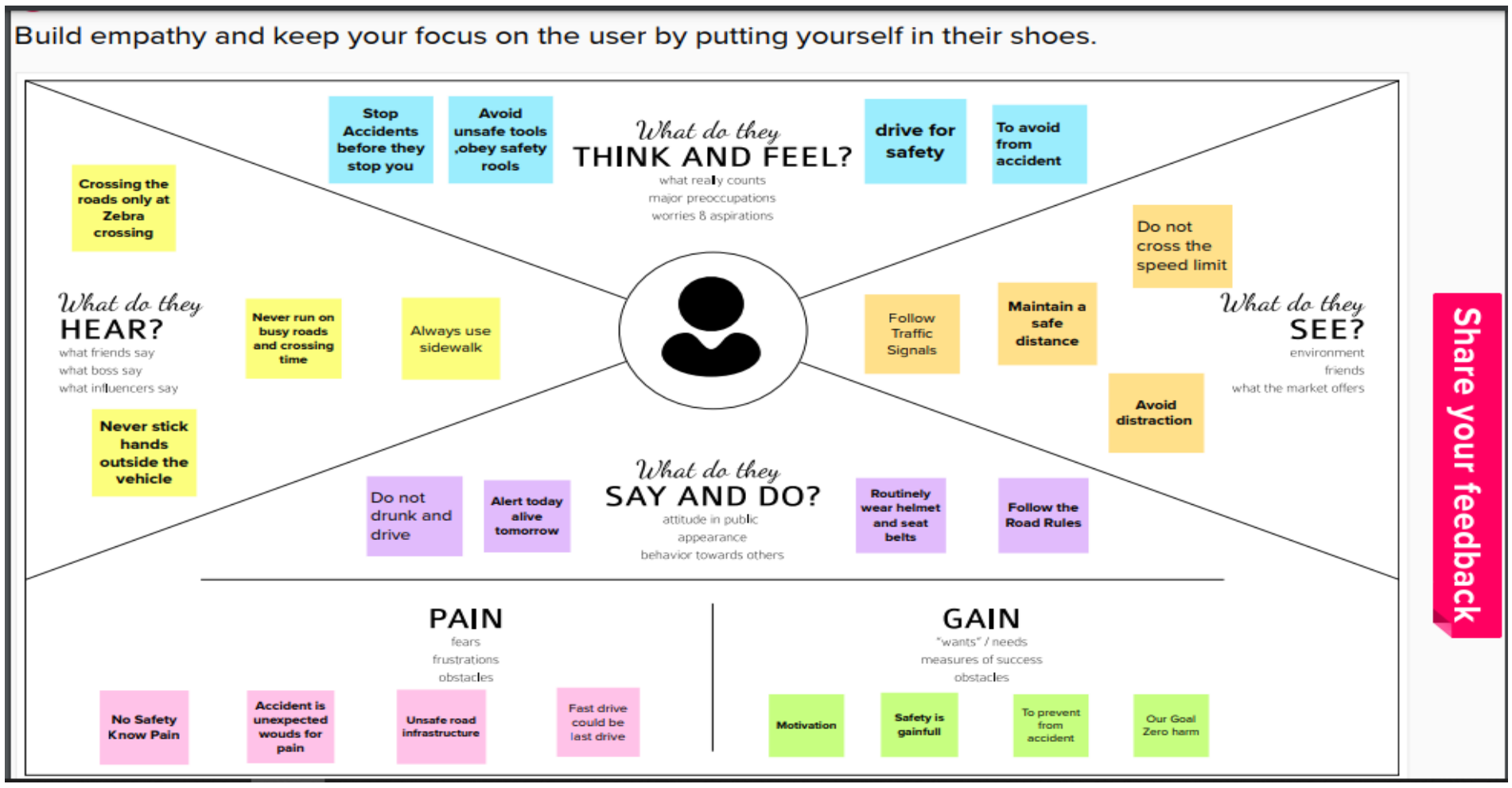
2.3 Problem Statement Definition

Problem statement include the Accidents free techniques,Reducing the chances of the drivers coliding with other Pedestrians or cyclists,Signs provides information and warnings about hazards or threats which are essential to safety,thus it assists in avoiding accidents.

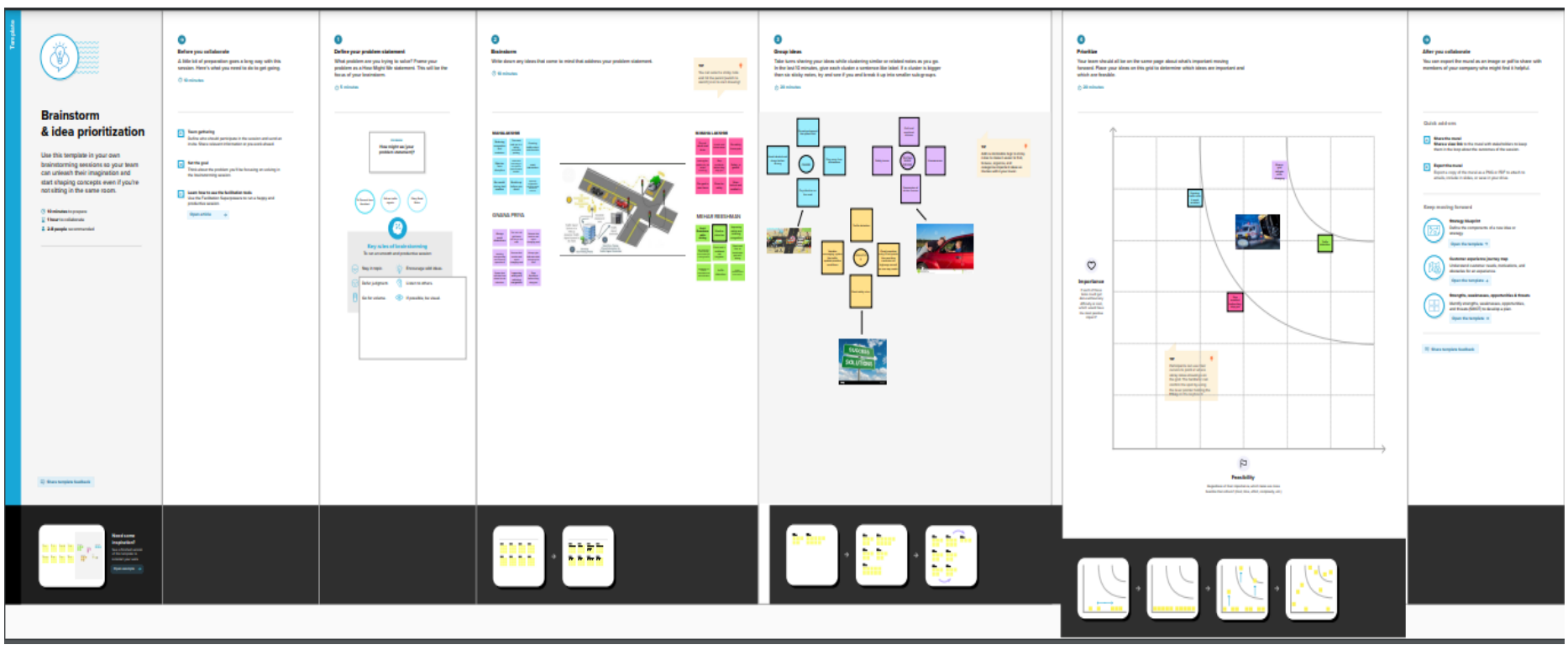


3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



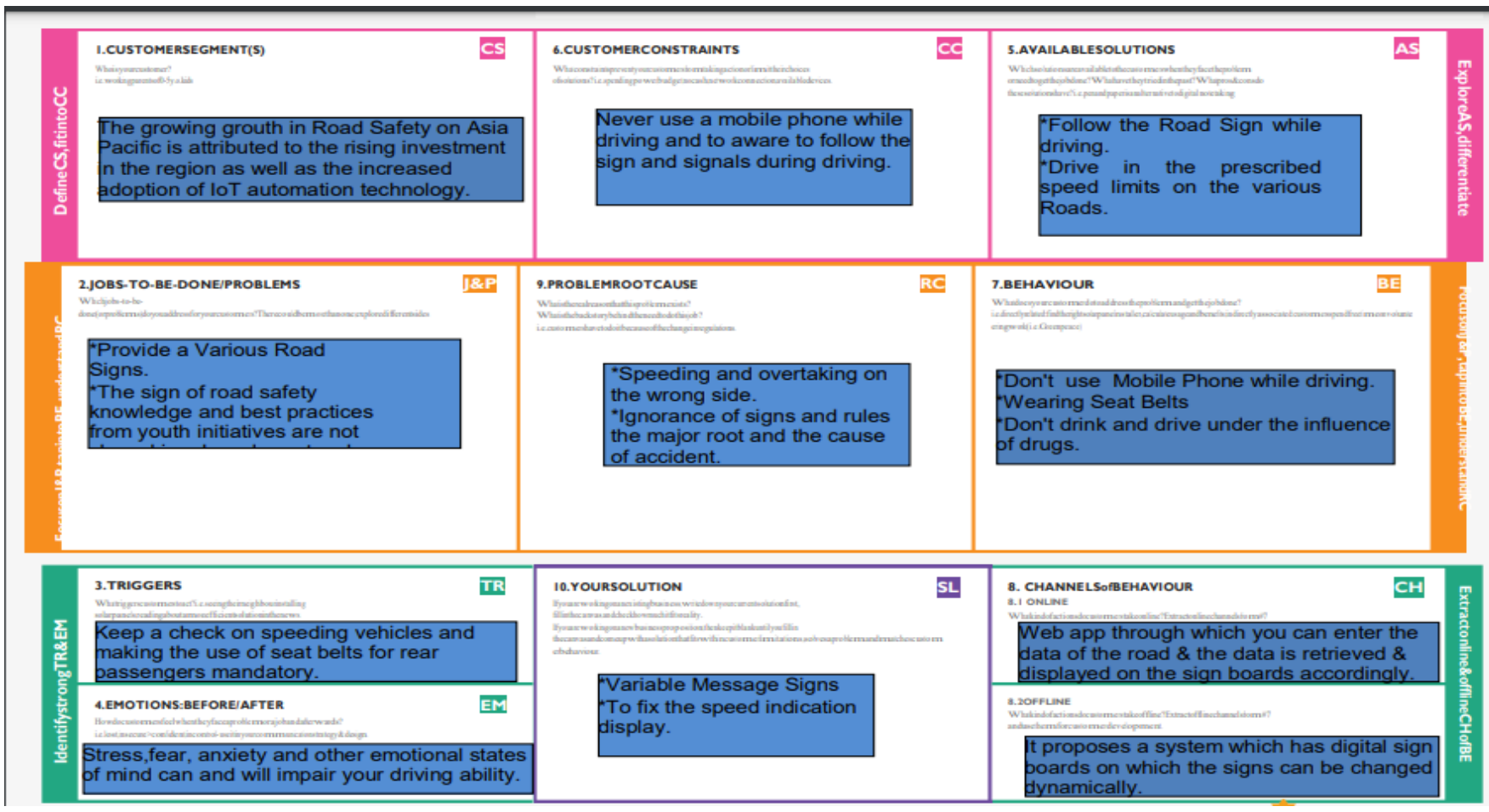
3.2 Ideation & Brainstorming



3.3 Proposed Solution

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	A lack of resources for youth road safety programmes.
2.	Idea/Solution description	Variable Message Signs, To fix the Speed Indication display.
3.	Novelty/Uniqueness	To Advanced the education of the public concern of sign of road safety
4.	Social Impact/Customer Satisfaction	People loss their life, The rapid introduction and use of new vehicles with the latest safety technology.
5.	Business Model	To reduce road deaths and injuries by supporting and encouraging partnerships between the monitor industry and related companies.
6.	Scalability of the Solution	Provide signal road marking sign post., Strict enforcement of speed limit. Oneway traffic should be implemented.

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through e-mail id & Mobile Number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Web Application	Node -Red-Service
FR-4	Configure to Device	IBM Watson IoT Platform
FR-5	Database	RRI & Road Database
FR-6	Python Script	IBM IoT Platform

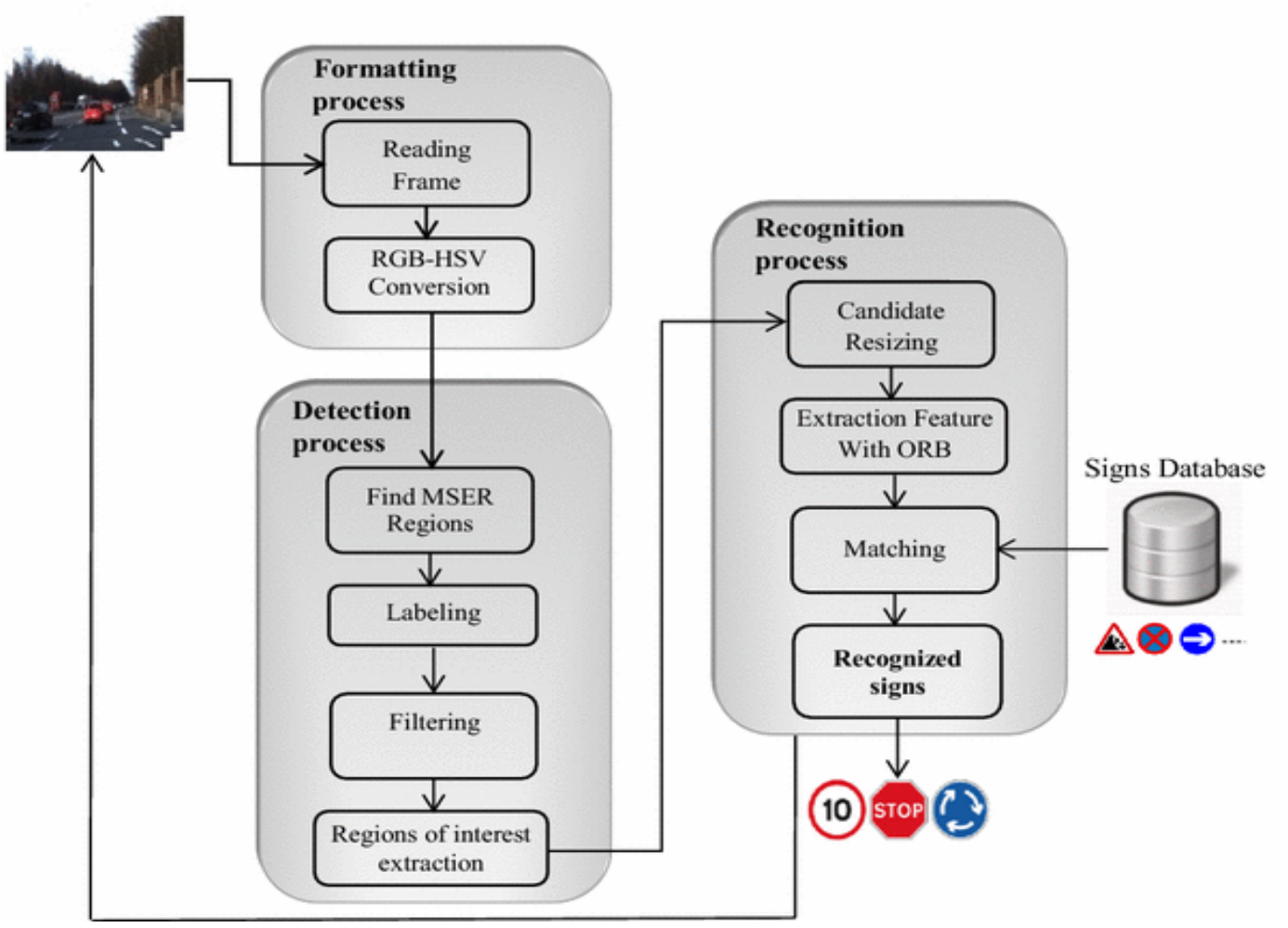
4.2 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	To help the People to prevent from accident
NFR-2	Security	Information sends the Traffic Control Department
NFR-3	Reliability	More Consistency and Dependability
NFR-4	Performance	Provide Safety and Prevent from accident
NFR-5	Availability	Available in Radar sensor, Lidar gun, Geofence
NFR-6 S	Scalability	To exceed future demand

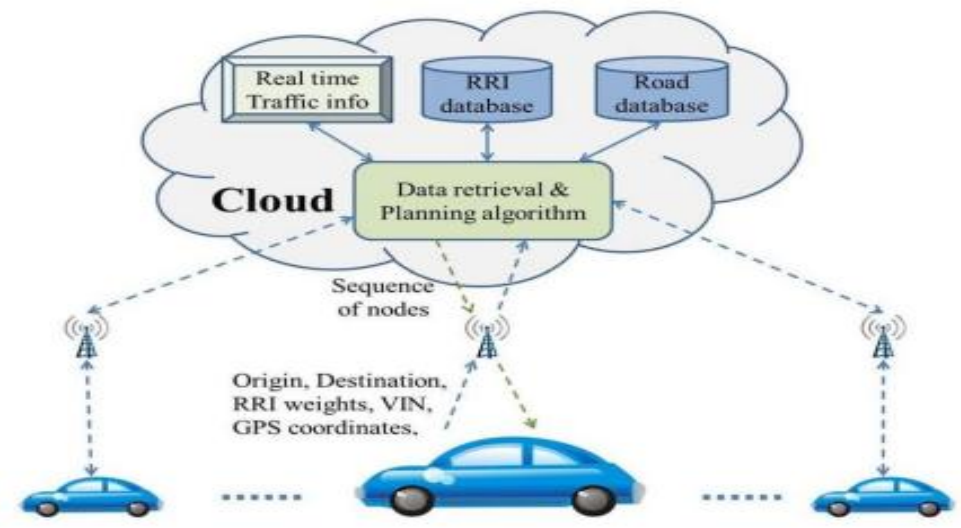
5. PROJECT DESIGN

5.1 Data Flow Diagrams

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



5.2 Solution & Technical Architecture



5.3 User 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 Gmail	I can register my account through Gmail	Low	Sprint-2
	Login	USN-4	As a user, I can register for the application by entering Gmail & password	I can reach the dashboard	Medium	Sprint-1
		USN-5	As a user, I need to clear my queries regarding the problems	I have option to ask my queries	High	Sprint-1
	Dashboard					

6. PROJECT PLANNING & SCHEDULING

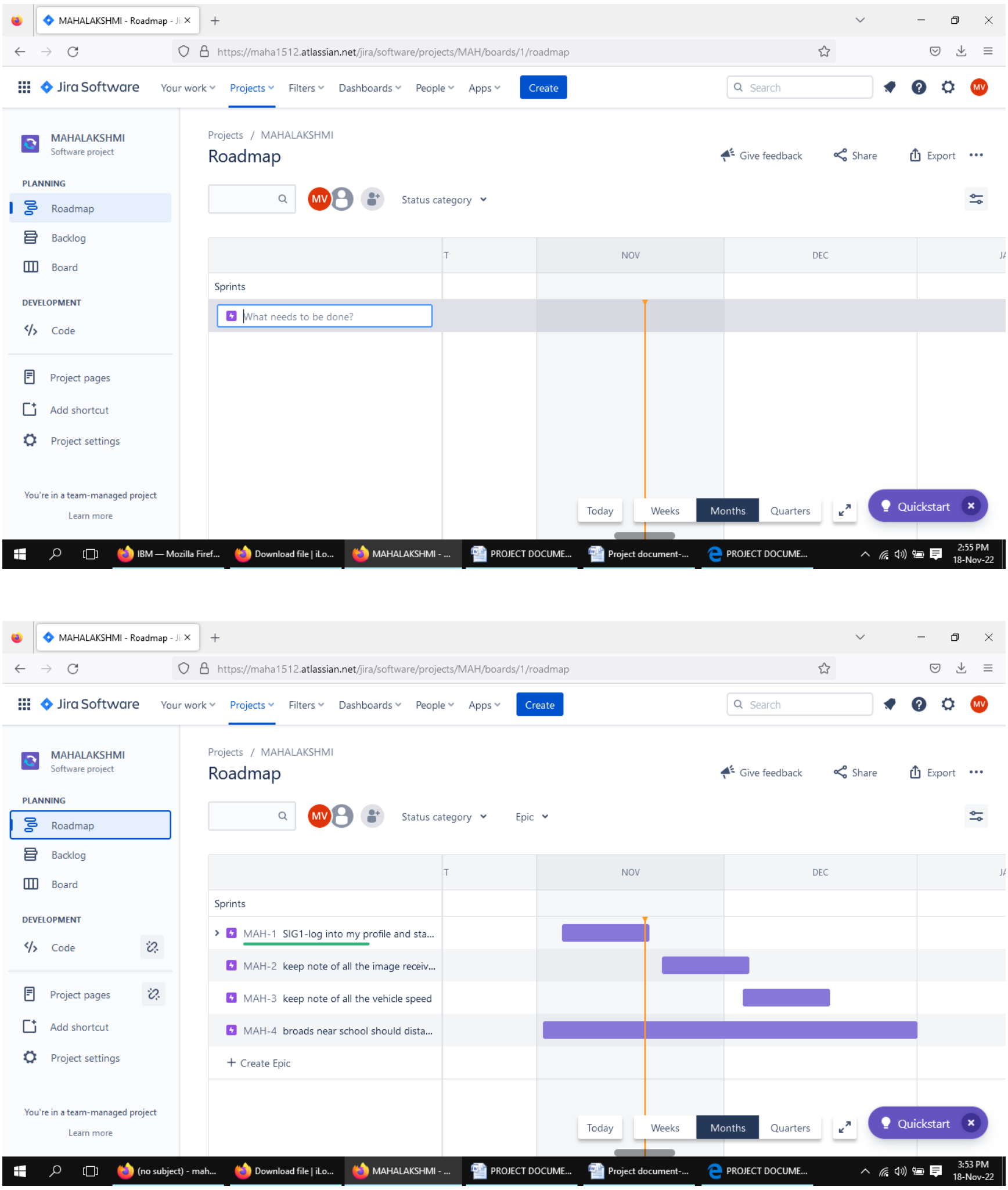
6.1 Sprint Planning & Estimation

	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Resources Initialization, Local Server/Software Run	USN-1	Create and initialize accounts in various public APIs like Open Weather Map API. Write a python program that outputs results given the inputs like weather and location	20	MEDIUM	S. Gnana Priya
Sprint-2	Push the Server/Software to cloud	USN-2	Push the code from Sprint 1 to cloud so it can be accessed from anywhere	20	MEDIUM	V. Mahalakshmi
Sprint-3	Hardware Initialization	USN-3	Integrate the hardware to be able to access the cloud functions and provide inputs to the same.	20	HIGH	S. Mehar Reeshman
Sprint-4	UI/UX Optimization & Debugging	USN-4	Optimization all the shortcomings and provide better user experience.	20	LOW	M. Maha Lakshmi

6.2 Sprint Delivery Schedule

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

6.3 Reports from JIRA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https://maha1512.atlassian.net/jira/software/projects/MAH/boards/1/roadmap
Jira Software
Your work
Projects
Filters
Dashboards
People
Apps
Create
Search
MAHALAKSHMI
Software project
PLANNING
Roadmap
Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
Learn more
Projects / MAHALAKSHMI
Roadmap
Give feedback
Share
Export
Status category
Epic
NOV
DEC
Sprints
What needs to be done?
MAH-1 SIG1-log into my profile and sta...
MAH-2 keep note of all the image receiv...
MAH-3 keep note of all the vehicle speed
MAH-4 broads near school should dista...
Create Epic
Today
Weeks
Months
Quarters
Quickstart
IBM — Mozilla Firef...
Download file | iLo...
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PROJECT DOCUME...
Project document-...
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2:55 PM
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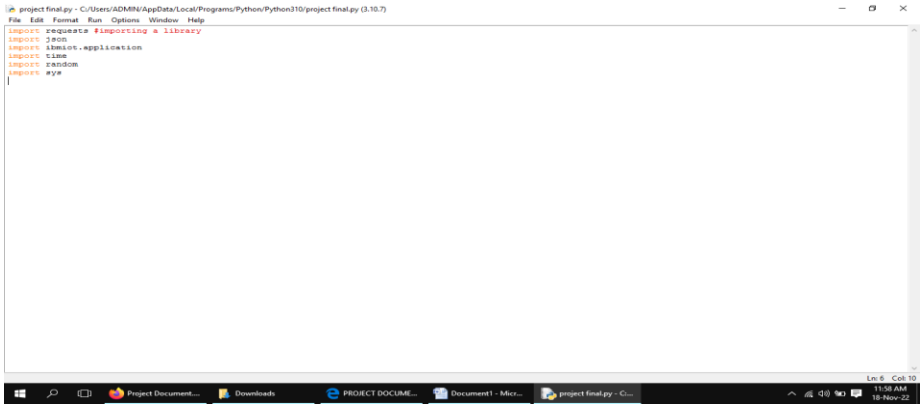
7.CODING & SOLUTIONING

Code Explanation:

Libraries:

Including all libraries like json, random, time, sys, ibmiotf ect..



Credentials:

Entering all the credentials corresponding to IoT Watson device in order to publish data to it.

#Watson device details

Organization ID : ” 6x3sv6”

Device Type : “abcd”

Device ID : “15”

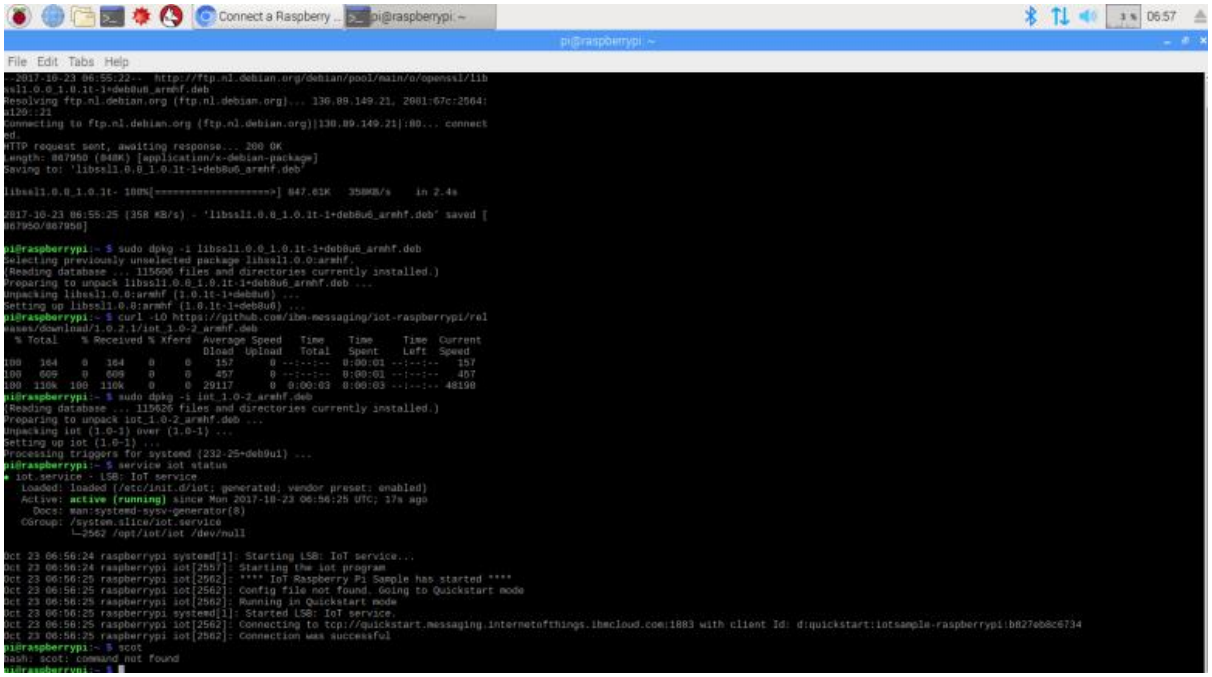
AuthMethod : “token”

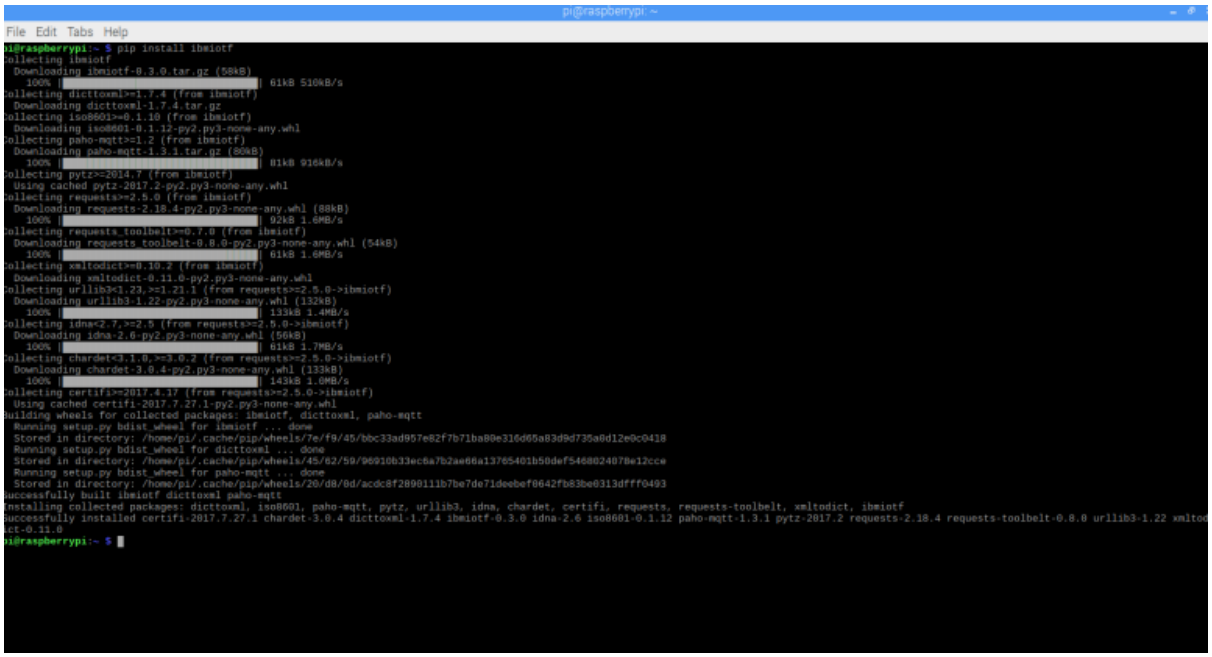
AuthToken : “12345678”

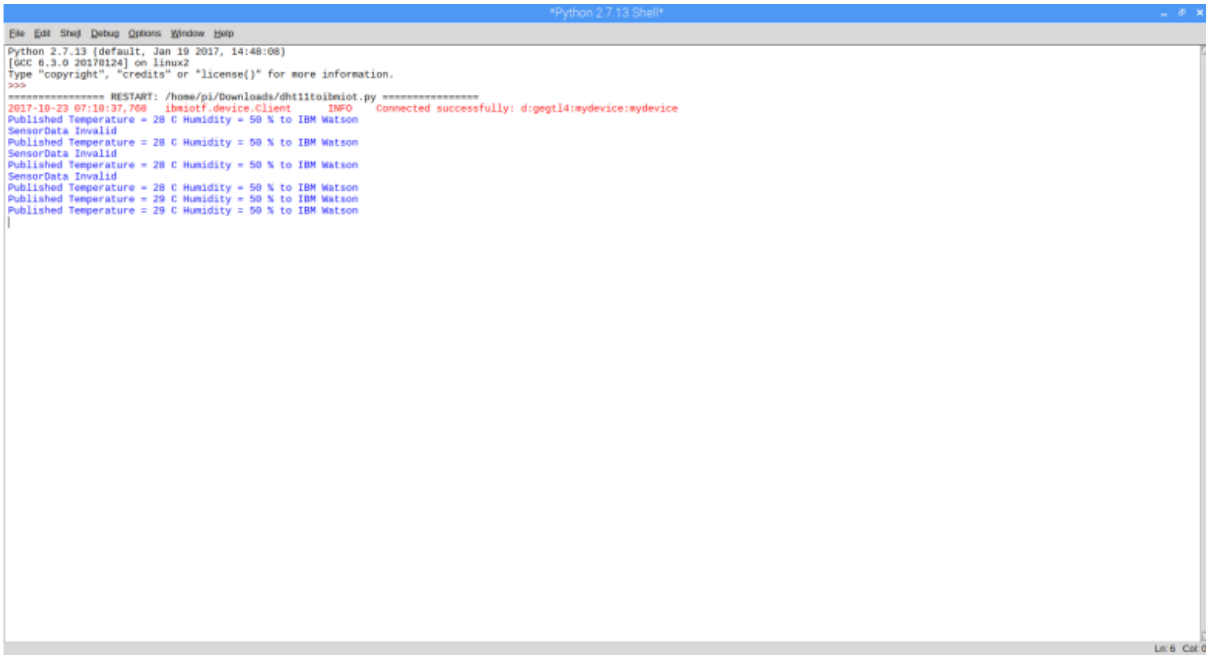
Publish Data To IBM IOT WATSON Platform:

Passing all the data(temperature, humidity, warning, instruction) to ibm iot watson.

Disconnecting the connection established with IoT Watson device.







7.1 Feature 1:

WEATHER UPDATE AND CORRESPONDING COMMAND:

Getting temperature and humidity from open weather map for a particular city and displaying warning regarding the speed when humidity is below 100

7.2 Feature 2: SPEED DETECTION

• By implementing a location sensor in MIT APP INVENTOR, with changes in the location with respect to time, speed can easily be detected and displayed in the app to the user.

• This requires location settings from user's phone to be active.

• An image of normal speed limit is also displayed which means that, travelling within that range would be safe.

7.3 Feature 3: DETERMINING TRAFFIC:

• Since hardware sensors are not implemented, we have used random function to generate values for the distance between the user and the vehicle ahead.

• If the distance is below 20, it instructs the driver or the user to stop immediately and try moving forward with different direction or to take diversion.


```
dist=random.randint(0,50)
dis={'dista':dist}

if(dist<20):
    insta={'inst':'stop'}
```

8. TESTING :

8.1 Test Cases :

A test case documents strategy that will be used to verify and ensure that a product or system meets its design specification and other requirements. A test case is usually prepared by or with significant input from the engineer. This document describes the plans for testing the architectural prototype of System. In my Project the system has to be tested to get the Desired Output. I use different speed for testing the system.

8.2 User Acceptance Testing :

In engineering and its various sub disciplines, acceptance testing is black-box testing performed on a system (e.g. software, lots of manufactured mechanical parts, or batches of chemical products) prior to its delivery. It is also known as functional testing, black-box testing, release acceptance, QA testing,

application testing, confidence testing, final testing, validation testing, or factory acceptance testing.

In software development, acceptance testing by the system provider is often distinguished from acceptance testing by the customer (the user or client) prior to accepting transfer of ownership. In such environments, acceptance testing performed by the customer is known as user acceptance testing (UAT). This is also known as end-user testing, site (acceptance) testing, or field (acceptance) testing.

A smoke test is used as an acceptance test prior to introducing a build to the main testing process. Acceptance test cards are ideally created during sprint planning or iteration planning meeting, before development begins so that the developers have a clear idea of what to develop. Sometimes (due to bad planning!) acceptance tests may span multiple stories (that are not implemented in the same sprint) and there are different ways to test them out during actual sprints.

One popular technique is to mock external interfaces or data to mimick other stories which might not be played out during an iteration (as those stories may have been relatively lower business priority). A user story is not considered complete until the acceptance tests have passed.

The acceptance test suite is run against the supplied input data or using an acceptance test script to direct the testers. Then the results obtained are compared with the expected results. If there is a correct match for every case, the test suite is said to pass. If not, the system may either be rejected or accepted on conditions previously agreed between the sponsor and the manufacturer.

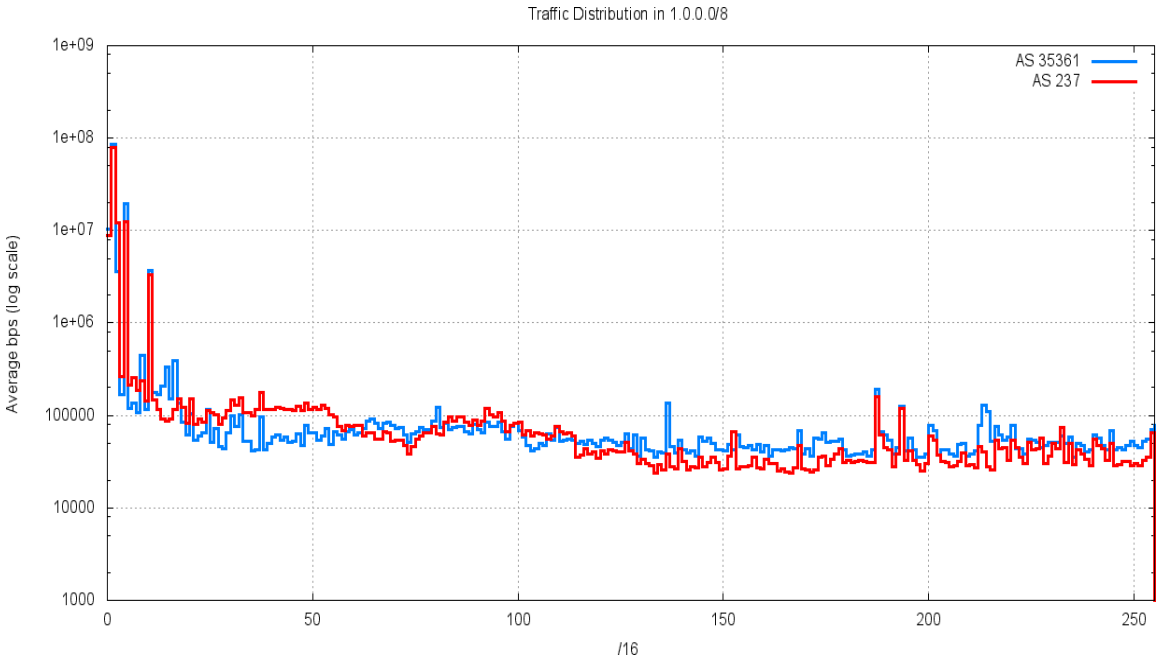
The objective is to provide confidence that the delivered system meets the business requirements of both sponsors and users. The acceptance phase may also act as the final quality gateway, where any quality defects not previously detected may be uncovered.

In these testing procedures the project is given to the customer to test whether all requirements have been fulfilled and after the user is fully satisfied.

The project is perfectly ready. If the user makes request for any change and if they found any errors those all errors has to be taken into consideration and to be correct it to make a project a perfect project.

9. Results:

9.1 Performance Metrics



10. ADVANTAGES:

• Signs with smart connectivity are an inexpensive and flexible medium that can help transmit information according to particular situation and entertain passengers.

• The digital signboards helps in reducing the air pollution due the emission of vehicles in heavy traffic area.

• The drivers can able to know about the weather condition and accordingly follow the speed limit displayed on the sign boards.

• The increased flexibility of these digital sign boards makes it easy for any private or government department to change the message as per the need of the hour.

• The driver can easily find the route and navigation instructions to reach the destination.

• The speed of the vehicle can be identified using location sensor.

• The digitals sign boards and the app are user-friendly.

DISADVANTAGES:

• The digital signboards involves high Installation Costs.

• Getting digital signboards up and running is a far more involved process than print media.

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

• The digital sign boards are still new and developing technology in the road safety sector.

11. CONCLUSION:

Digital road signs are an important part of modern infrastructure and are becoming increasingly common.

Digital road signs are becoming more common as technology improves and more states adopt them.

The use of digital road signs is expected to continue to grow in the future as it would be observed user-friendly, economic, environment friendly, profitable promoting road safety.

Digital road signs are designed to improve road safety and efficiency by providing real-time information to drivers.

These signs can display a variety of information, including speed limits, traffic conditions, and weather warnings.

Digital road signs can help drivers by providing information that is not always available from traditional signs.

12. FUTURE SCOPE:

One of the benefits of digital road signs is that they can be updated in real- time, which means that they can be used to provide motorists with up-to-the- minute information about conditions on the road ahead.

This can be particularly useful in the case of accidents or other incidents that might cause delays. In the future, digital road signs could also be used to provide information about alternative routes that might be available in the event of a problem on the road.

This could be particularly useful in the case of major incidents, such as road closures due to bad weather.

Finally, digital road signs could be used to provide motorists with information about the best times to travel in order to avoid traffic congestion.

This could be particularly useful in areas where there is a lot of traffic.

13. APPENDIX:

Source Code:

```
import requests #importing a library

import json

import ibmiotf.application

import ibmiotf.device

import time

import random

import sys

# watson device details
```

```
organization = “6x3sv6”

devicType = “abcd”

deviceId = “15”

authMethod= "token"

authToken= “12345678”

#generate random values for randomo variables (temperature&humidity)

def myCommandCallback(cmd):

global a

#print("command recieved:%s" %cmd.data['command'])

#status=cmd.data['command']

print("command recieved:%s" %cmd.data['command'])

control=cmd.data['command']

print(control)

try:

deviceOptions={"org": organization, "type": devicType,"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 "temp" with value integer value into the cloud as a type of
```

```
event for every 10 seconds

deviceCli.connect()

while True:

#get sensor data from DHT11

a =
"https://api.openweathermap.org/data/2.5/weather?q=Chennai,%20IN&appid=e
2bea247ed9ad643a04d9a8e55499d5f"

r=requests.get(url=a)

data=r.json()

Temp= data['main']['temp']

Humd= data['main']['humidity']

data= {'temp':Temp,'humid':Humd}

dist=random.randint(0,20)

dis={'dista':dist}

if(Humd<100):

warn={'alert':'PLEASE SLOW DOWN!!!!!!'}

if(dist<20):

insta={'inst':'stop'}

def myOnPublishCallback():

print("published Temperature = %s c" %Temp,"humidity:%s %%" %Humd)

print(warn)

print(dis)
```

```
print(insta)
success=deviceCli.publishEvent ("IoTSensor","json",insta,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",data,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",warn,qos=0,on_publish=
myOnPublishCallback)
success=deviceCli.publishEvent ("IoTSensor","json",dis,qos=0,on_publish=
myOnPublishCallback)
if not success:
print("not connected to ibmiot")
time.sleep(5)
deviceCli.commandCallback=myCommandCallback
#disconnect the device
deviceCli.disconnect()
```

Project Demo link:

https://drive.google.com/file/d/1BMdnGIRqs4AKRG0O0lroTK5gXbBBTvb9/view?usp=share_link

GitHub Link:

https://github.com/IBM-EPBL/IBM-Project-38530-1668690481