SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Project Report Submitted By

DHARANI .M - 820419106012

MATHUMITHA .A - 820419106032

NIRAIMATHI .K - 820419106037

PRAVINA .D - 820419106040

In project based learning of the degree of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

ANJALAI AMMAL MAHALINGAM ENGINEERING COLLEGE

ANNA UNIVERSITY : CHENNAI 600 025

1. **INTRODUCTION**
    a. Project Overview
    b. Purpose

2. **LITERATURE SURVEY**
    a. Existing problem
    b. References
    c. Problem Statement Definition

3. **IDEATION & PROPOSED SOLUTION**
    a. Empathy Map Canvas
    b. Ideation & Brainstorming
    c. Proposed Solution
    d. Problem Solution fit

4. **REQUIREMENT ANALYSIS**
    a. Functional requirement
    b. Non-Functional requirements

5. **PROJECT DESIGN**
    a. Data Flow Diagrams
    b. Solution & Technical Architecture
    c. User Stories

6. **PROJECT PLANNING & SCHEDULING**
    a. Sprint Planning & Estimation
    b. Sprint Delivery Schedule
    c. Reports from JIRA

7. **CODING & SOLUTIONING (Explain the features added in the project along with code)**
    a. Feature 1
    b. Feature 2
    c. Database Schema (if Applicable)

8. **TESTING**
    a. Test Cases
    b. User Acceptance Testing

9. **RESULTS**
    a. Performance Metrics

10. **ADVANTAGES & DISADVANTAGES**

11. **CONCLUSION**

INTRODUCTION :

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.

2. Purpose

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.

LITERATURE SURVEY :

1. Existing problem

Challenges in current system:

- Speed limits are not dynamic.
- No automatic diversion system.
- Non-coordinated way of traffic signals.

2. References

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Ideation%20phase/Literature%20survey%20(IBM-41104-1662632231).pdf

Wireless Digital Traffic Signs of the Future

Authors :

CHAI K.TOH
PIETRO MANZONI
CARLOS TAVARES CALAFATE

Traffic signs have come a long way since the first automobile was invented. They have long served the purpose of warning and guiding drivers and also enforcing the traffic laws governing speed, parking, turns, and stopping. In this study, the authors discuss the issues and challenges facing current traffic signs, and how it will evolve into a next-generation traffic sign architecture using advanced wireless communications technologies. With technological advances in the areas of wireless communications and embedded electronics and software, we foresee that, in the future, digital traffic sign posts will be capable of transmitting the traffic sign information

wirelessly to road users, and this will transform our roads into intelligent roads, where signs will appear promptly and automatically on in-vehicle displays to alert the driver. There is no longer the need to watch out for traffic signs since the detection will be automatic and performed wirelessly. This transformation will lessen burden on the drivers, so that they can then focus more on the traffic ahead while driving. Also, this evolution into wireless digital sign posts will fit well with the vision of future smart cities, where smart transportation technologies will be present to transform how we drive and commute, yielding greater safety, ease, and assistance to drivers.

Application of machine learning methods for traffic signs recognition

Authors :

D V FILATOV
A V DEVIATKIN
SERYKH ELENA

This paper focuses on solving a relevant and pressing safety issue on intercity roads. Two approaches were considered for solving the problem of traffic signs recognition; the approaches involved neural networks to analyse images obtained from a camera in the real-time mode. The first approach is based on a sequential image processing. At the initial stage, with the help of colour filters and morphological operations (dilatation and erosion), the area containing the traffic sign is located on the image, then the selected and scaled fragment of the image is analysed using a feed forward neural network to determine the meaning of the found traffic sign. Learning of the neural network in this approach is carried out using a back propagation method. The second approach involves convolution neural networks at both stages, i.e. when searching and selecting the area of the image containing the traffic sign, and when determining its meaning. Learning of the neural network in the second approach is carried out using the intersection over union function and a loss function. For neural networks to learn and the proposed algorithms to be tested, a series of videos from a dash cam were used that were shot under various weather and illumination conditions. As a result, the proposed approaches for traffic signs recognition were analysed and compared by key indicators such as recognition rate percentage and the complexity of neural networks' learning process.

Integration of Image-Based Fog Detection with Autonomous Decision System for Intelligent Road Sign

Authors :

WOJCIECH CHMIEL
JAN DERKACZ
JANUSZ GOZDECKI
ANDRZEJ DZIECH

The paper presents the description of the decision system implemented for Intelligent Road Signs. It focuses on the implementation of the novel air transparency analysis system and its integration with

the rule system and the speed control infrastructure. Moreover, there are presented issues of making decisions about the content displayed in the case of autonomous and cooperating signs. To reflect more closely on real-life situations, it is assumed that the content presented by the IRS changes dynamically, depending on the road traffic and weather parameters. The IRS system operation was presented using fog detection as an example.

Development and Testing of Road Signs Alert System Using a Smart Mobile Phone

Authors :

ERIC MASATU
RAMADHANI SINDE
ANAEL SAM

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 to respond accordingly. In this study, a system for alerting drivers about road signs has been developed and tested using a smart mobile phone. The study was carried out in Tanzania along an 80 km highway stretch from Arusha to Mos-hi town. The Haver-sine formula was used to measure and estimate the distance between two pairs of coordinates using the smartphone-based navigation application, Google Map. The application provides a voice alert to a needed action enhances driver’s attention. We propose an alternative method that identifies and modifies a specific class of energy inefficiencies. According to the experimental results, the proposed methodology has the benefits of high accuracy within a user radius of 10 meters, minimum bandwidth, and low-cost application. Furthermore, the system application was secured by limiting access to the application program interface key to avoid unauthorized access to sensitive information.

A Comprehensive and Effective Framework for Traffic Congestion Problem Based on the Integration of IoT and Data Analytics

Authors :

YAZED ALSAAWY
AHMAD ALKHODRE
ADNAN ABI SEN
ABDULLAH ALSHANQITI

Traffic congestion is still a challenge faced by most countries of the world. However, it can be solved most effectively by integrating modern technologies such as Internet of Things (IoT), fog computing, cloud computing, data analytics, and so on, into a framework that exploits the strengths of these technologies to address specific problems faced in traffic management. Unfortunately, no

such framework that addresses the reliability, flexibility, and efficiency issues of smart-traffic management exists. Therefore, this paper proposes a comprehensive framework to achieve a reliable, flexible, and efficient solution for the problem of traffic congestion. The proposed framework has four layers. The first layer, namely, the sensing layer, uses multiple data sources to ensure a reliable and accurate measurement of the traffic status of the streets, and forwards these data to the second layer. The second layer, namely, the fog layer, consumes these data to make efficient decisions and also forwards them to the third layer. The third layer, the cloud layer, permanently stores these data for analytics and knowledge discoveries. Finally, the fourth layer, the services layer, provides assistant services for traffic management. We also discuss the functional model of the framework and the technologies that can be used at each level of the model. We propose a smart-traffic light algorithm at level one for the efficient management of congestion at intersections, tweet-classification and image-processing algorithms at level 2 for reliable and accurate decision-making, and support services at level 4 of the functional model. We also evaluated the proposed smart-traffic light algorithm for its efficiency, and the tweet classification and image-processing algorithms for their accuracy.

3. Problem Statement Definition

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Ideation%20phase/problem%20statement.pdf

Customer Problem StatementTemplate:

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel

PS-1	A Driver	Follow static road signs	it may cause accidents by natural causes or man made errors	Static signs willfade and decay over time	Distracted
PS-2	A Pedestrian	Cross the road safely	The information of when to walk andwhen to stop is perceivable to me	Of the most possibility oftraffic accidents	Not safe

IDEATION & PROPOSED SOLUTION :

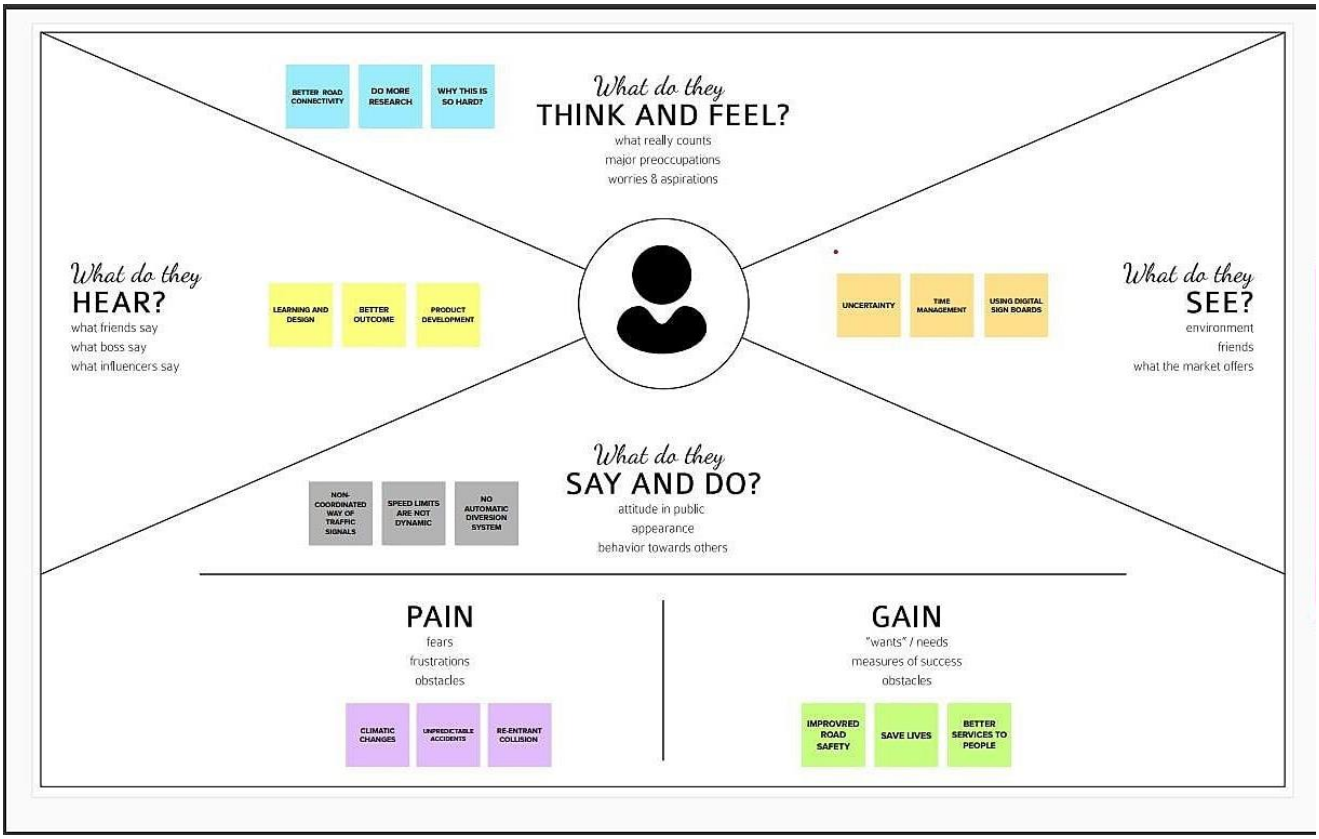
1.Empathy Map Canvas

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Ideation%20phase/EmpathyMap.pdf

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

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

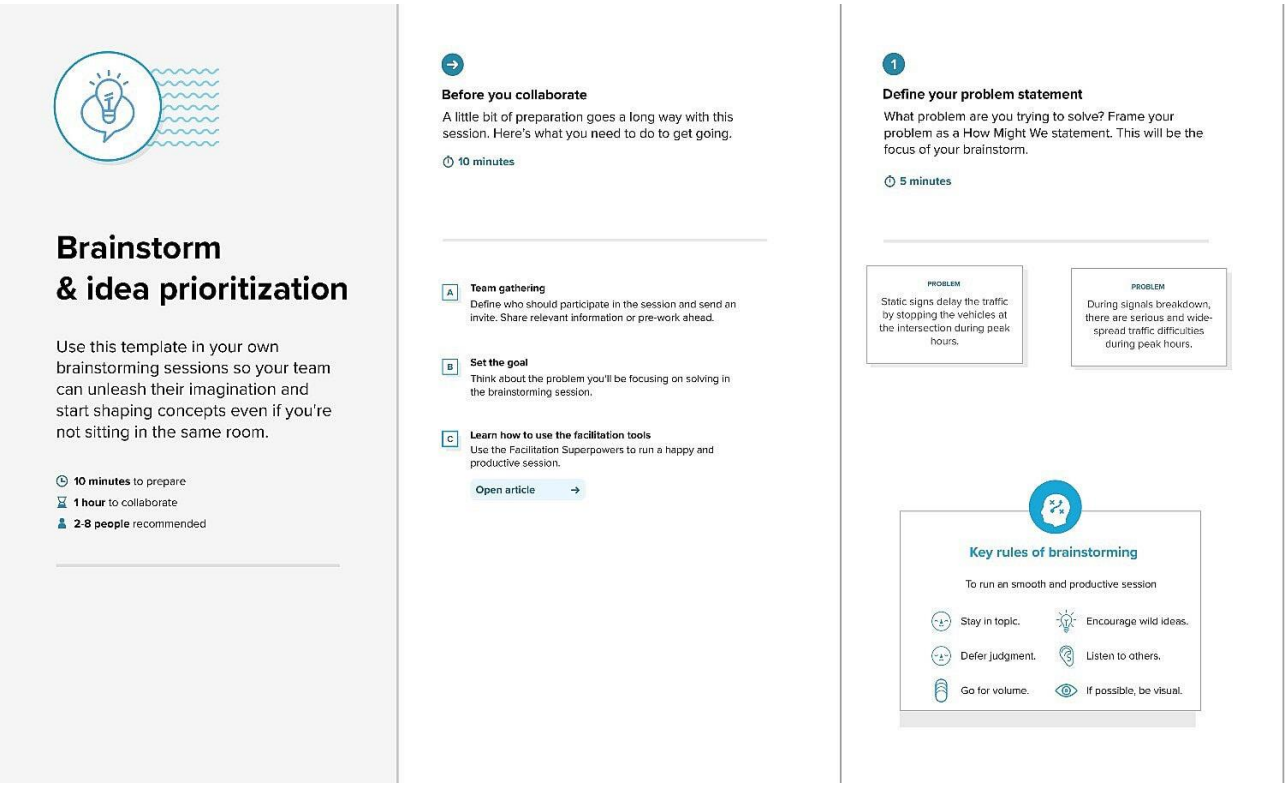
3. Creating an effective solution requires understanding the true problem and the person who is experiencing it.
4. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



2.Ideation & Brainstorming

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Ideation%20phase/brainstroming.pdf

Brainstorming provides a free and open environment that encourages everyone within a teamto 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.



2

Brainstorm

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

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

DHARANI.M		MATHUMITHA.A		NIRAIMATHI.K		PRAVINA.D	
Digital speed limit maintain system	Animal crossing detection system	when the vehicle crosses the stop line in load signal,automatically the vehicles shutdown	speed sensor controls the speed accordings to the road rules	When the vehicles crosses the stop line in road signal,an alarm be set by keeping sensor on the stop line	Send out geo-location data in order to sustainable and automous on open road	intimating road signs on prediction	signs will appear promptly and automatically on in-vehicle displays to alert the driver.
Accident prevention in foggen areas using sensor detector to alert the vehicle	We can get an indication before going to the road which is blocked, through sensor	sensing distance between the vehicles, and intimating through alarm and make the distance between vehicles as advised per rules	Digital signs are not affected by poor weather and lighting conditions, unlike existing traffic sign posts.	For emergency vehicles (e.g., ambulances, etc.), it systemically creates "green routes" by adjusting the frequency of the traffic lights to reduce the time of intervention	Drivers to be informed of the availability of the charging stations and petrol pump	Helping road users navigate through or around special events.	Implimentation of digital road signs on critical intersections
Alarm intimation on parking vehicle in no parking	Placing digital signs on turning places to avoid accident	sensors on satellite to monitor the traffic controls	predict overload for imbalance of vechicle	location information of digital sign posts are transmitted to on-coming call	improved safety of Vulnerable Road Users (VRU), like pedestrians, cyclists, etc.	The server has to perform authentication to ensure clients are genuine, and that acknowledgements of the signs are made by the client.	Improved driving experience, reducing the time it takes to circumvent blocked traffic situations related to accidents, road works

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, 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

GPS tracking (location data)

Detective sensor

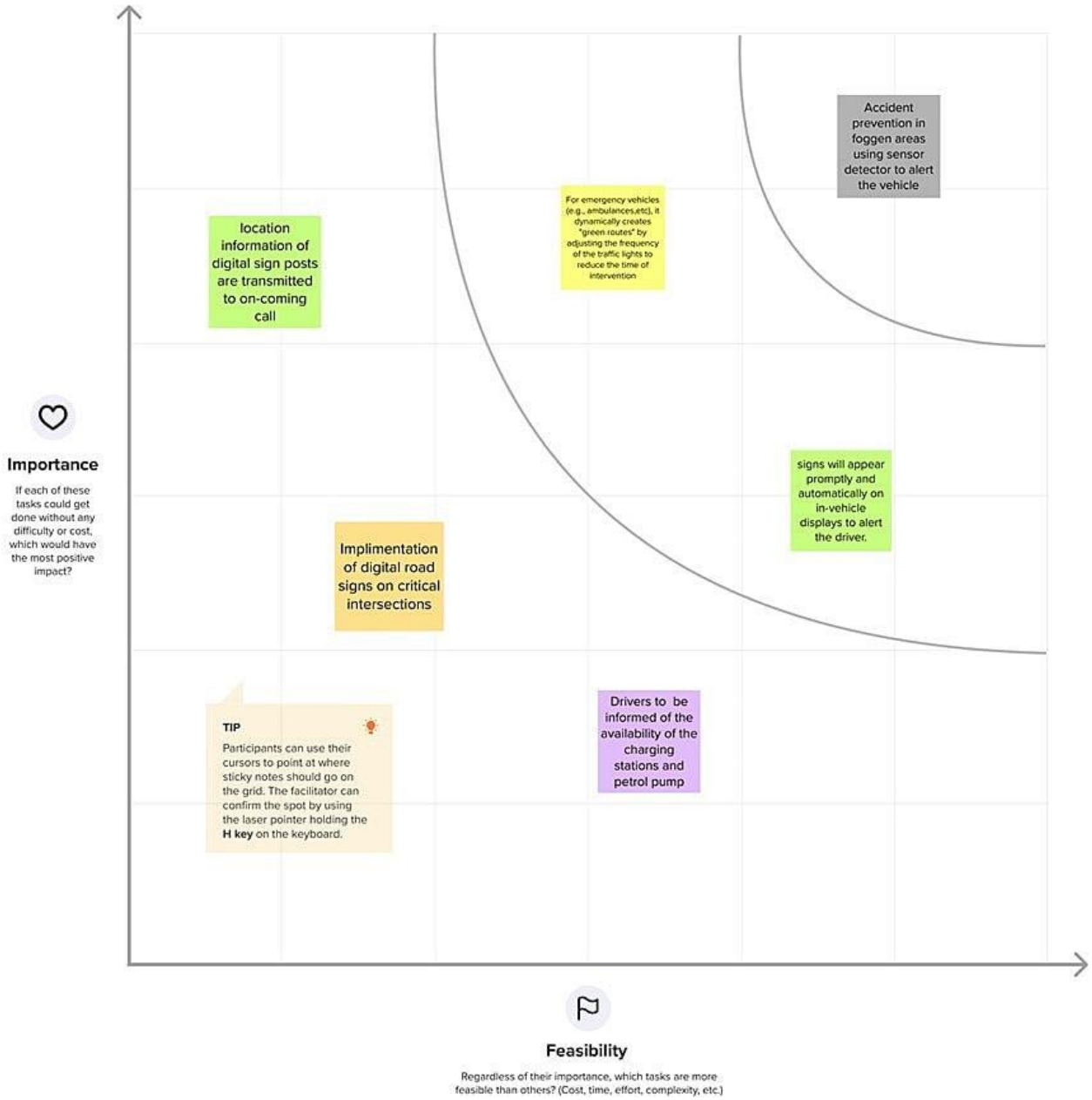
Alert message

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



3.Proposed Solution

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20Design%20Phase-1/Proposed%20Solution.pdf

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Static signs delay the traffic by stopping the vehicles atthe intersection during peak hours.
2.	Idea / Solution description	The project includes features like suggesting alternativeway and easy access to traffic system.
3.	Novelty / Uniqueness	If there is huge traffic jam in intersections or in fog-gen areas, then they can take alternative way to reach thedestination.
4.	Social Impact / Customer Satisfaction	It helps people to reach their destination on time andalso helps to know the traffic situation.
5.	Business Model(Revenue Model)	It gives friendly access to traffic system. Takes constant follow up till signs light is replaced.
6.	Scalability of the Solution	Feels frustrated about the traffic office situations.

4.Problem Solution fit

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20Design%20Phase-1/Problem%20Solution%20Fit.pdf

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioural patterns and recognize what would work and why.

Purpose:

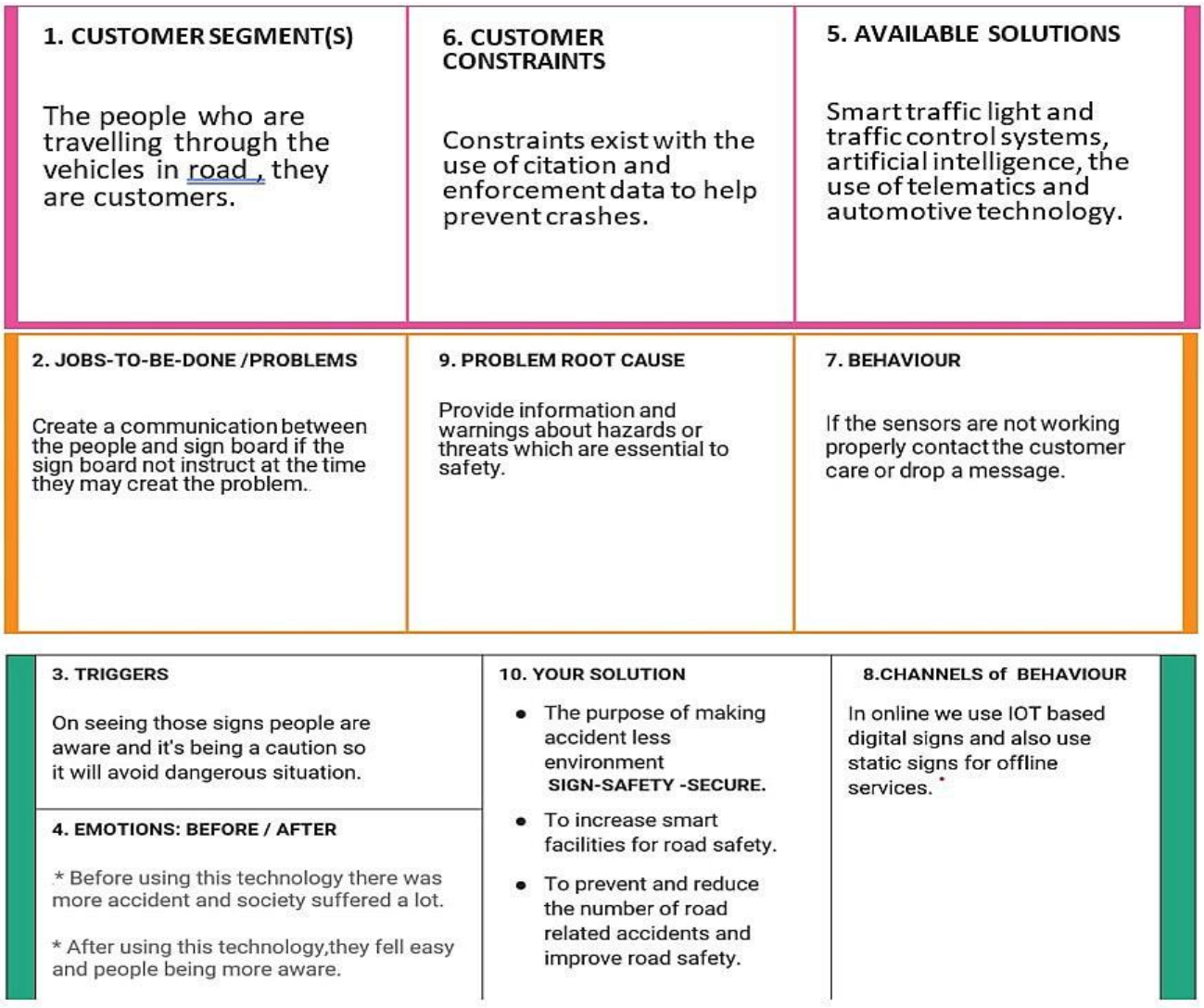
❑ Solve complex problems in a way that fits the state of your customers.

❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging.

❑ Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, or urgent or costly problems.

❑ Understand the existing situation in order to improve it for your target.



REQUIREMENT ANALYSIS :

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**	1. visibility refers to a motorist's capacity to clearlysee the traffic and environmental surroundings on the road while maintaining the ability for other drivers to perceive the driver in question. 2. In transport, driver visibility is the maximum distance at which the driver of a vehicle can seeand identify prominent objects around the vehicle.
FR-2	**User need**	1. Road safety education is as essential as anyother basic skills of survival. 2. our aim is to provide road safety information for road users to encourage safer road user behaviour among current and prospective roadusers and reduce the number of people killed and injured on our roads every year.
FR-3	**User understanding**	1. Road traffic safety refers to the methods andmeasures used to prevent road users from being killed or seriously injured. 2. Anyone who uses a road, such as a pedestrian,cyclist or motorist.
FR-4	**User convenience**	1. Passive traffic safety measures sought to avoidinfluence in the behaviour of drivers while giving automobiles maximum convenience.
FR-5	**Database**	1. Updating information in the database tointimate the users about the abnormal situations.

2.Non-Functional requirements

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

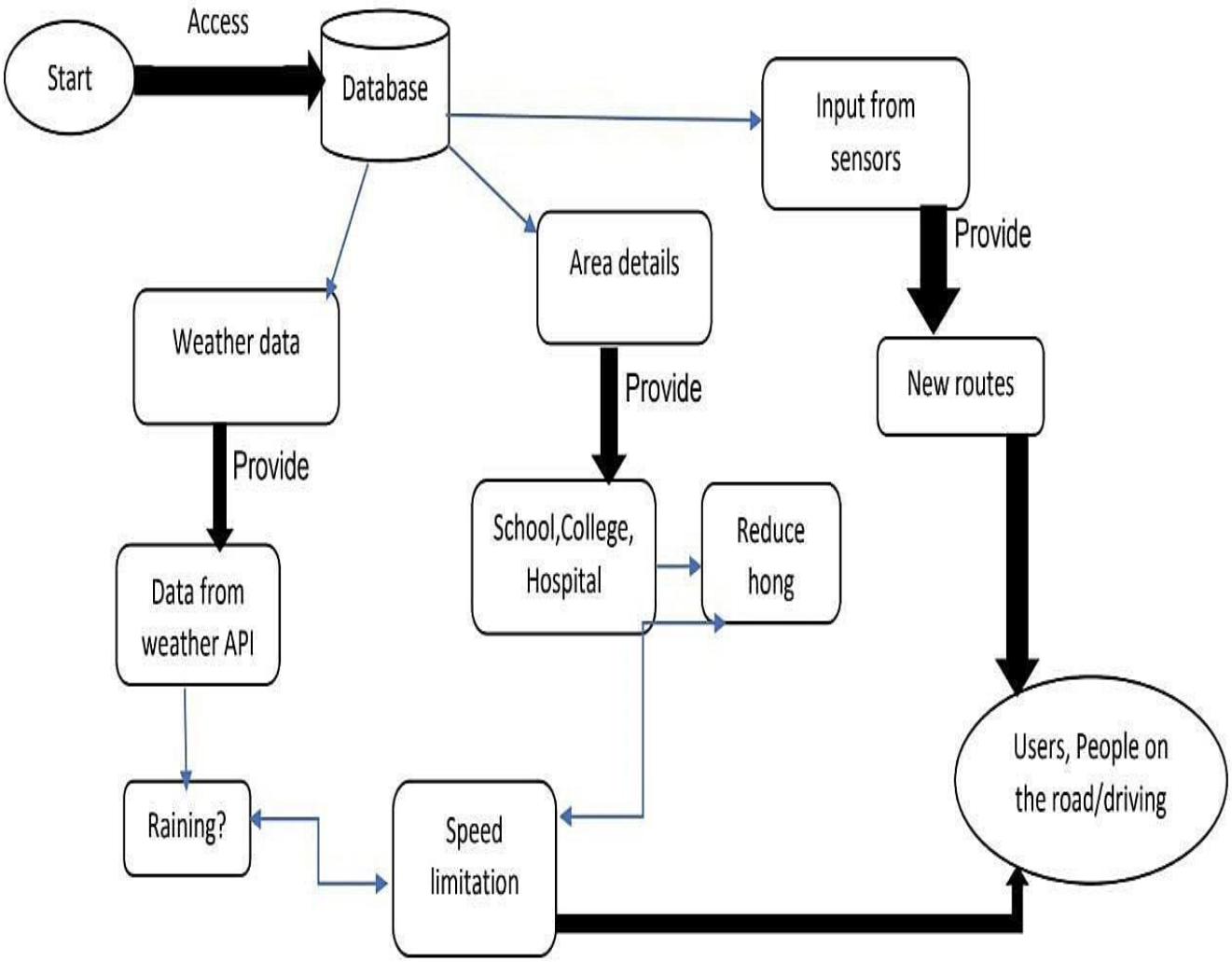
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	1. Easy to follow instructions displays on the board. 2. Understanding the signs should be clear.
NFR-2	**Security**	3. Provide better security, any other third party can't 4. able to display information in the board, Users dataare kept confidential.
NFR-3	**Reliability**	5. It can able to withstand in any weather condition and the hardware parts require periodic monitoringto avoid any damage. It is dynamic in nature and 6. reduce traffic congestion.
NFR-4	**Performance**	7. The smart display improves the safety and it makesuser tense free and keep them in a comfort zone. 8. Also quality of service is improved.
NFR-5	**Availability**	9. The solution is available 24X7 and also withstand 10. any climate changes.
NFR-6	**Scalability**	11. It can be implemented efficiently in anywhere and 12. data execution will be faster. Provides better safety.

PROJECT DESIGN :

1.Data Flow Diagrams

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20design%20phase-II/Data%20Flow%20Diagrams%20and%20User%20Stories.pdf

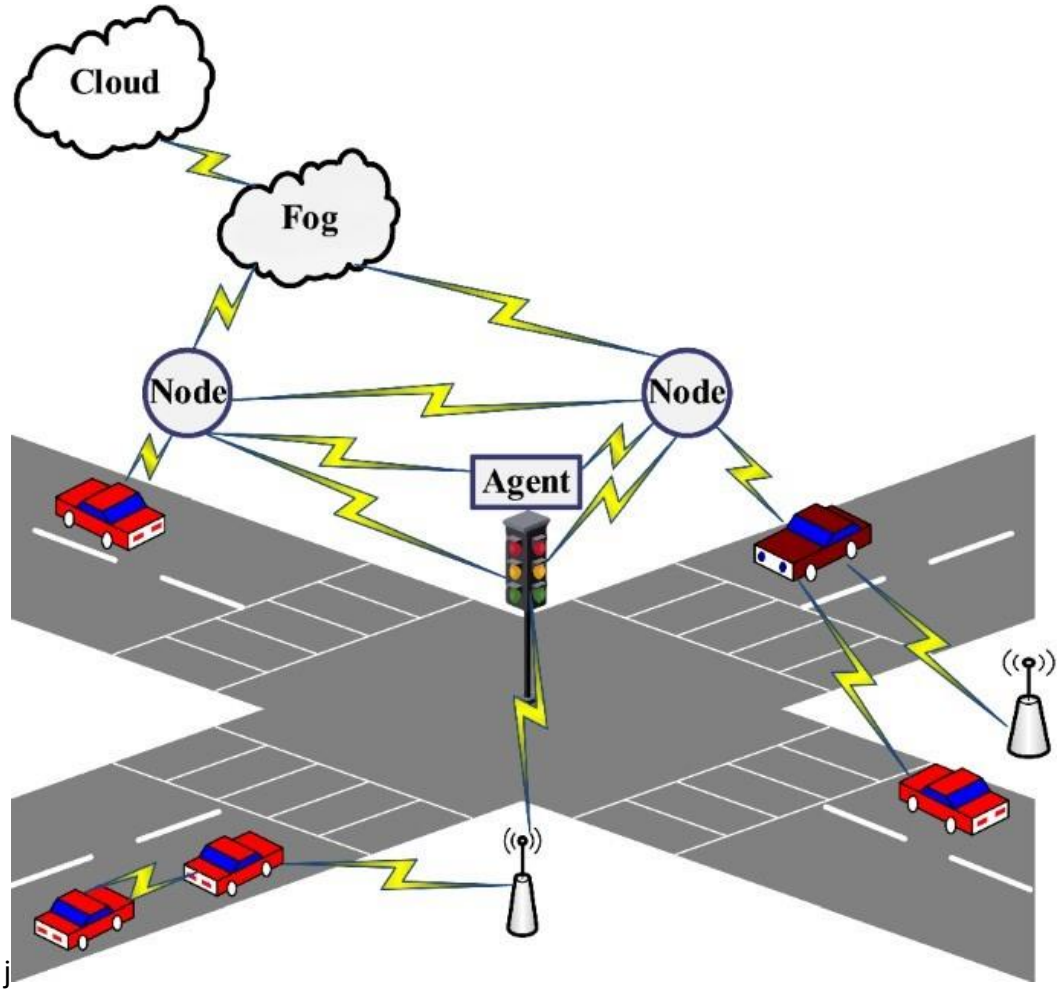
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the rightamount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



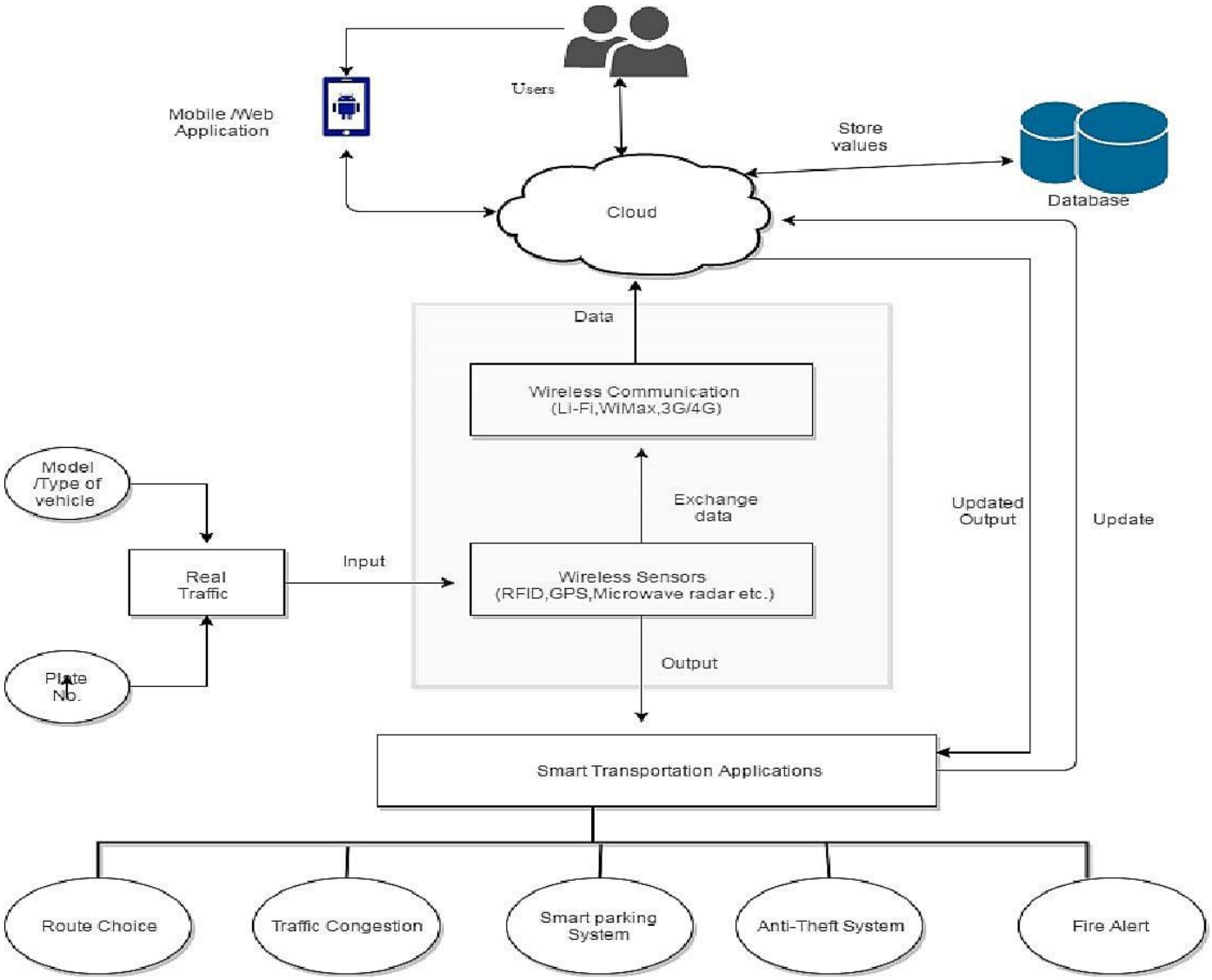
2.Solution & Technical Architecture

Solution Architecture Diagram:

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20Design%20Phase-1/Solution%20Architecture.pdf

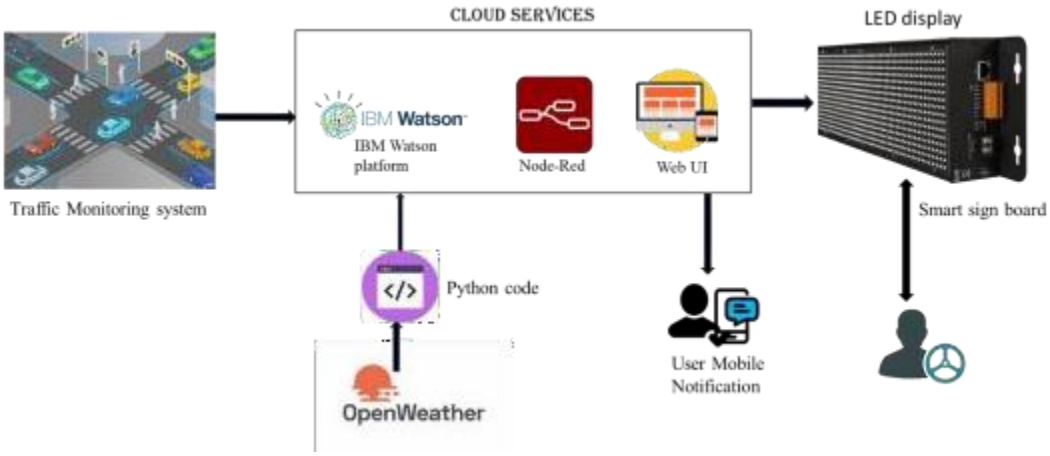


j



Technical Architecture:

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20design%20phase-II/Technology%20Stack%20.pdf



3.User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobileuser)	Registration	USN-1	Login into the application.	I can access Dashboard.	High	Sprint-1
	Login	USN-2	As a user, I will receive confirmation email once I have registered for the application.	I can receive confirmation email& clickconfirm.	High	Sprint-1
		USN-3	Through OpenWeather Map, speedlimitation is controlled.	I can access weather API.	High	Sprint-2
		USN-4	As a user, I can control my driving speed.	I can decrease / increase speed.	Medium	Sprint-1
		USN-5	I can get traffic diversions signs throughsmart sign board.	I can access traffic status.	Medium	Sprint-1
	Dashboard	USN-6	I can get new updated routes due to traffic/accidents.	I can handle the situation.	Low	Sprint-1
Customer (Web user)	Data generation	USN-7	Use of OpenWeather map.	Weather related	High	Sprint-1

				Information .		
		USN-8	Use of Node-Red.	To connect devices	High	Sprint-2
Administrator	Problem solving	USN-9	Future inundation and monitoring.	Can monitor sign board.	Medium	Sprint-2

PROJECT PLANNING & SCHEDULING :

1.Sprint Planning & Estimation

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20Planning%20Phase/Milestone%20and%20Activity%20List.pdf

Sprint	Functional Requirement (Epic)	User Story Number	User Story /Task	Story Points	Priority	Team Members
Sprint-1	IDE	USN-1	Installing all the software. which is required like python IDE.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-1	Checking the simulation with conditions	USN-1	Simulating the circuits and experimenting.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-2	Software	USN-2	• IBM Watson IOT. • Node Red integration.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-2	Software	USN-2	Test the device and workflow.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-3	Application Developmen t	USN-3	Using MIT App Inventorcreate an App.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-3	Testing	USN-3	Testing the Application.	2	High	Dharani Mathumitha Niraimathi Pravina
Sprint-4	WEBUI	USN-4	User interface with theSoftware	2	High	Dharani Mathumitha Niraimathi Pravina

2.Sprint Delivery Schedule

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484/blob/main/Project%20Planning%20Phase/sprint%20delivery%20plan.pdf

Sprint Delivery

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint EndDate (Planned)	StoryPoints Completed (as onPlanned EndDate)	Sprint Release Date(Actual)
Sprint-1	20	6 Days	24 Oct2022	29 Oct2022	20	29 Oct2022
Sprint-2	20	6 Days	31 Oct2022	05 Nov2022	20	05 Nov2022
Sprint-3	20	6 Days	07 Nov2022	12 Nov2022	20	12 Nov2022
Sprint-4	20	6 Days	14 Nov2022	19 Nov2022	20	19 Nov2022

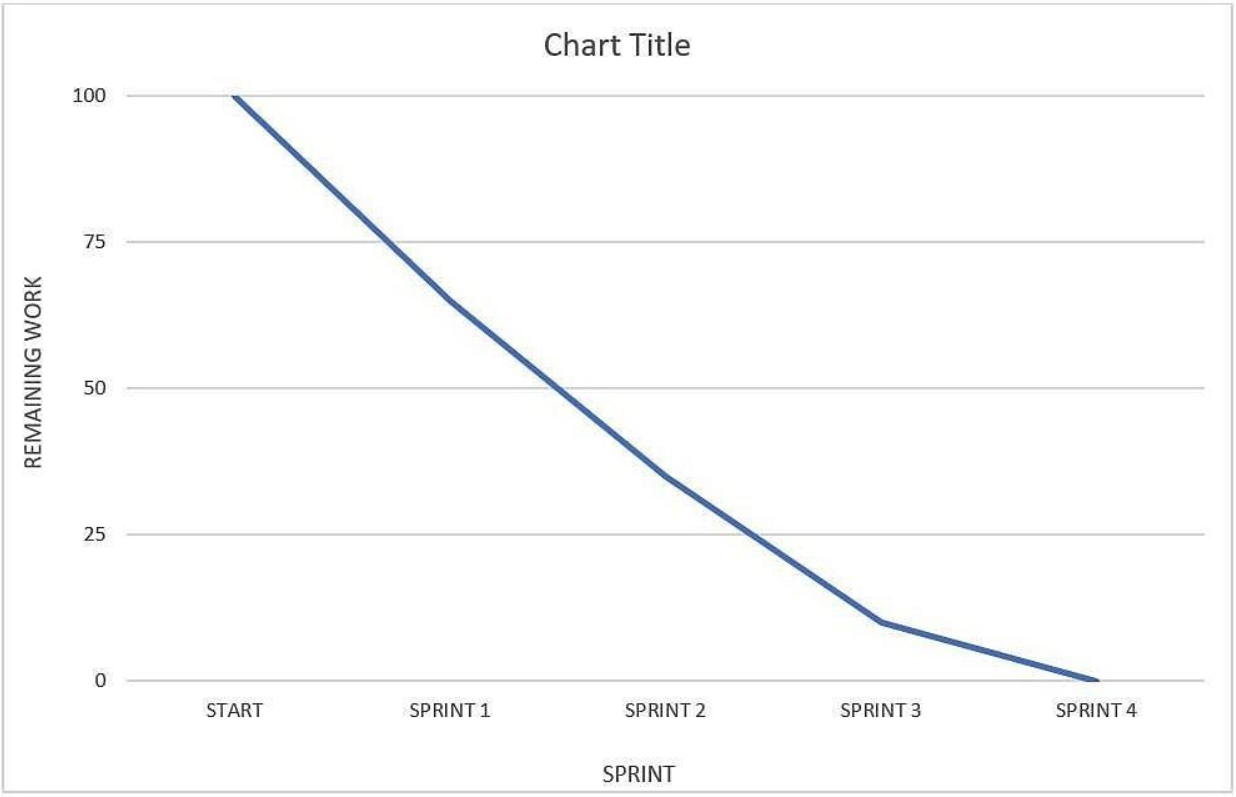
Velocity:

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

AV = sprint duration / velocity = 20 / 10 = 2

3.Reports from JIRA

BURNDOWN CHART

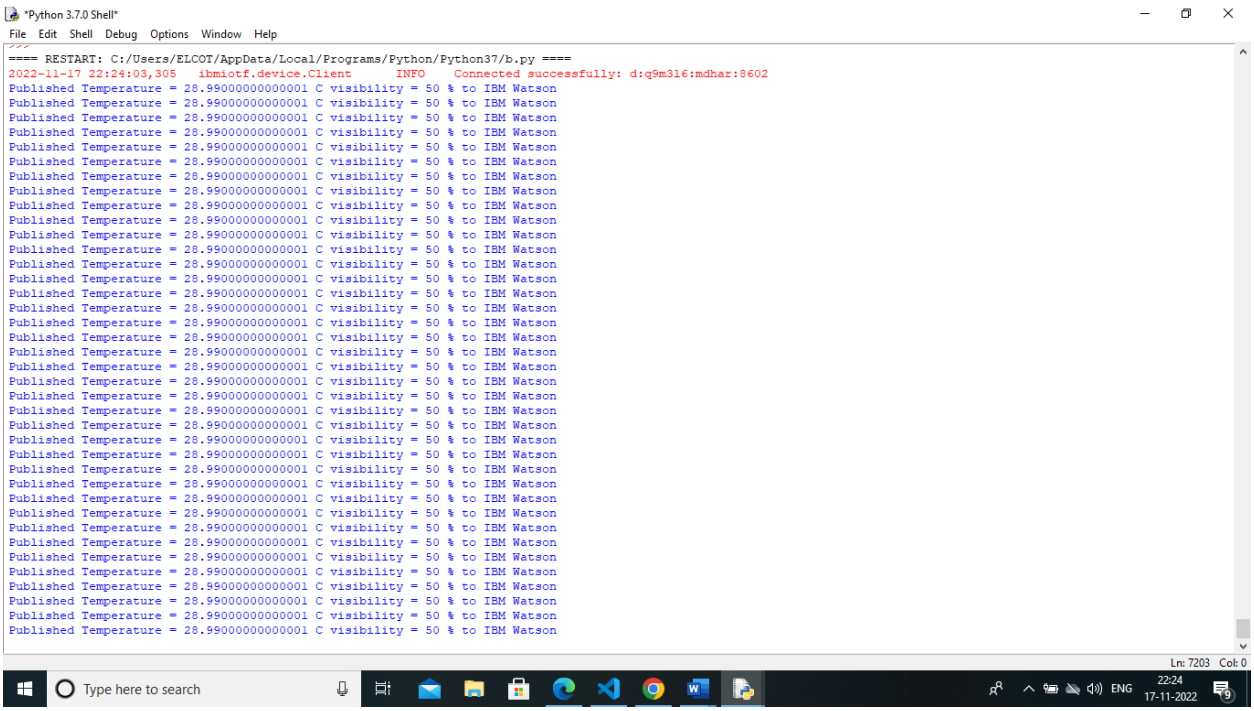


CODING & SOLUTIONING :

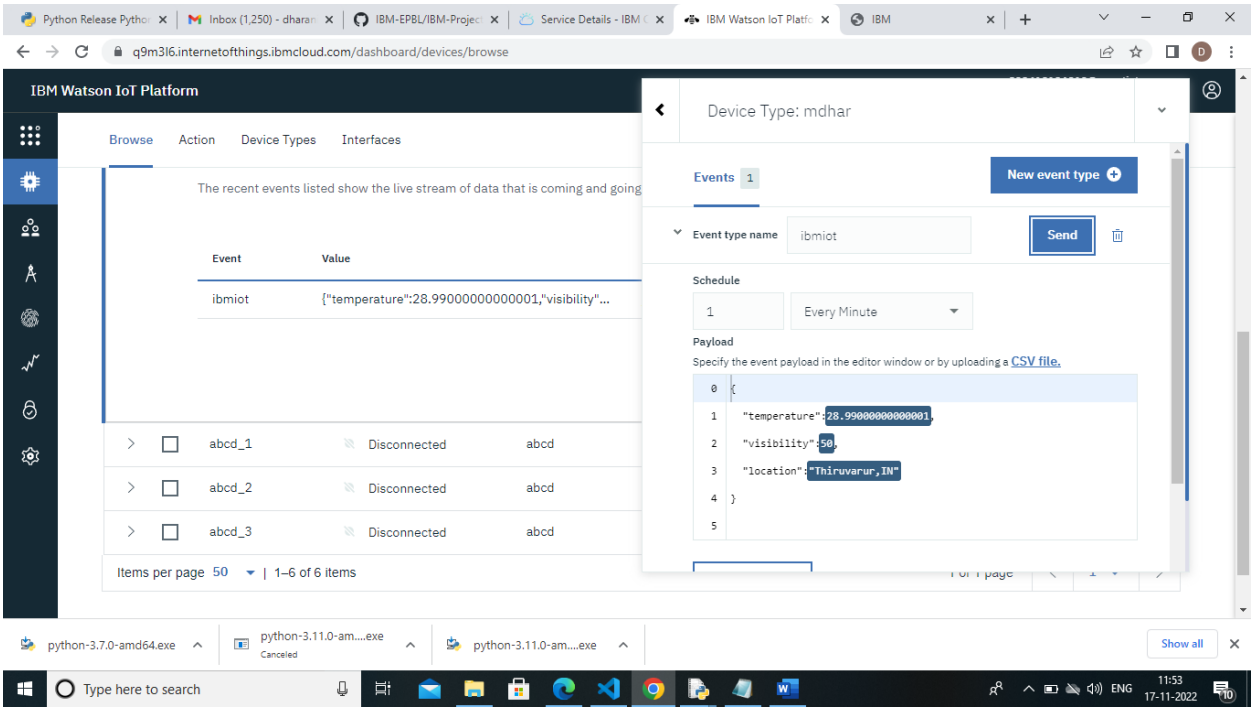
(Explain the features added in the project along with code)

1.Feature

 # push data to IBM Watson

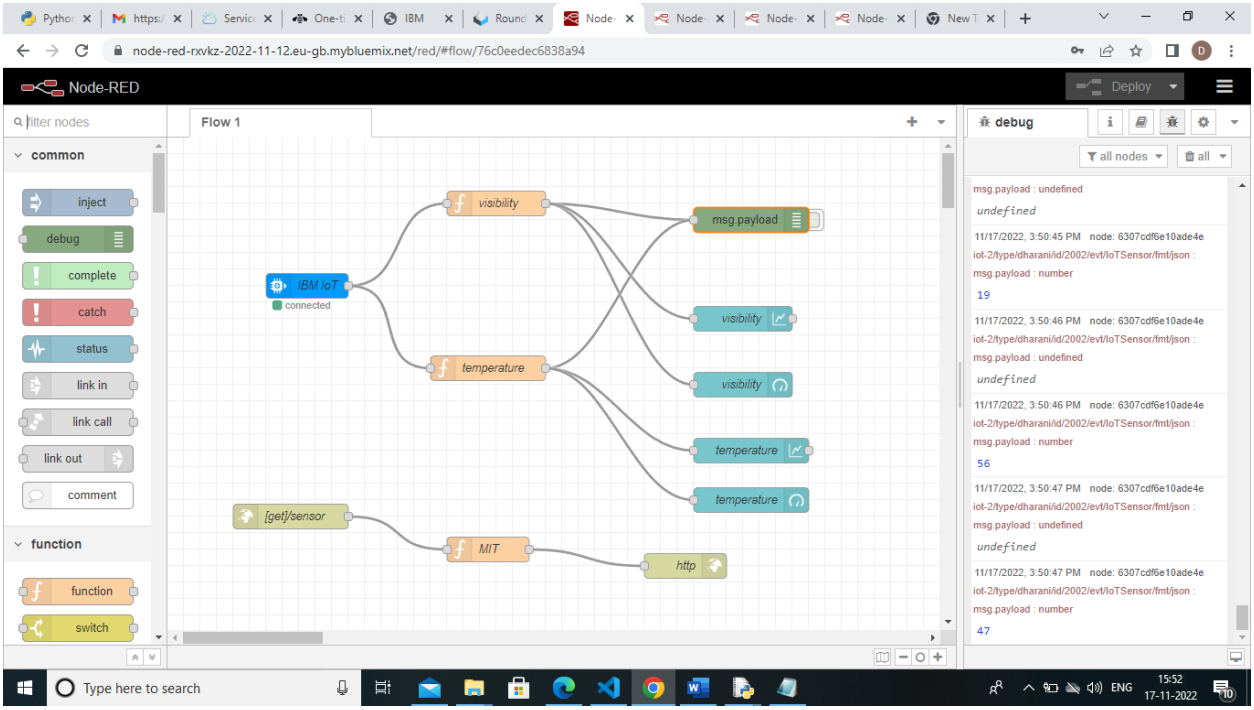


IBM Watson iot platform

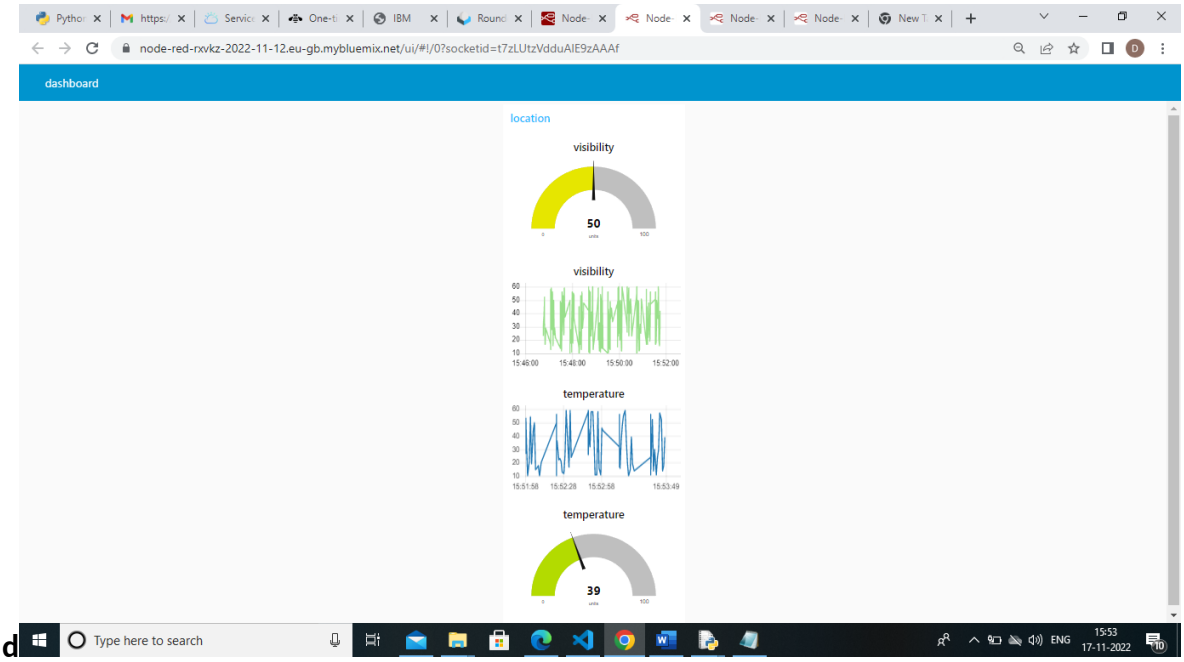


2.Feature 2

node red workflow



#node red dashboard



d

TESTING :

Testcases :

Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result
Login page	Verify user is able to log into application with InValid credentials		Enter invalid username/email in email text box . Enter valid password text box. Click on log in button	username:speed password:123456	Application should show 'Incorrect email or password ' validation message.	Working as expected
Login page	verify user is able to connect with open weather api		if open weather api was connected it will show connected.		open weather api will connected	Working as expected
Login page	verify user is able to see the temperature and visibility		click the link the temperature and the visibility will be shown		if the user click on link the value will be shown otherwise it will not shown	Working as expected

Performance Testing :

			NFT - Risk Assessment					
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volume Changes	Risk Score
1	signs with smart con	Existing	Low	No Changes	moderate	No downtime	>5 to 10%	GREEN

User Acceptance Testing :

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 release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37

Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

This report shows the number of test cases that have passed, failed,and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final ReportOutput	4	0	0	4
Version Control	2	0	0	2

RESULTS :

Performance Metrics

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

ADVANTAGES & DISADVANTAGES :

1. **ADVANTAGES**
    a. Lower battery consumption since processing is done mostly by Node RED servers in the cloud.
    b. Cheaper and low requirement microcontrollers can be used since processing requirements are reduced.
    c. Longer lasting systems.
    d. Dynamic Sign inundation.
    e. School/Hospital Zone alerts.

2. **DISADVANTAGES**
    a. The size of the display determines the requirement of the micro controller.
    b. Dependent on OpenWeatherAPI and hence the speed reduction is samefor a large area in the scale of cities.

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 helpreduce a lot of accidents and maintain a more peaceful traffic atmosphere in the country.

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. Evendisplaying 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.

APPENDIX :

Source Code

```
import time
import sys
import ibmiotf
import ibmiotf.device
import random

#Provide your IBM Watson Device Credentials
organization = "q9m3l6"
deviceType = "mdhar"
deviceId = "8602"
authMethod = "token"
authToken = "12345678"

# Initialize GPIO

def myCommandCallback(cmd):
   print("Command received: %s" % cmd.data['command'])
   status=cmd.data['command']
   if status=="switchon":
      print ("Switch is on")
   else :
      print ("Switch is off")

   #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

      temperature=28.99000000000001
      visibility=50


      data = { 'temperature' : temperature, 'visibility': visibility}

      #print data
      def myOnPublishCallback():
         print ("Published Temperature = %s C" % temperature, "visibility =
    %s %%" % visibility,"to IBM Watson")

      success = deviceCli.publishEvent("ibmiot", "json", data, qos=0,
    on_publish=myOnPublishCallback)
      if not success:
         print("Not connected to IoTF")
      time.sleep(1)

      deviceCli.commandCallback = myCommandCallback

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

GitHub & Project Demo Link

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-41104-1660639484

DEMO VIDEO :

https://www.youtube.com/embed/Fz-dDSGU74E