**1. INTRODUCTION:**

**1.1. Projectoverview:**

We wanted to be a part of our surrounding with some change and advancement so that it can bring the better life of the middle class and lower class people to travel in high security and advanced locomotion .the train is one and only most widely used transportation,and not only for this they are used for goods transportation also.Indian railways are not able to facility the customer properly due to crowded amount of people. Statistics show that the leading cause of death by injury in railways traffic accidents(two train collision each other).There are number of causes for which an accident can occur, some of them are; lack of training for driving or less experienced,use of mobile phone while driving, unskilled drivers, driving while intoxicated, bad railway tack condition, overloading in train and negligence traffic management. In this survey paper, we briefly review selected railway accidents detection techniques and propose a solution. Rear end crashes occur mainly due to obstacle and crack in tracks.According to recent statistics, a major percentage of train accident happens due to not proper surveillance of railway track.

**1.2. Purpose:**

Sensor used for real time monitoring of railwaysthe development of railways in India dates back to seconddecade of the nineteenth century. India railwaysystem is an important lifeline in our country. Lights and fans can be on off by using special logic circuitry. An accident happening due to track breakage has been a big problem in railway sector. It is also need to design system for detecting obstacles such as cars, bicycles and human on the track in the range upto hundreds of meters ahead. In the proposed system includes the several features which prevent the train accidents.

**[1]** The system has been implemented for the detection and controlling of railways accidents using the PIC controller. Actually the contribution of the Railways to the growth of the economy with its incredible services like mobility of various commodities and passengers has been ignored.

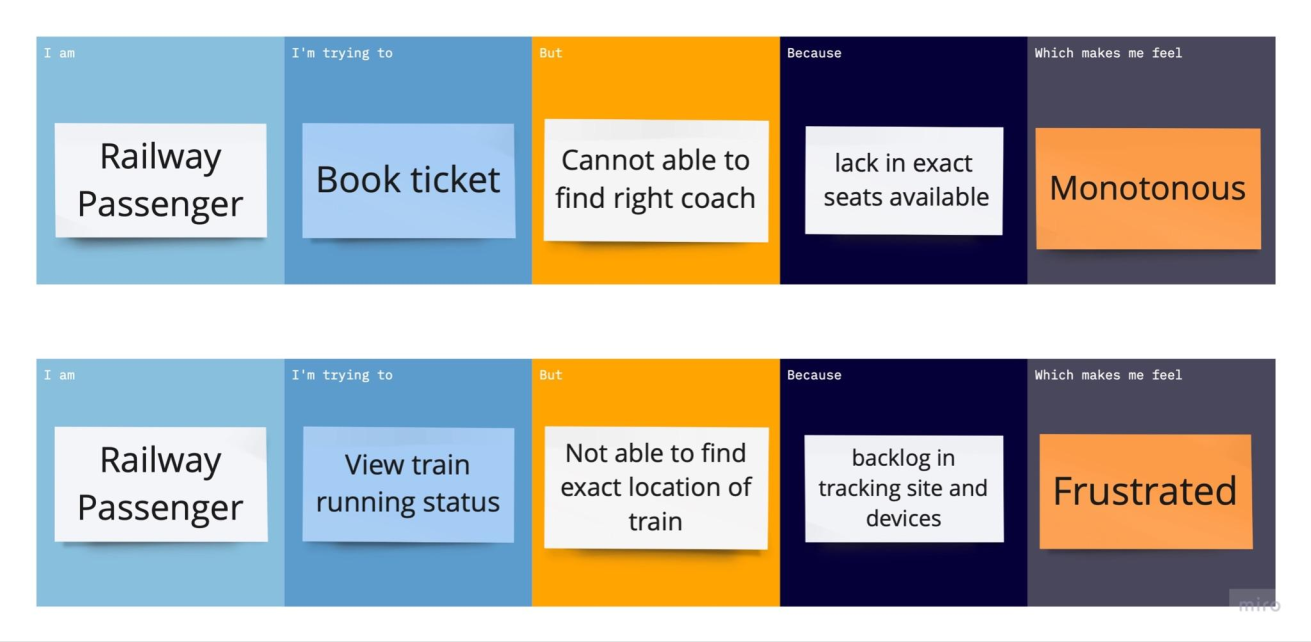
**[2]**The country’s vastness and diversity has been connected and coordinated by the largest and busiest rail networks in Asia, transporting over 18 million passengers and more than 2 million tons of freight daily. It is the world's largest commercial or utility employer, with more than 1.4 million employees. Indian Railways has become the lifeline for the country. Accident happening due to track breaking has been a big problem in railways sector.

**2. LITERATURE SURVEY:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Author** | **Title** | **Source** | **Findings** |
| Naveen Bhargav  (2016) | Automatic Fault  Detection of Railway Track System Based on PLC(ADORTAST) | International Journal of  Recent Research Aspects | The sensor is used to detect defect in the train track and the ultraviolet sensor is used to  detect the obstruction in front of  the train. |
| B. Siva Rama  Krishna *(*2017) | Railway track fault detection system using IR sensors and  Bluetooth technology | Asian Journal of Applied  Science and Technology  (AJAST) | In the event of any defect on the  track it will detect track defect  using IR sensors and then it  sends a message to the android  phone using a Bluetooth module. |
| Parvathy A. (2017) | Automatic Railway track fault detection forIndian railways | IEEE | The Automatic Railway Route  automatically detects the fares of  the Indian IEEE Rail  Automatically and detects cracks  very quickly without human  intervention. |
| Swati D. Patil &  Pallavi. M.  Taralkar (2018) | Train track fault  detection system | International Journal of  Current Engineering and  Scientific Research  (IJCESR) | Rail crashes have been identified  as a major cause of accidents in  the past. So, the solution to this  problem is using the robot to  detect cracks in the train track  and when the robot detects an  error it sends a message to the  base station. |
| Mansi R. Sarwan (2018) | Automated Railway  Track Fault Detection  System Using Robot | International Conference  on New Frontiers of  Engineering,  Management, Social  Science & Humanities | An IR (Slot sensor) assembly  that tracks the exact location of a  faulty track was quickly repaired  so that many lives could be  saved. |
| M. Banupriya (2019) | Self Powered For  Railway Track  Monitoring Using IoT | IOSR Journal of  Engineering (IOSR JEN) | This has resulted in a rapid  increase in surveillance of  systems, buildings, vehicles, and  machines using sensors. |
| S.Mishra, A. Shrivastava and B.Shrivastav  (2019) | A Smart Fault Detection  System For Indian  Railways | International Journal of  Scientific & Technology  Research | The device built will be attached  to a train engine and contains a  sensor that can detect a few  meters cracks and as soon as any  cracks are found the train driver  will receive a signal to install  emergency brakes and the  authorities will be notified of the  correct location of the fault. |

**2.1.Define the problem statements**

**Customer problem statement template**



References

[1]Khekare G S , Sakhare A V . A smart city framework for intelligent traffic system using

VANET[C]// International Multi-conference on Automation. IEEE, 2013.

[2]COOPER Dave E. Intelligent transportation systems for smart cities:a progress review[J].

Science China(Information Sciences), 2012, 55(12):2908-2914.

[3]Stefansson G, Lumsden K. Performance issues of Smart Transportation Management systems[J].

International Journal of Productivity & Performance Management, 2009, 58(1):55-70.

[4]Huang X. Smart Antennas for Intelligent Transportation Systems[C]// International Conference

on ITS Telecommunications Proceedings. IEEE, 2006:426-429.

[5]Li X, Song J. The Top Design Methodology of Smart City in China[C]// International

Conference on Intelligent Computation Technology and Automation. IEEE, 2014:861-864.

[6]Jianbo, Cheng, Peng. Top-Level Design of Smart City Based on "Integration of Four Plans"[J].

ZTE Communications, 2015, 13(4):34-39.

[7]Lanke N , Koul S , Lanke N , et al. Smart Traffic Management System[J]. International Journal

of Computer Applications, 2014, 75(7):19-22.

[8]Bouhedda M, Bellatreche S, Ahmed-Serier R. Smart traffic signal controller design and

hardware implementation based ant colony system[C]// International Conference on

Modelling, Identification and Control. IEEE, 2017:1110-1116.

References

[1]Khekare G S , Sakhare A V . A smart city framework for intelligent traffic system using

VANET[C]// International Multi-conference on Automation. IEEE, 2013.

[2]COOPER Dave E. Intelligent transportation systems for smart cities:a progress review[J].

Science China(Information Sciences), 2012, 55(12):2908-2914.

[3]Stefansson G, Lumsden K. Performance issues of Smart Transportation Management systems[J].

International Journal of Productivity & Performance Management, 2009, 58(1):55-70.

[4]Huang X. Smart Antennas for Intelligent Transportation Systems[C]// International Conference

on ITS Telecommunications Proceedings. IEEE, 2006:426-429.

[5]Li X, Song J. The Top Design Methodology of Smart City in China[C]// International

Conference on Intelligent Computation Technology and Automation. IEEE, 2014:861-864.

[6]Jianbo, Cheng, Peng. Top-Level Design of Smart City Based on "Integration of Four Plans"[J].

ZTE Communications, 2015, 13(4):34-39.

[7]Lanke N , Koul S , Lanke N , et al. Smart Traffic Management System[J]. International Journal

of Computer Applications, 2014, 75(7):19-22.

[8]Bouhedda M, Bellatreche S, Ahmed-Serier R. Smart traffic signal controller design and

hardware implementation based ant colony system[C]// International Conference on

Modelling, Identification and Control. IEEE, 2017:1110-1116.

References

[1]Khekare G S , Sakhare A V . A smart city framework for intelligent traffic system using

VANET[C]// International Multi-conference on Automation. IEEE, 2013.

[2]COOPER Dave E. Intelligent transportation systems for smart cities:a progress review[J].

Science China(Information Sciences), 2012, 55(12):2908-2914.

[3]Stefansson G, Lumsden K. Performance issues of Smart Transportation Management systems[J].

International Journal of Productivity & Performance Management, 2009, 58(1):55-70.

[4]Huang X. Smart Antennas for Intelligent Transportation Systems[C]// International Conference

on ITS Telecommunications Proceedings. IEEE, 2006:426-429.

[5]Li X, Song J. The Top Design Methodology of Smart City in China[C]// International

Conference on Intelligent Computation Technology and Automation. IEEE, 2014:861-864.

[6]Jianbo, Cheng, Peng. Top-Level Design of Smart City Based on "Integration of Four Plans"[J].

ZTE Communications, 2015, 13(4):34-39.

[7]Lanke N , Koul S , Lanke N , et al. Smart Traffic Management System[J]. International Journal

of Computer Applications, 2014, 75(7):19-22.

[8]Bouhedda M, Bellatreche S, Ahmed-Serier R. Smart traffic signal controller design and

hardware implementation based ant colony system[C]// International Conference on

Modelling, Identification and Control. IEEE, 2017:1110-1116.

**2.2. References**

**[1]** S. Sawadisavi J. Edwards, E. Resend, J. Hart, C. Barkan, and N. Ahuja,“Development of a machine vision system for inspection of railroad track,” in Proc. Amer. Railway Eng.MaintenanceWay Assoc. Annu. 2012

**[2]** M. Singh, S. Singh, J. Jaiswal, and J. Hempshall, “Autonomous railtrack inspection using vision based system,” in Proc. IEEE Int. Conf. Comput.Intell. Homeland Secure. Pers. Safety, 2009.

**[3]** P.Navaraja,”Crack Detection System For Railway Track By Using Ultrasonic And Pir Sensor” IJAIC-2014.

**[4]** Ramavath Swetha ,P.V. Prasad Reddy,” Railway Track Crack Detection Autonomous Vehicle” ISSN, vol. 4,Issue 2015.

**2.3. Problem Statement**

The Project explicitly deals with one of the most common problem that is traffic jams besides a Railway crossing. Since gates of Railway crossing are usually manually operated, for most of the times, gates are kept closed for no reason increasing road traffic. Moreover in our country accidents at rail road crossing are increasing day by day and the train accidents cause severe damage to life and property. To solve the above problem, we have come with an idea that would automatically control the Railway gates at junctions.

**IDEATION PHASE**

**3.Ideation & proposed solution:**

Forthechosenuse casesforthesmartsolutionforrailwayswehadputforththefollowingideas forprojectdescriptionvision.

**1.Changeinpaymentgateway**

Addingthescan &paymethodforthebookingprocessmakesthepaymentgateway better,whichwillgivetheuseragreatreliefbyﬁllingthecarddetailseverytime.

**2.Non-ScanCoderefund**

Refundofmoneyfornon-boardedjourneywillbecomeeasierbychangingtheprocess likeiftheQRcodegeneratedfortheticketisnotscannedbytheTTRuntiltherespectedtrain reachedthedestinationstation.

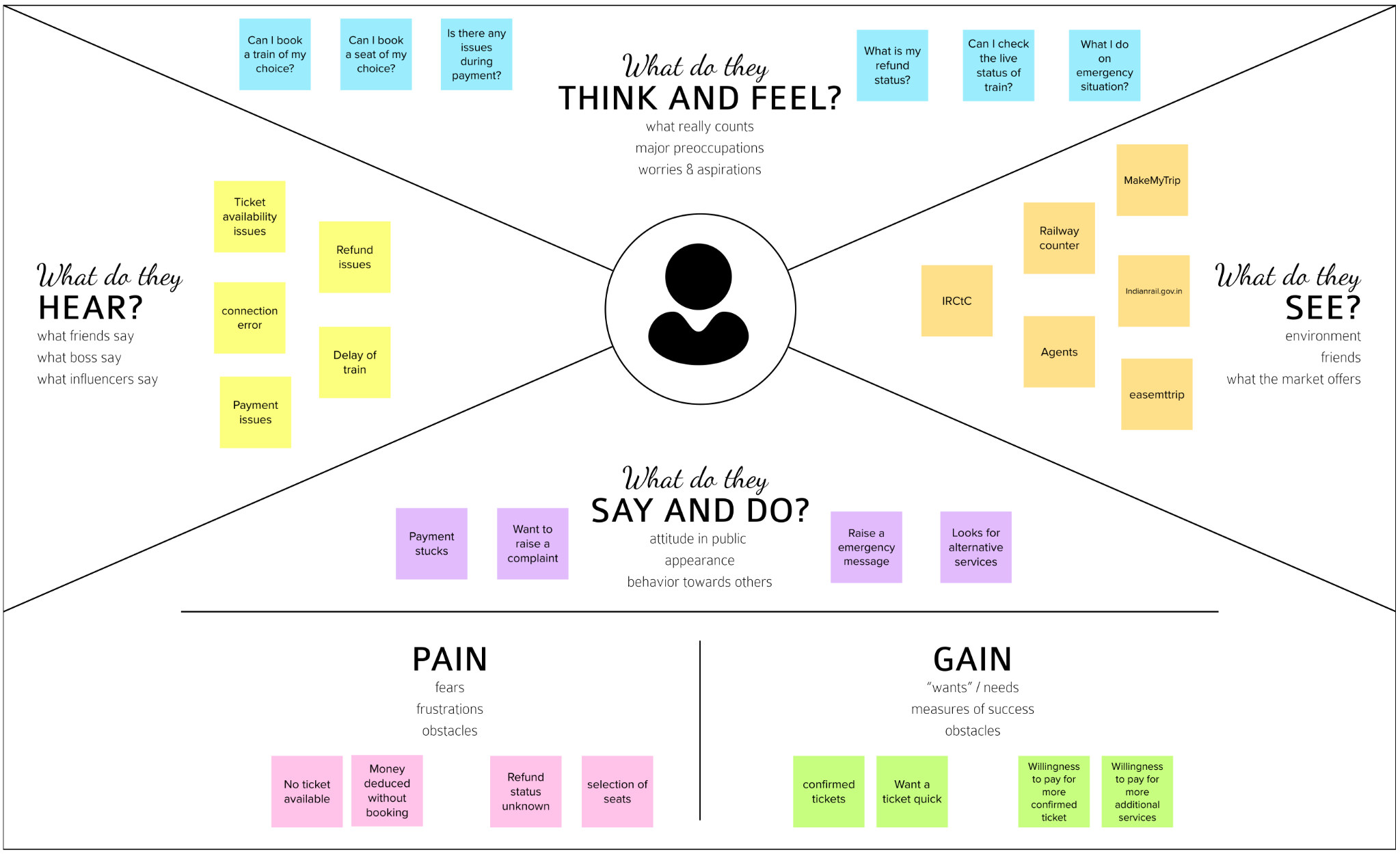
**3.EmergencyAssistance**

Helpingthepassengersonthedurationoftheemergencybyprovidingtheemergency quickresponseteamonthenearbystationbygettinginformationviawebapp.

**4.ParalleltrainAssistance**

Providingthedetailstothepassengersabout theparalleltrainonthesameroutewhich thebookedticketcaneligibletoboard.

**3.1.Empathy Map Canvas**

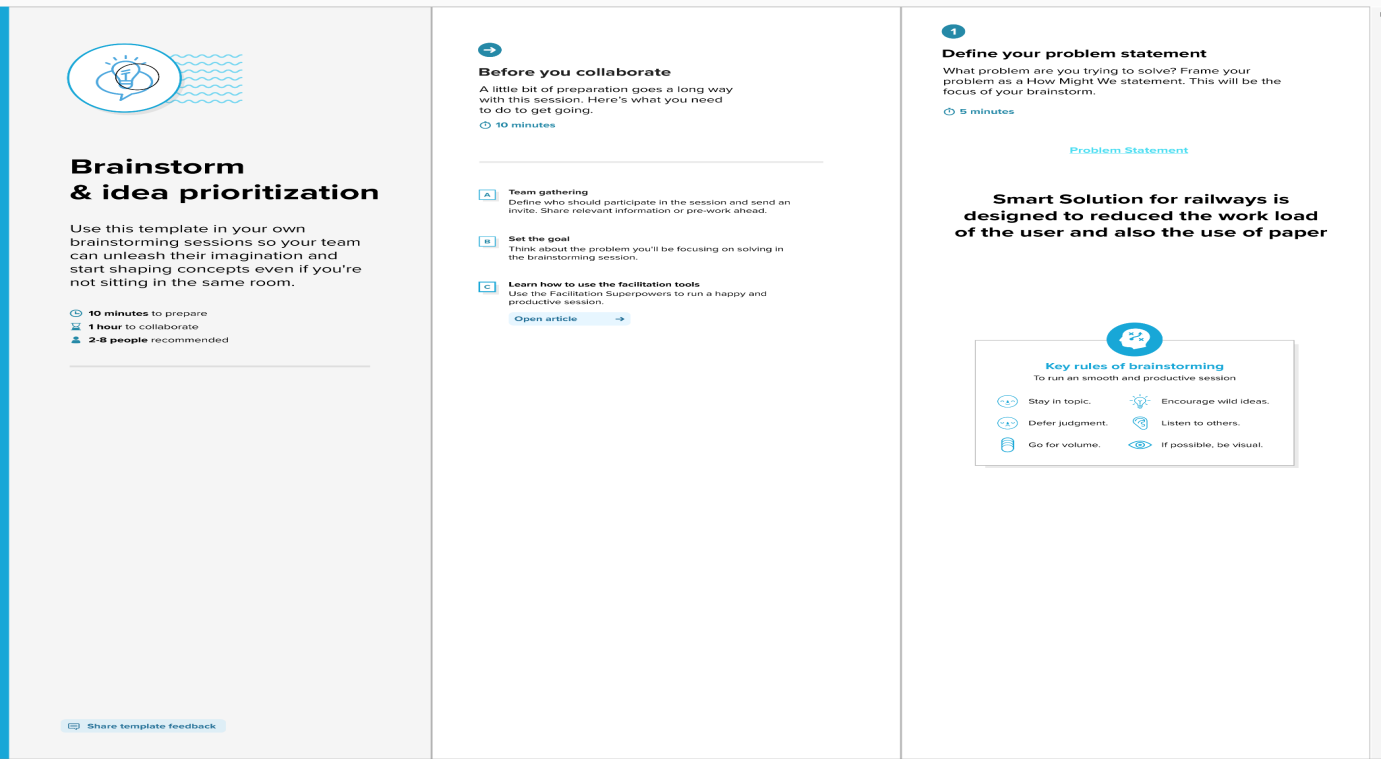


**3.2.Brainstorm & Idea Prioritization Template**

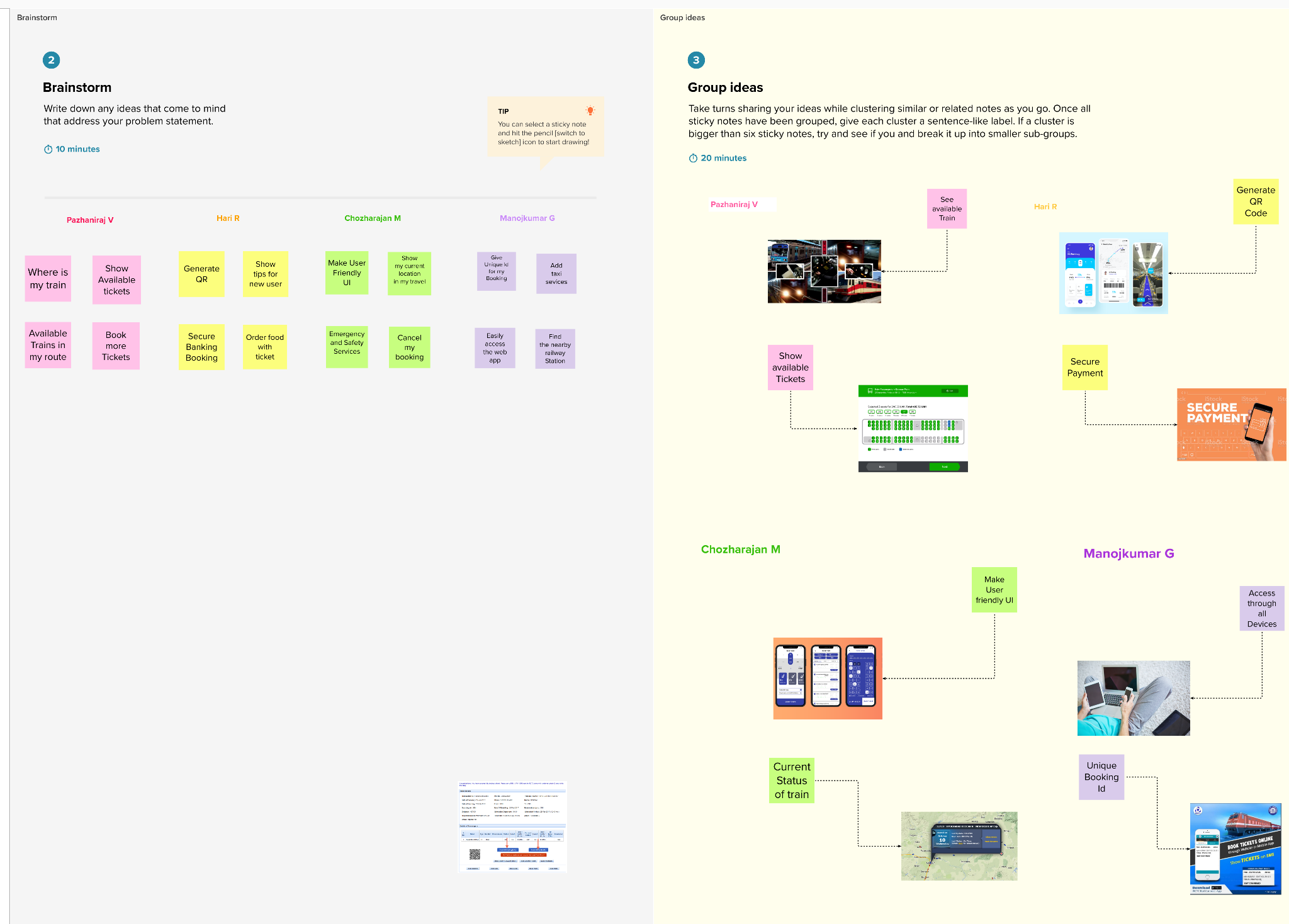
Brainstormingprovidesafreeandopenenvironmentthatencourageseveryonewithinateam toparticipateinthecreativethinkingprocessthatleads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Usethistemplateinyourownbrainstormingsessionsso your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

*Step-1:*Team Gathering, Collaboration & Select the Problem Statement.



*Step-2*: Brainstorm, Idea Listing & Grouping



*Step-3*: Idea Prioritization



**3.3.Proposed Solution**

The device consists of an Arduino UNO microcontroller & some sensor i.e. Ultrasonic Sensor, PIR Sensor & IR Sensor. These sensors are connected with an IoT circuit. All the sensors are attached to the Locomotive (Engine) & can sense range greater than 200m. Every object having temperature greater than perfect zero releases thermal energy in the form of radiation. We humans are radiated at a wavelength of 9-10 micrometers. The PIR sensors are adapted to perceive this IR wavelength which only gets disgorge when a living being arrives in their vicinity. The term “pyroelectricity” means: heat that generates electricity. The PIR device consists of 2 slots and each of these slots are created of IR sensitive materials. Beneath the traditional condition wherever there's no motion before the device each the slots within the device discover constant quantity of actinic radiation.

**Device Layout**

1. Assemble all the components of the IoT platform.

2. Connect an ultrasonic sensor, IR sensor, PIR sensor to the Arduino board.

3. Attach an alarm in the engine connected to an Arduino.

4. Connect a GSM-GPS to the Arduino for sending a notification to the authorities.

5. To function IoT use any programming language.

6. The device is ready for attaching it into the train engine.

**3.4. PROBLEM SOLUTION FIT**

User can login and book their ticket:Web UI

* HTML
* CSS
* JavaScript

Requirements filled by the passenger are stored in the cloud database:

* Cloud Services

Any time available system. The ticket can be verified by the ticket collector:

* IBM Load Balancer

YOU’RE SOLUTION:

* Channels Of Behaviour
* Emotions: Before / After

**4. REQUIREMENT ANALYSIS:**

|  |  |  |  |
| --- | --- | --- | --- |
| **SI.No** | **Component** | **Description** | **Technology** |
| 1. | Web UI | User can login and book their ticket through the website based on the availability of the seats. | HTML, CSS, JavaScript |
| 2. | Cloud Services | Requirements filled by the passenger is stored in the cloud database. | Python |
| 3. | GPS Tracking | Live Location details shared through the code to share the location in the website | IBM Watson Service |
| 4. | External API-1 | Used for rail schedule, ticketing and travel documents generation, cancellation. | Sabre API |
| 5. | External API-2 | Used for combining carriers and ticket types, Multilanguage & currency support. | Trainline B2B API |
| 6. | Data Processing | Ticket is verified with the unique ID generated with the cloudland DB | Python, IBM cloud |

**4.1. FunctionalRequirements**

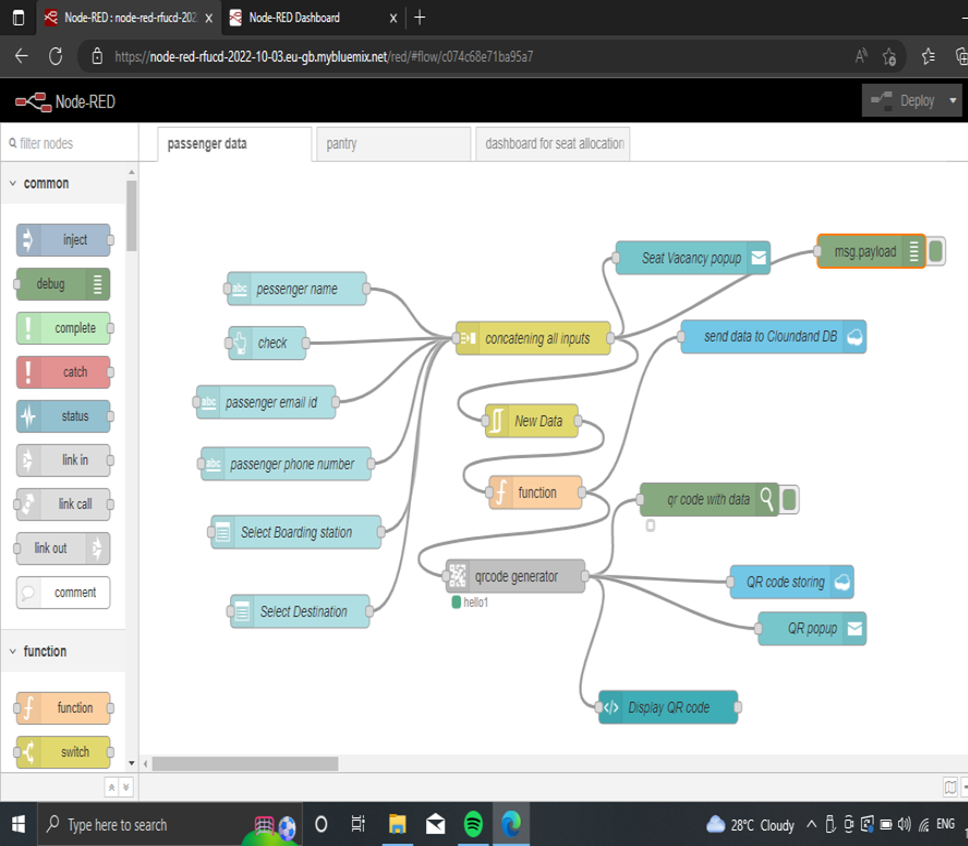
|  |  |  |
| --- | --- | --- |
| **FRNo.** | **FunctionalRequirement(Epic)** | **SubRequirement(Story/Sub-Task)** |
| FR-1 | UserRegistration | IfPassengerwanttobook tickets.Firstly,theyneedto registerasnewuserinwebapp.Userneedtoenter emailorphonenumberandcreatestrongpasswordfor registration |
| FR-2 | Userverification | Theverificationcodeis sendtotheregisteredemail idorphonenumberforregistration. |
| FR-3 | Userconfirmation | Theverificationcodeis entered intotheapp application.Afterfinishingthathomepageis opened.Afterverification,usercanproceedtologin withvalid credential. |
| FR-4 | Process ofbooking | Whenthehomepageis openedtherewillbeaformandtooption.Then,thepassengerhastoprovide his/herdetailswiththedateofthejourney,namesof thepassengersandtheirdetails,originstationdetails, destinationstationdetails,andtheclasstypeofthe requiredticket(s)  TheRailwayReservationSystemwillprovidethe  AvailableTrain-list,andSeat-availability,via-details. |

**4.2. Non-functionalRequirements**

|  |  |  |
| --- | --- | --- |
| **FR No.** | **Non-Functional Requirement** | **Description** |
| NFR-1 | **Usability** | The web app can easily accessible because of it’s sleek and simple user interface |
| NFR-2 | **Security** | The web app can access only by valid user and password credential. The payment gateway have lot of security |
| NFR-3 | **Reliability** | In the process booking ticket, passenger may face session timed out or network error.The web app auto save option.Therefore lot of time is saved |
| NFR-4 | **Performance** | The application is work faster with good network connection |
| NFR-5 | **Availability** | QR code is sended through the message and email id or phone number |
| NFR-6 | **Scalability** | Session management is available for web app. Numerous user can access the web app easily. |

**5.PROJECT DESIGN:**

5.1. Data Flow Diagram



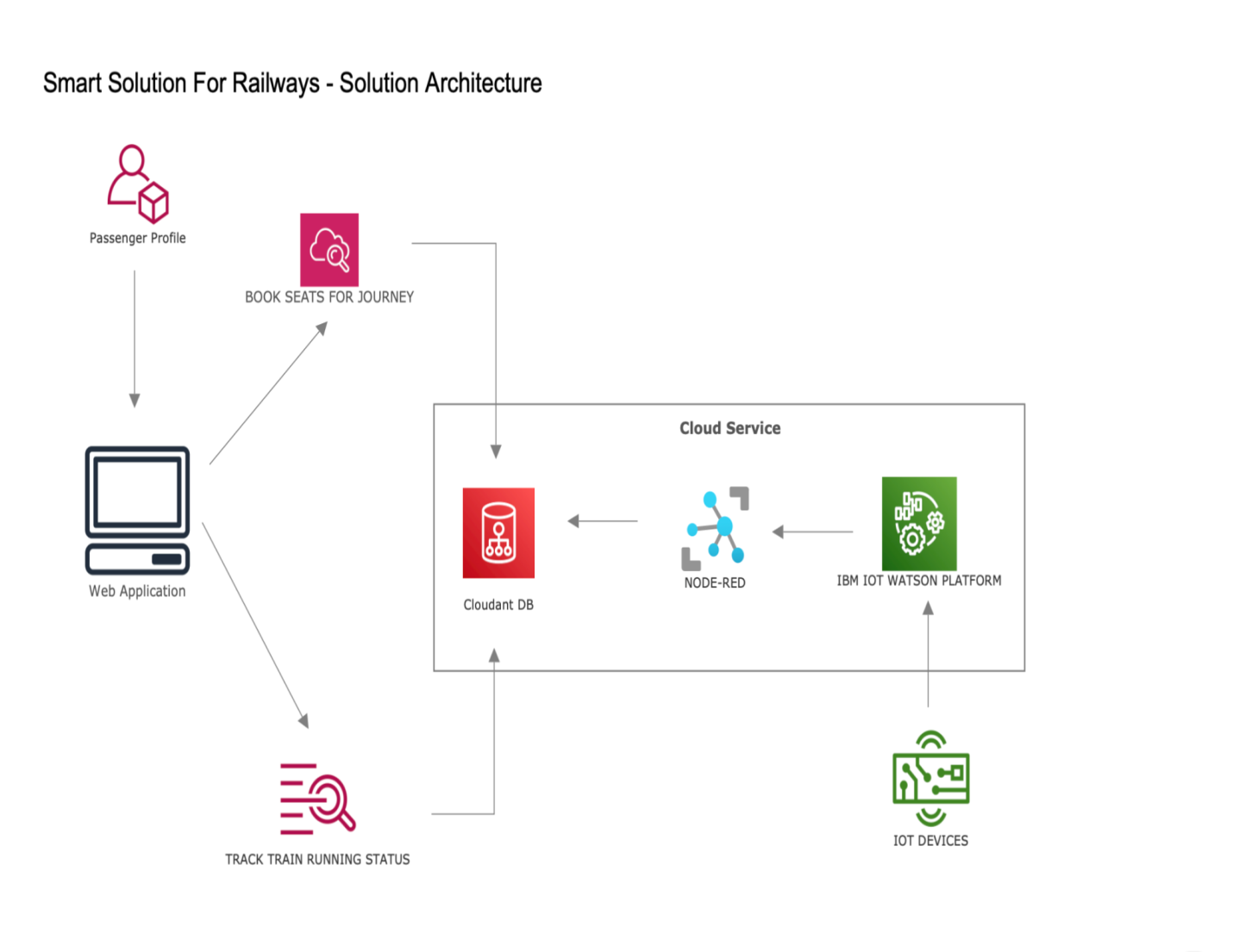
**5.2 SOLUTION &TECHNICAL ARCHITECTURE**

**Solution Architecture:**

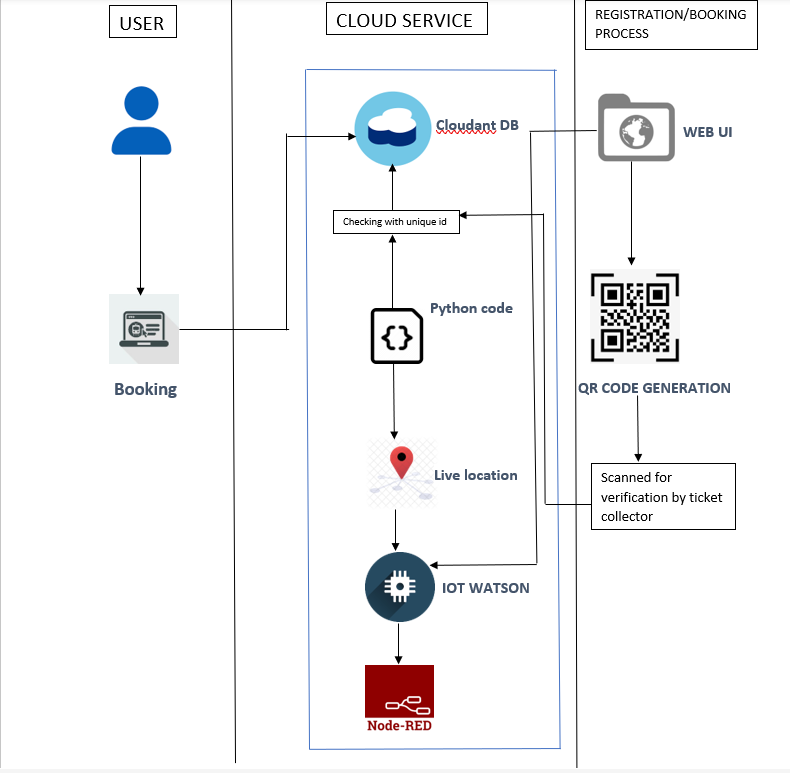
Solution architecture is a complex process – with many sub-processes – that bridges

The gap between business problems and technology solutions. Its goals are to:

* Find the best tech solution to solve existing business problems.
* Describe the structure, characteristics, behavior, and other aspects of the
* Software to project stakeholders.
* Define features, development phases, and solution requirements.
* Provide specifications according to which the solution is defined, managed,
* And delivered.

Example - Solution Architecture Diagram:

**TECHNICAL ARCHITECTURE:**

****

**5.3. UserStories**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 |
| Customer  (Mobile user) | Registration | 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 |
| Customer  (Mobile user) | Registration | 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 |
| Customer  (Mobile user) | Login | USN-4 | As a user, I can log into the application by entering email & password | I can log in to the application by entering email & password | High | Sprint-1 |
| Customer  (Mobile user) | Dashboard | Users | The details will be stored safely | I can access it using  database | Medium | Sprint-3 |
| Customer (Web user) | Reserving ticket | User | Enter the details and click submit button to  book ticket | I can use the QR code which is been  generated | High | Sprint-4 |
| Customer Care  Executive | Connecting the service provider | Customer | Connects with the service by logging in | Can get connected with the server | Medium | Sprint-3 |
| Administrator | Provides the  services | Admin | The data is given by the user | Can add or update the  data provided by the user | High | Sprint-4 |

6.PROJECTPLANNING& SCHEDULING

Project Development PhaseSprint 4

Project Development PhaseSprint 3

Project Development PhaseSprint 2

Project Development PhaseSprint1

ProjectDesignandProjectPlanningPhase

ProjectDesignandPlanningProjectDesignPhase2

ProjectDesignandPlanningProjectDesignPhase1

ProjectDesignandPlanningIdeationPhase

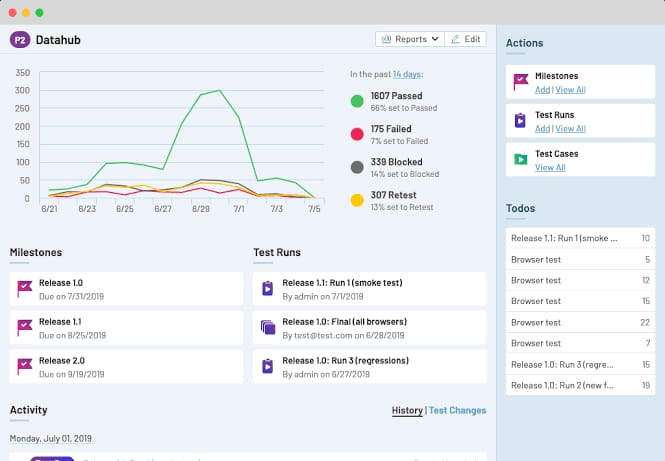
**6.1. Sprint Planning & Estimation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **TotalStory**  **Points** | **Duration** | **SprintStartDate** | **SprintEndDate**  **(Planned)** | **StoryPoints Completed(ason PlannedEndDate)** | **SprintReleaseDate**  **(Actual)** |
| Sprint-1 | 20 | 6Days | 24Oct2022 | 29Oct2022 | 20 | 29Oct2022 |
| Sprint-2 | 20 | 6Days | 31Oct2022 | 05Nov2022 | 20 | 05Nov2022 |
| Sprint-3 | 20 | 6Days | 07Nov2022 | 12Nov2022 | 20 | 12Nov2022 |
| Sprint-4 | 20 | 6Days | 14Nov2022 | 19Nov2022 | 20 | 19Nov2022 |

**6.2. Sprint Delivery Schedule**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **TotalStory**  **Points** | **Duration** | **SprintStartDate** | **SprintEndDate**  **(Planned)** | **StoryPoints Completed(ason PlannedEndDate)** | **SprintReleaseDate**  **(Actual)** |
| Sprint-1 | 20 | 6Days | 24Oct2022 | 29Oct2022 | 20 | 29Oct2022 |
| Sprint-2 | 20 | 6Days | 31Oct2022 | 05Nov2022 | 20 | 05Nov2022 |
| Sprint-3 | 20 | 6Days | 07Nov2022 | 12Nov2022 | 20 | 12Nov2022 |
| Sprint-4 | 20 | 6Days | 14Nov2022 | 19Nov2022 | 20 | 19Nov2022 |

**6.3. Reports from JIRA**

****

**7. CODING & SOLUTION:**

import wiotp.sdk.deviceimport time import randommyConfig={

"identity": ("orgId":"gagtey",

"typeId":"GPS",

"deviceId":"12345"},"auth":{

"token": "12345678"}} defmyCommandCallback(cmd):

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

client=wiotp.sdk.device.DeviceClient(config=myConfig,logHandlers=None)client.connect()def pub (data):

client.publishEvent (eventId="status", msgFormat="json", data=myData, qos=0,print("Published data Successfully: %s", myData) while True: myData={'name':'Train1','lat':17.6387448,'lon':78.4754336)pub(myData)time.sleep(3)

#myData('name': 'Train2', 'lat': 17.6387448, 'lon': 78.4754336) #pub(myData)#time.sleep

(3)myData={'name':'Train1','lat':17.6341908,'lon':

78.4744722)

pub(myData)time.sleep(3)

myData={'name': 'Trainl', 'lat': 17.6340889, lon': 78.4745052) pub(myData)time.sleep(3)

myData={'name': 'Trainl', 'lat': 17.6248626, 'lon': 78.4720259) pub(myData)time.sleep (3)

myData={'name': 'Trainl', 'lat': 17.6188577, 'lon': 78.4698726) pub(myData)time.sleep (3)

myData={'name': 'Train1', 'lat': 17.6132382, 'lon': 78.4707318)pub(myData) time.sleep (3)

client.commandCallback=myCommandCallbackclient.disconnect()

# QRSCANNER CODE:

Import cv2 importnumpyasnpimporttime

Import pyzbar.pyzbar as pyzbarfromibmcloudant.cloudant\_v1importCloudantV1from

ibmcloudant import CouchDbSessionAuthenticator from ibm\_cloud\_sdk\_core.authenticators import BasicAuthenticator authenticator=BasicAuthenticator('apikey-v2-

16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz', 'b0ab119f45d3e6255eabb978 serviceCloudant V1 (authenticator-authenticator) service.set\_service\_url('https://apikey-v2-16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119f45d3e6255eabb978e7e2f0cap= cv2.VideoCapture (0) font cv2.FONT HERSHEY PLAIN while True: framecap.read() decodedobjects pyzbar.decode (frame) for obj in decodedObjects: #print ("Data",obj.data)a-obj.data.decode('UTF-8')cv2.putText(frame,"Ticket",(50,50),font,2,(255,

0,0), 3)#print

(a)try: response =service.get\_document(db='booking,doc\_id= a).get\_result()print

**7.1. Feature 1**

* A. Railways can carry a large number of passengers and goods.
* B. They are an environment friendly means of transport.
* C. Railways has reduced the time of travel to a few hours between two places.
* D. Railways are a relatively cheap means of transport.

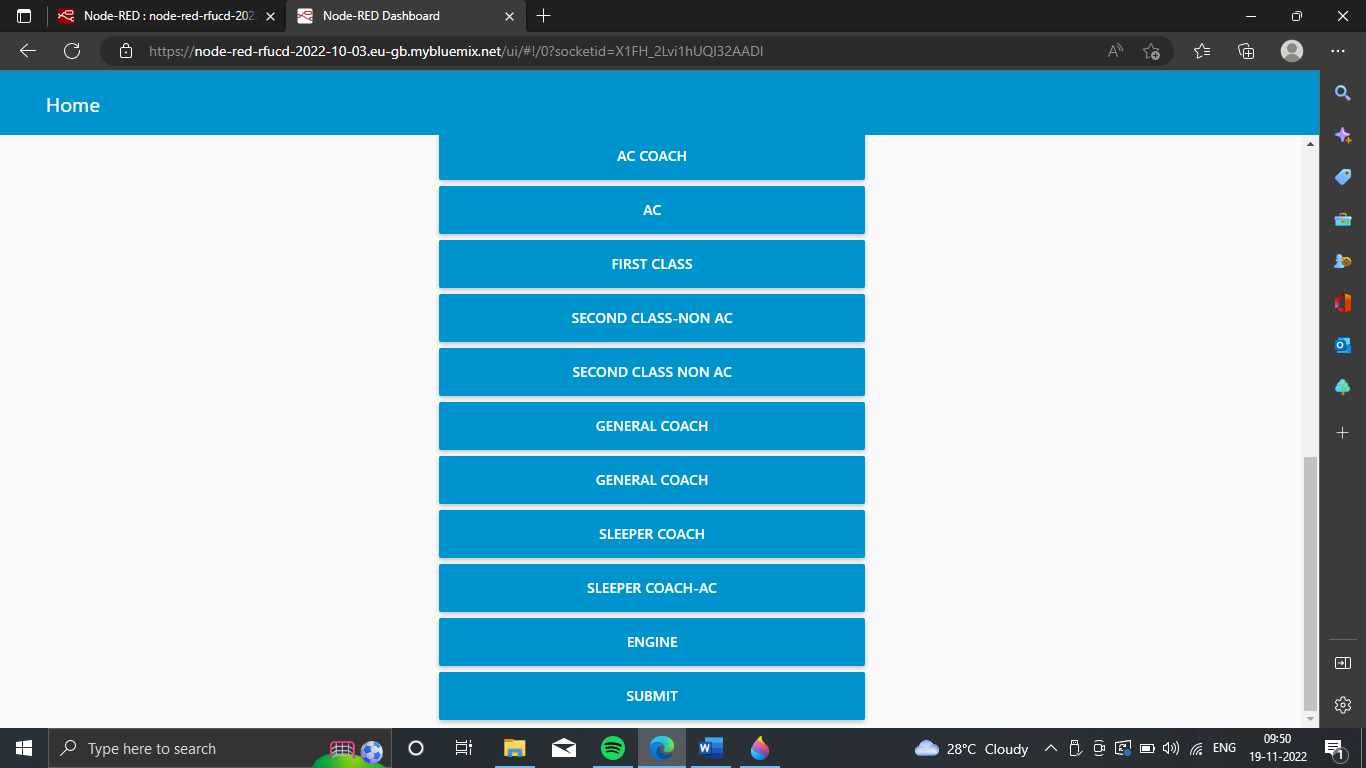
**7.2. Feature 2**

* Rail transport can be cost effective. ...
* Shipping via train is more environmentally friendly. ...
* Trains are capable of hauling large loads. ...
* Railways are reliable. ...
* Rail freight can be efficient. ...
* Rail options provide you with access to capacity.

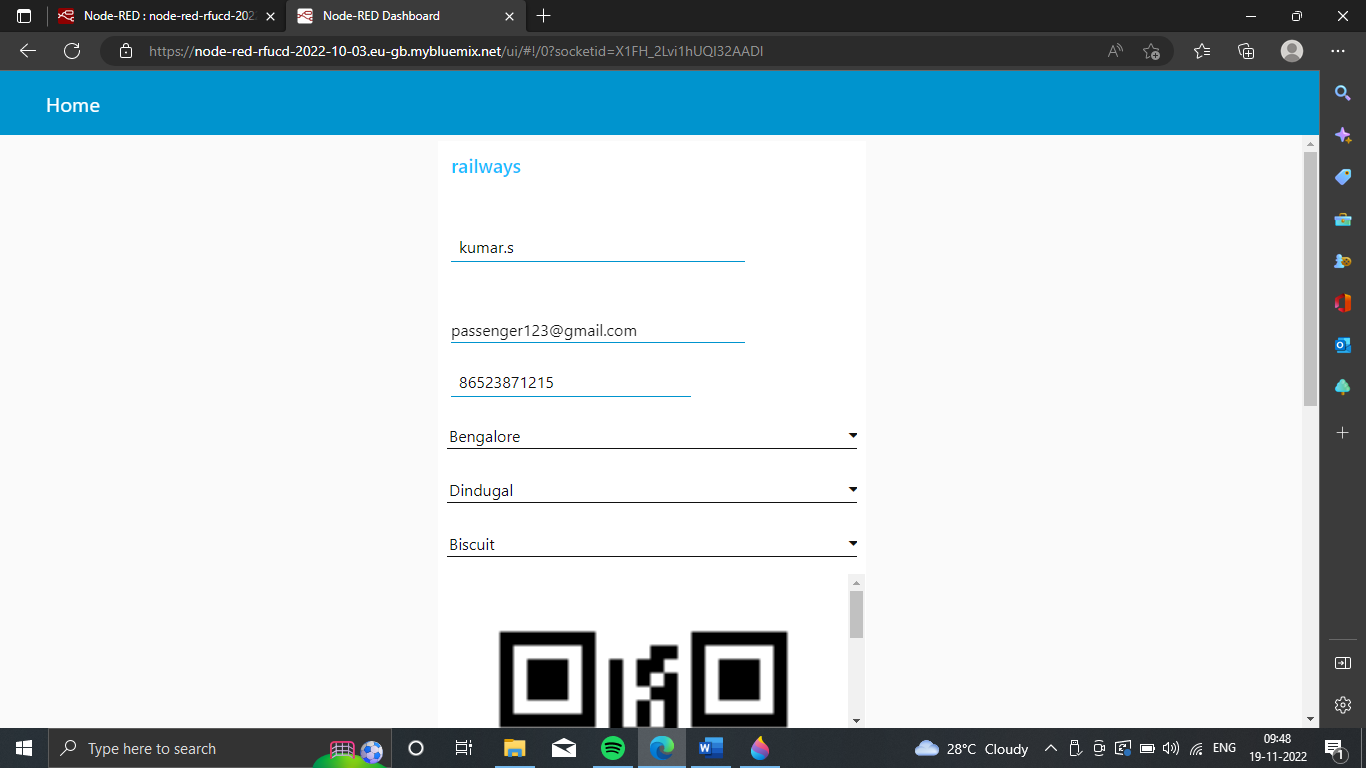
**7.3. Database Scheme:**

A smart railway will leverage advanced computing and sensing capabilities to meet the increasing transportation demands. State-of-the-art ITs (e.g., Internet of Things (IoT), big data, and cloud computing) can make the development of the smart railway feasible [ 3, 4 ].

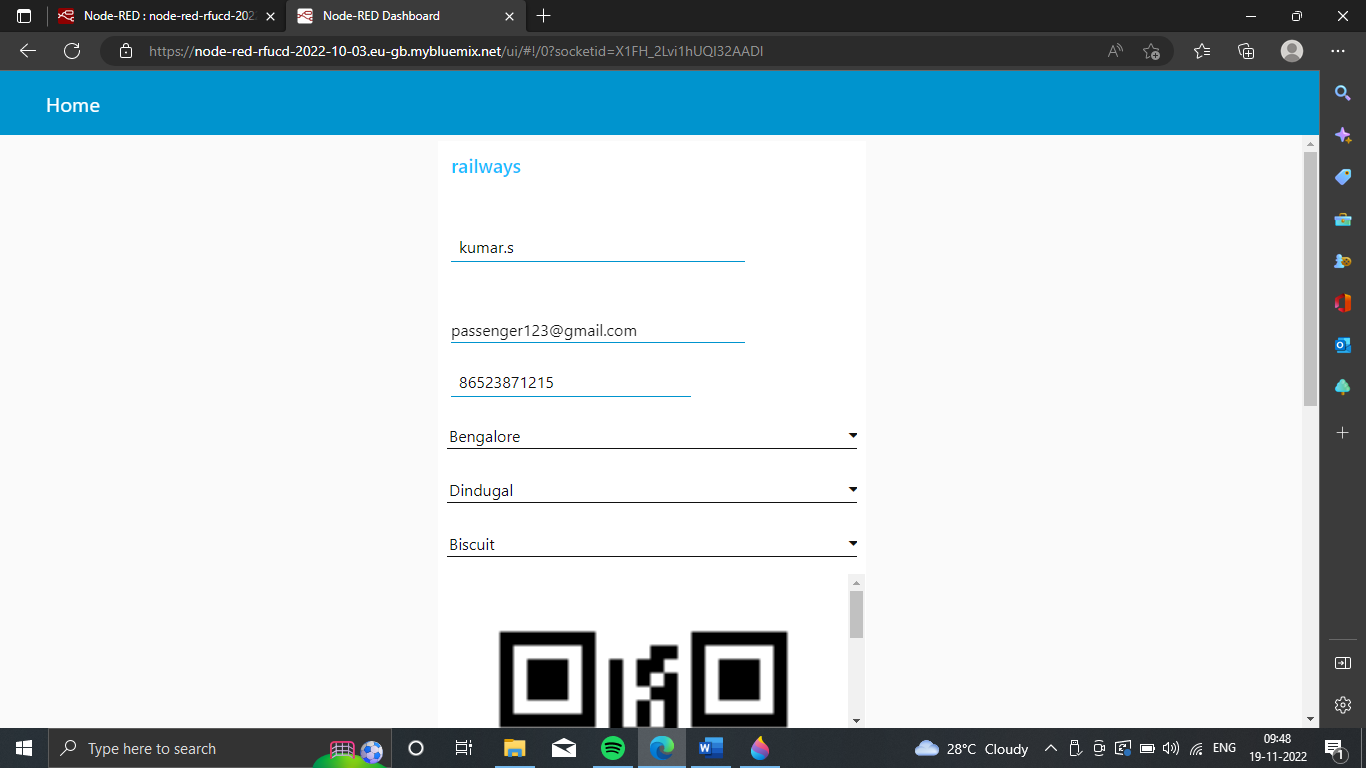
**8. TESTING:**

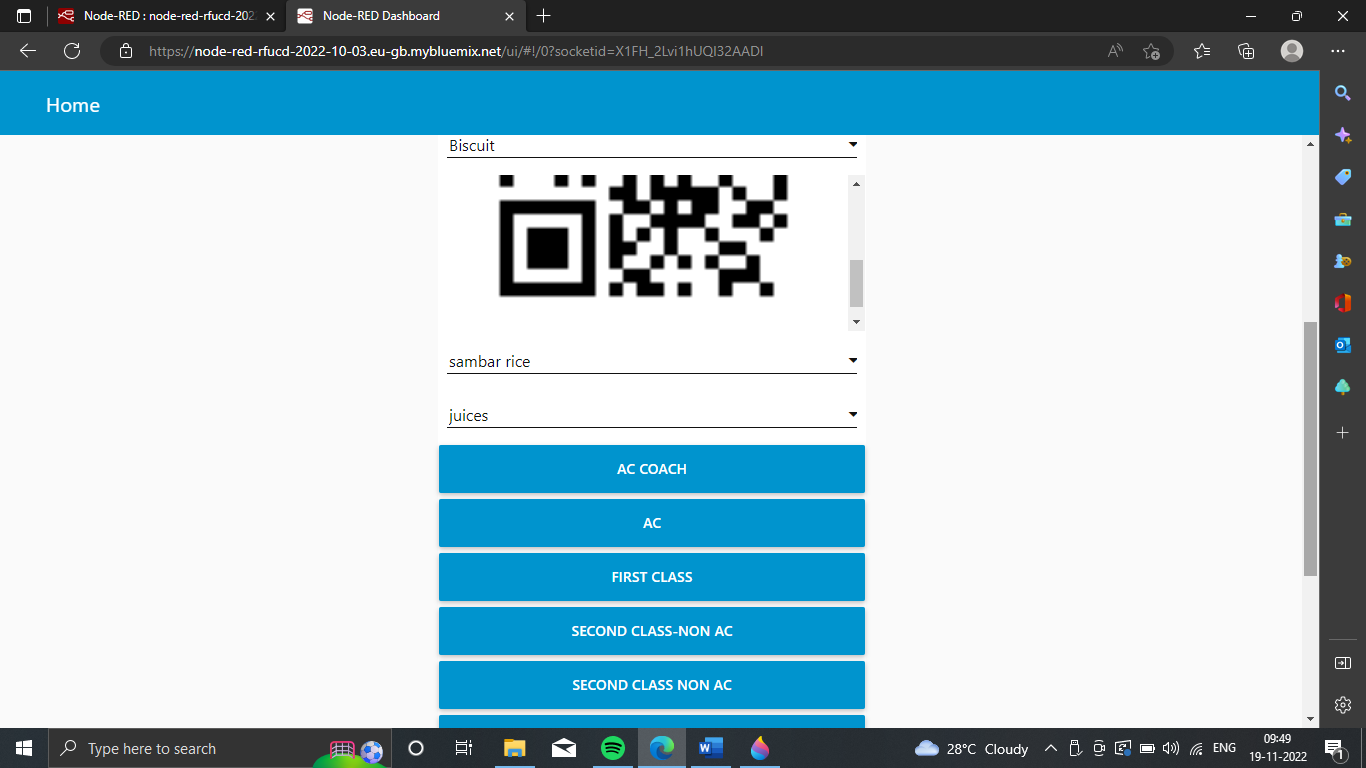
****

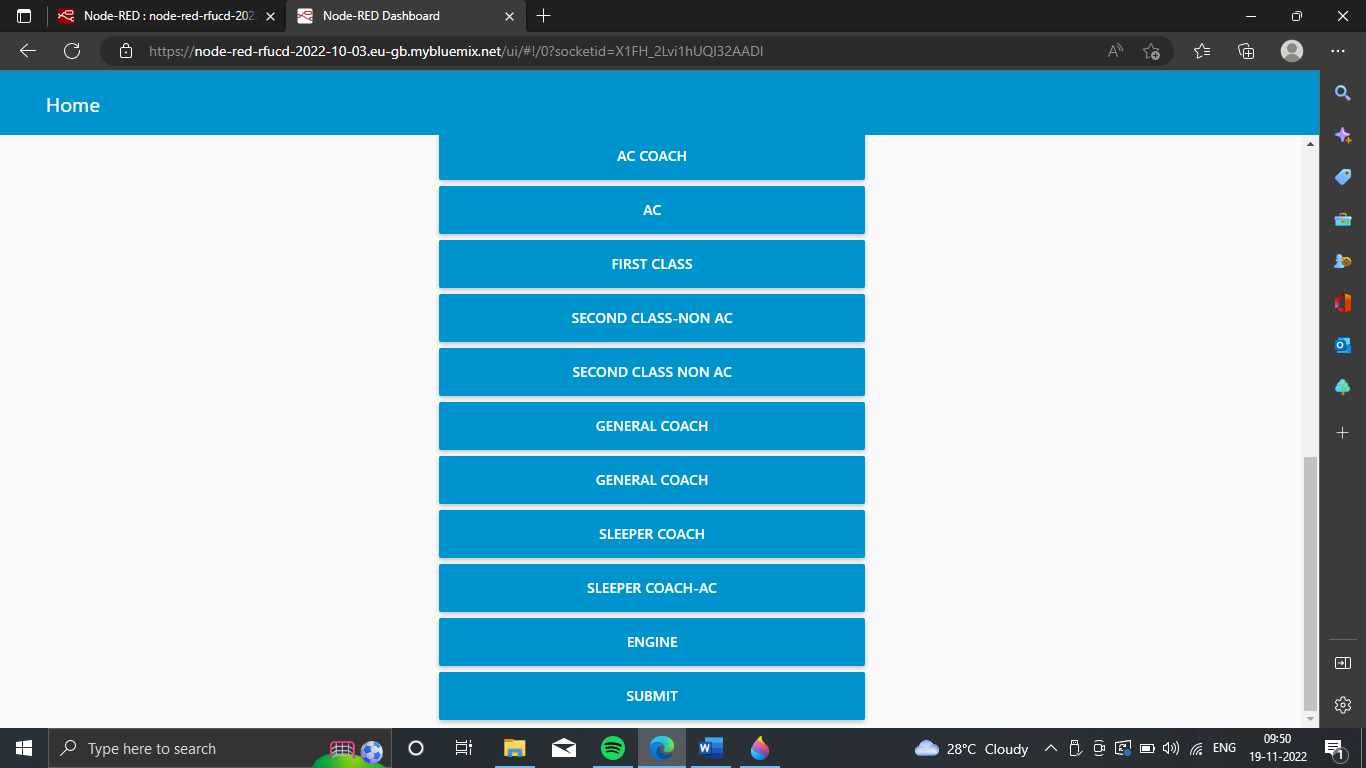
**8.1. TEST CASES**

****

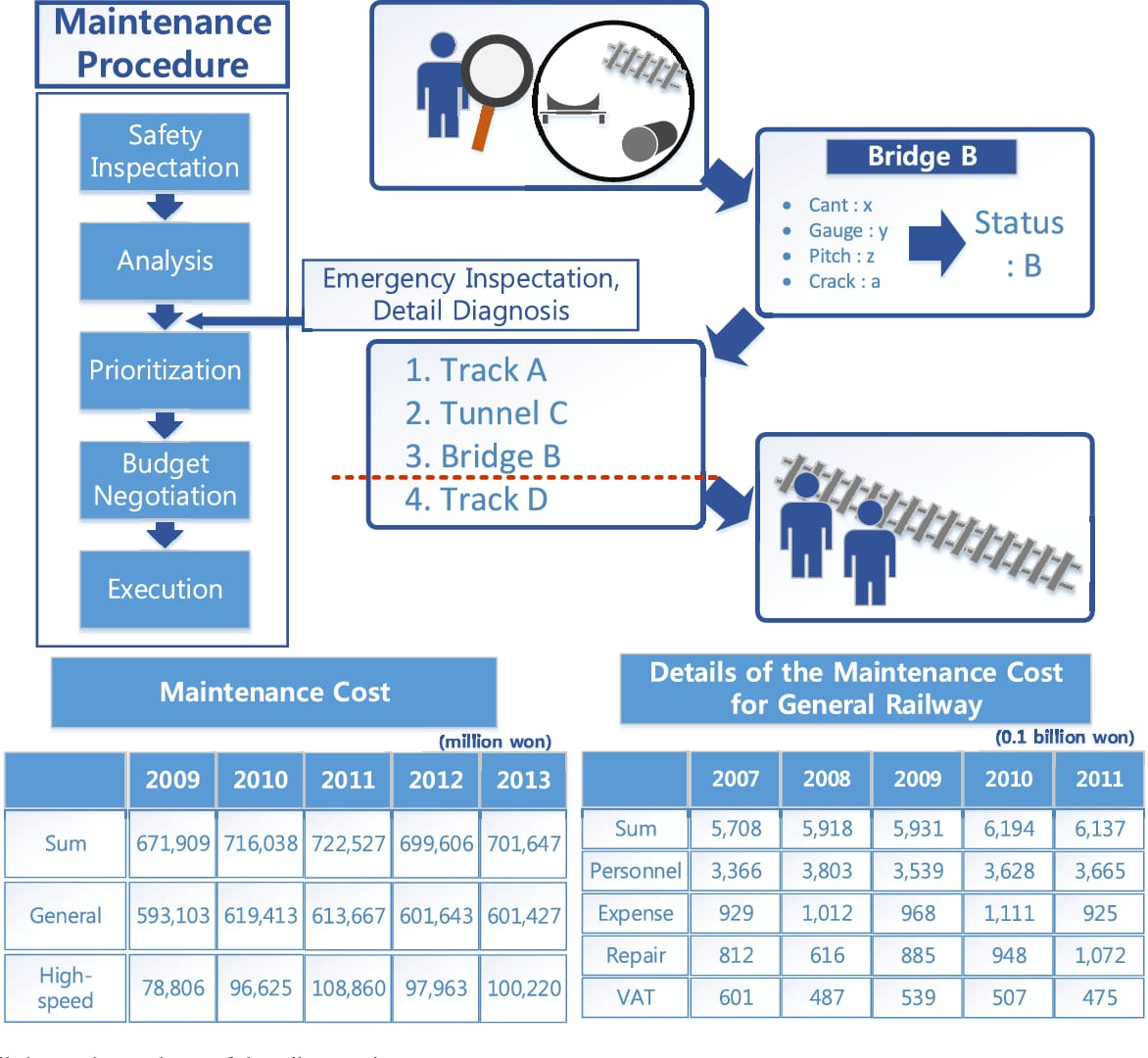
**9. Results:**

****

****

****

**9.1.Performance Metrics**

****

**10. Advantages:**

**1. Dependable:**

The greatest advantage of the railway transport is that it is the most dependable mode of transport as it is the least affected by weather conditions such as rains, fog etc. compared to other modes of transport.

**2. Better Organised:**

The rail transport is better organised than any other form of transport. It has fixed routes and schedules. Its service is more certain, uniform and regular as compared to other modes of transport.

**3. High Speed over Long Distances:**

Its speed over long distances is more than any other mode of transport, except airways. Thus, it is the best choice for long distance traffic.

**4. Suitable for Bulky and Heavy Goods:**

Railway transport is economical, quicker and best suited for carrying heavy and bulky goods over long distances.

**5. Cheaper Transport:**

It is a cheaper mode of transport as compared to other modes of transport. Most of the working expenses of railways are in the nature of fixed costs. Every increase in the railway traffic is followed by a decrease in the average cost. Rail transport is economical in the use of labour also as one driver and one guard is sufficient to carry much more load than the motor transport.

### 10. Disadvantages:

**Although railway transport has many advantages, it suffers from certain serious limitations:**

**1. Huge Capital Outlay:**

The railway requires is large investment of capital. The cost of construction, maintenance and overhead expenses are very high as compared to other modes of transport. Moreover, the investments are specific and immobile. In case the traffic is not sufficient, the investments may mean wastage of huge resources.

**2. Lack of Flexibility:**

Another disadvantage of railway transport is its inflexibility. Its routes and timings cannot be adjusted to individual requirements.

**3. Lack of Door to Door Service:**

Rail transport cannot provide door to door service as it is tied to a particular track. Intermediate loading or unloading involves greater cost, more wear and tear and wastage of time. The time and cost of terminal operations are a great disadvantage of rail transport.

**4. Monopoly:**

As railways require huge capital outlay, they may give rise to monopolies and work against public interest at large. Even if controlled and managed by the government, lack of competition may breed inefficiency and high costs.

**5. Unsuitable for Short Distance and Small Loads:**

Railway transport is unsuitable and uneconomical for short distance and small traffic of goods.

**6. Booking Formalities:**

It involves much time and labour in booking and taking delivery of goods through railways as compared to motor transport.

**11. CONCLUSION:**

By using this Autonomous vehicle for purpose of railway track inspection and crack detection, it will have a great impact in the maintenance of the tracks which will help in preventing train accidents to a very large extent. The regions where manual inspection is not possible, like in deep coal mines, mountain regions and dense thick forest regions can be easily done using this vehicle. By using this vehicle for the purpose of Railway track inspection and crack detection and automated SMS will be sent to pre-defined phone number whenever the vehicle sensors detect any crack or deformation. This will help in maintenance and monitoring the condition of railway tracks without any errors and thereby maintaining the tracks in good condition, preventing train accidents to very large extent Railway track crack detection autonomous vehicle is designed in such a way that it detects the cracks or deformities on the track which when rectified in time will reduce train accidents.

**12.FUTURE SCOPE:**

In future CCTV systems with IP based camera can be used for monitoring the visual videos captured from the track. It will also increase security for both passengers and railways. GPS can also be used to detect exact location of track fault area, IP cameras can also be used to show fault with the help of video. Locations on Google maps with the help of sensors can be used to detect in which area track is broken.

**13. APPENDIX:**

**SOURCE CODE FOR TICKET RESERVASTION:**

print("\n\nTicket Booking System\n")

restart = ('Y')

while restart != ('N','NO','n','no'):

print("1.Check PNR status")

print("2.Ticket Reservation")

option = int(input("\nEnter your option : "))

if option == 1:

print("Your PNR status is t3")

exit(0)

elif option == 2:

people = int(input("\nEnter no. of Ticket you want : "))

name\_l = []

age\_l = []

sex\_l = []

for p in range(people):

name = str(input("\nName : "))

name\_l.append(name)

age = int(input("\nAge : "))

age\_l.append(age)

sex = str(input("\nMale or Female : "))

sex\_l.append(sex)

restart = str(input("\nDid you forgot someone? y/n: "))

if restart in ('y','YES','yes','Yes'):

restart = ('Y')

else :

x = 0

print("\nTotal Ticket : ",people)

for p in range(1,people+1):

print("Ticket : ",p)

print("Name : ", name\_l[x])

print("Age : ", age\_l[x])

print("Sex : ",sex\_l[x])

x +=

**GitHub :** <https://github.com/IBM-EPBL/IBM-Project-28728-1660115587>

**Project Demo Link:**<https://youtu.be/Z66EYRDv6BY>