PROJECT REPORT

PROJECT NAME : SMART SOLUTIONS FOR RAILWAYS
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TEAM LEADER : NITHYASHREE R
TEAM MEMBERS : DIVYA T
MAHESWARI S
SHANMUGA PRIYA C

1. INTRODUCTION

1.1 Project Overview

Due to its advantages, trains are one of the most popular ways of transportation for middle class and poor people. The probability of thefts and mishaps including chain snatching, derailments, and fire incidents is rising concurrently. We developed an application that users can access after purchasing tickets as a means to prevent or, more accurately, to stop all such cruelty. This app resolves problems by alerting TC and RPF via text message with a single click. To store passenger data for our project, we make use of the Node-Red service, app development, and IBM cloud platform.

1.2 Purpose

The purpose of this project is to report and get relieved from the issues related to trains.

2. LITERATURE SURVEY

2.1 Problem Statement

A Web page is designed for the public, where they can book tickets by seeing the available seats. After booking the train, the person will get a QR code which has to be shown to the Ticket Collector while boarding the train. The ticket collectors can scan the QR code to identify the personal details. A GPS module is present in the train to track it. The live status of the journey is updated in the Web app continuously. All the booking details of the customers will be stored in the database with a unique ID and they can be retrieved back when the Ticket Collector scans the QR Code.

2.2 References

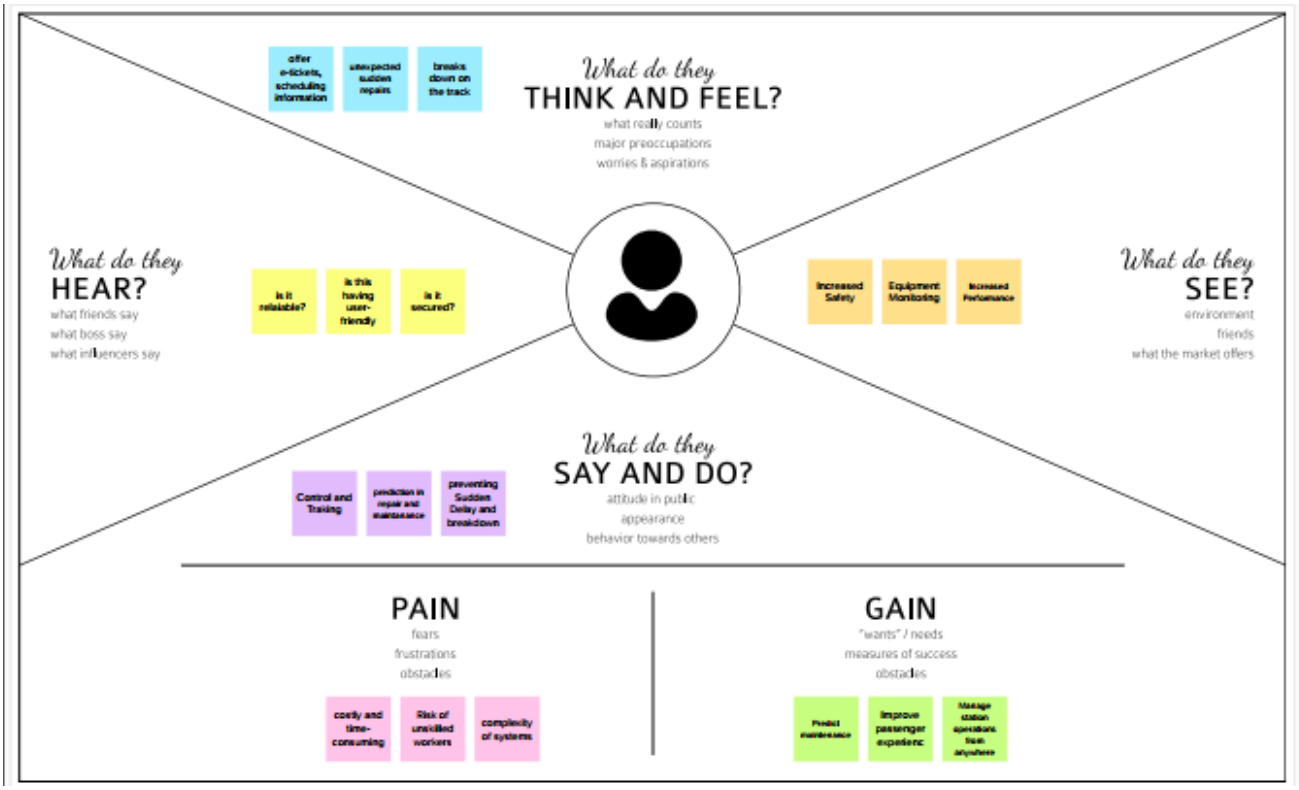
S.NO	TITLE	AUTHOR	YEAR	KEY TECHNOLOGY
1.	Main geotechnical problems of railways and roads in kriolit ozone and their solutions.	Kondratiev,Valentin G	2017	Main problems in railways
2.	Construction and Building Materials	Sañudo, Roberto, Marina Miranda, Carlos García, and David GarcíaSanchez	2019	Drainage in railways
3.	Problems of Indian Railways	Benjamin	2021	Common problems in Indian railways
4.	A comparative study of Indian and worldwide railways.	Sharma, Sunil Kumar, and AnilKumar	2014	Study of Indian railways
5.	Ticketing solutions for Indian railways using RFID technology	Prasanth,Venugopal, and K.P. Soman	2009	Solution for ticketing using RFID

2.3 Problem Statement Definition

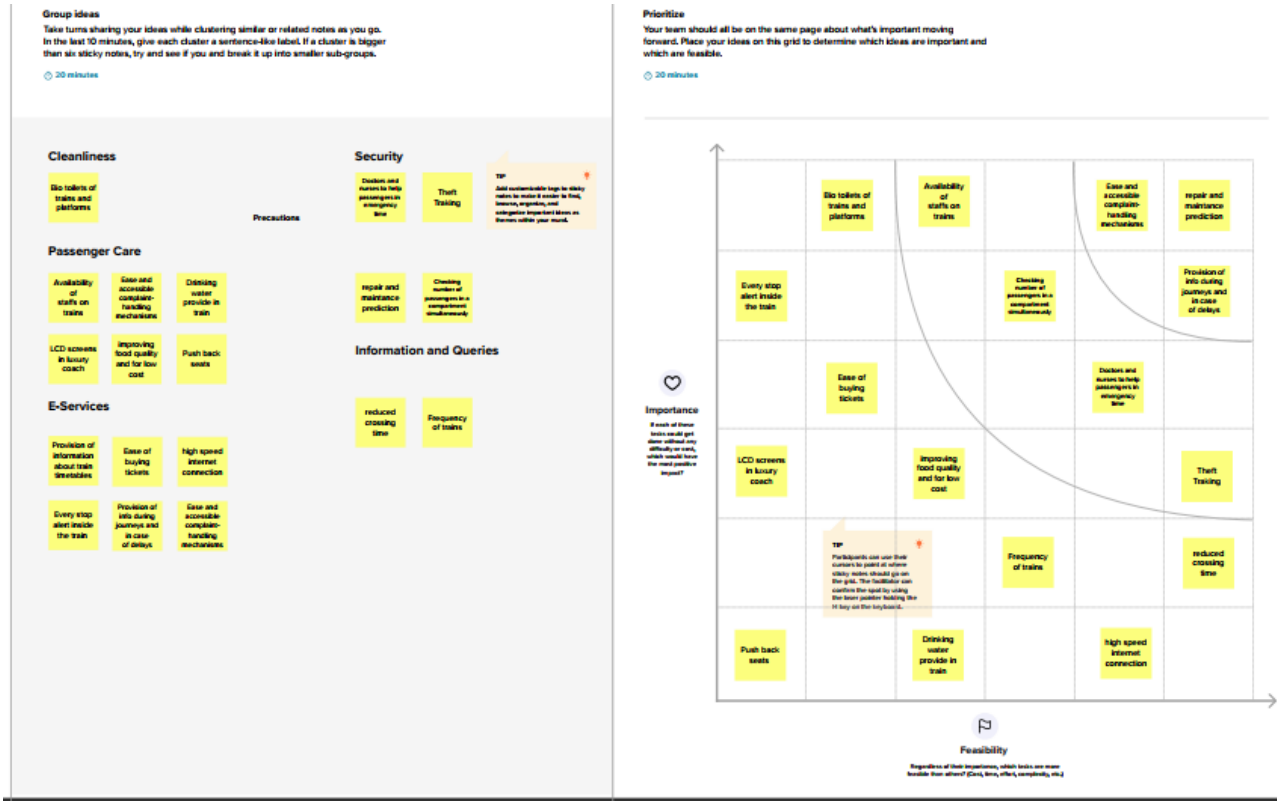
Smart Solutions for railways are designed to reduce the workload of the user and the use of paper.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



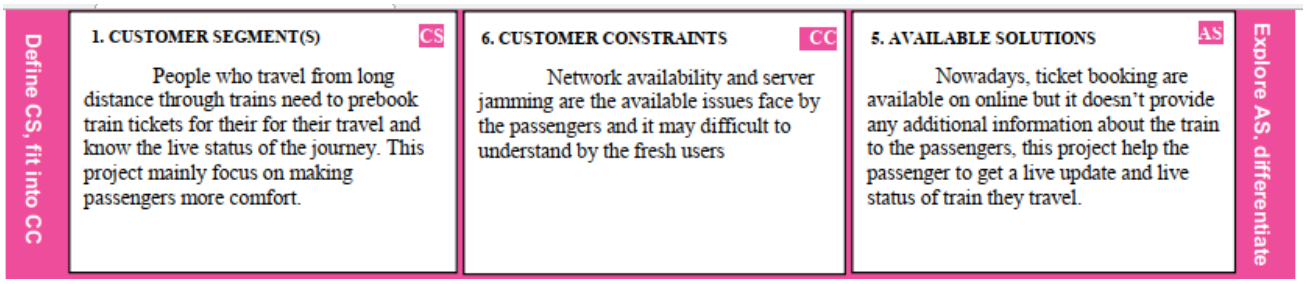
3.2 Ideation & Brainstorming

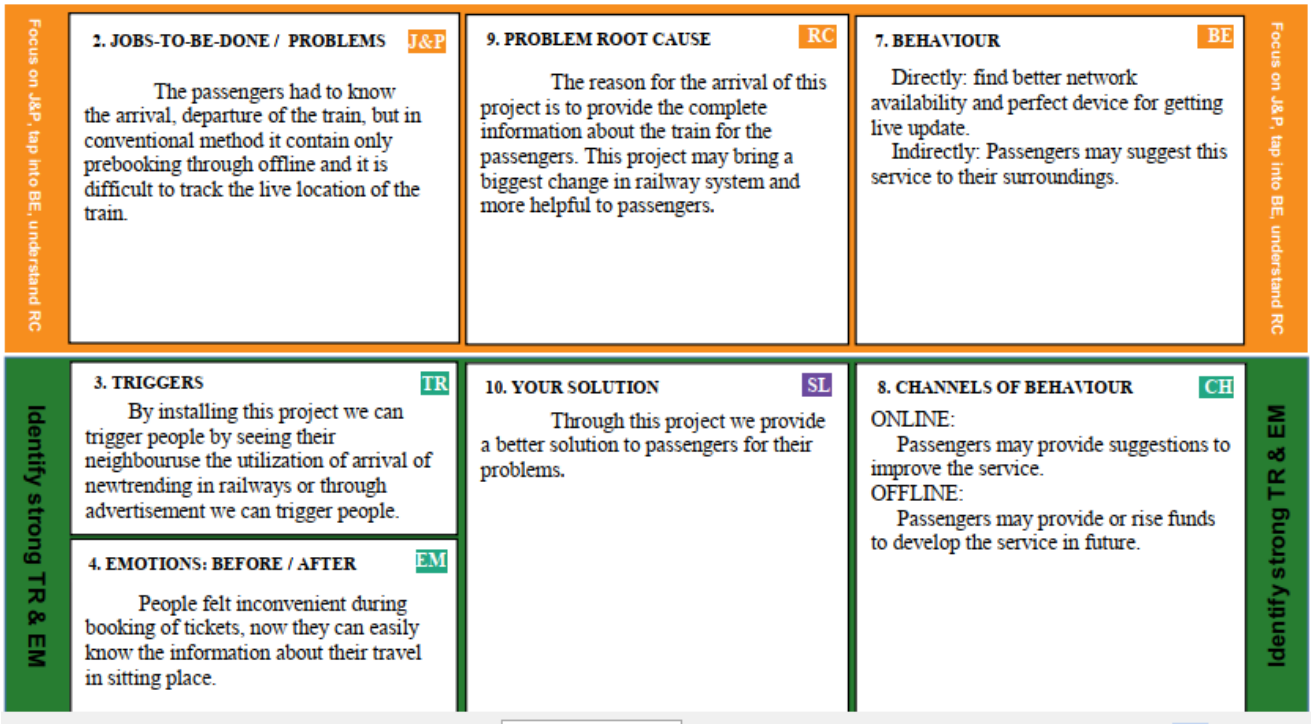


3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Smart solution for Railways will provide will provide information about tracks, e-tickets and also the arriving time of the train
2.	Idea / Solution description	We are using various sensors and internet connection to send and receive the notifications and alerts immediately to the railway department and people.
3.	Novelty / Uniqueness	The uniqueness of this project is we can easily identify the track information within a short period of time with less manpower.
4.	Social Impact / Customer Satisfaction	It will help people to book their tickets more easily and quickly and save their time of booking.
5.	Business Model (Revenue Model)	This project requires less manpower and has a great life and more accuracy in the system.
6.	Scalability of the Solution	This project can withstand for huge years and technology updates can also be applicable to it.

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 Requirements**	1.Mobile Phone
		2.Internet
		3.QR Code Scanner
FR-2	**User Registration**	1.Manual Registration
		2.Registration through web page
		3.Registration through Application
FR-3	**User Confirmation**	1.Confirmation via Phone.
		2.Confirmation via Email.
		3.Confirmation via OTP.
		4.Confirmation via SMS.
FR-4	**Payment Options**	1.Net Banking/UPI.
		2.Credit/Debit/ATM Card.
		3.Digital Wallet.

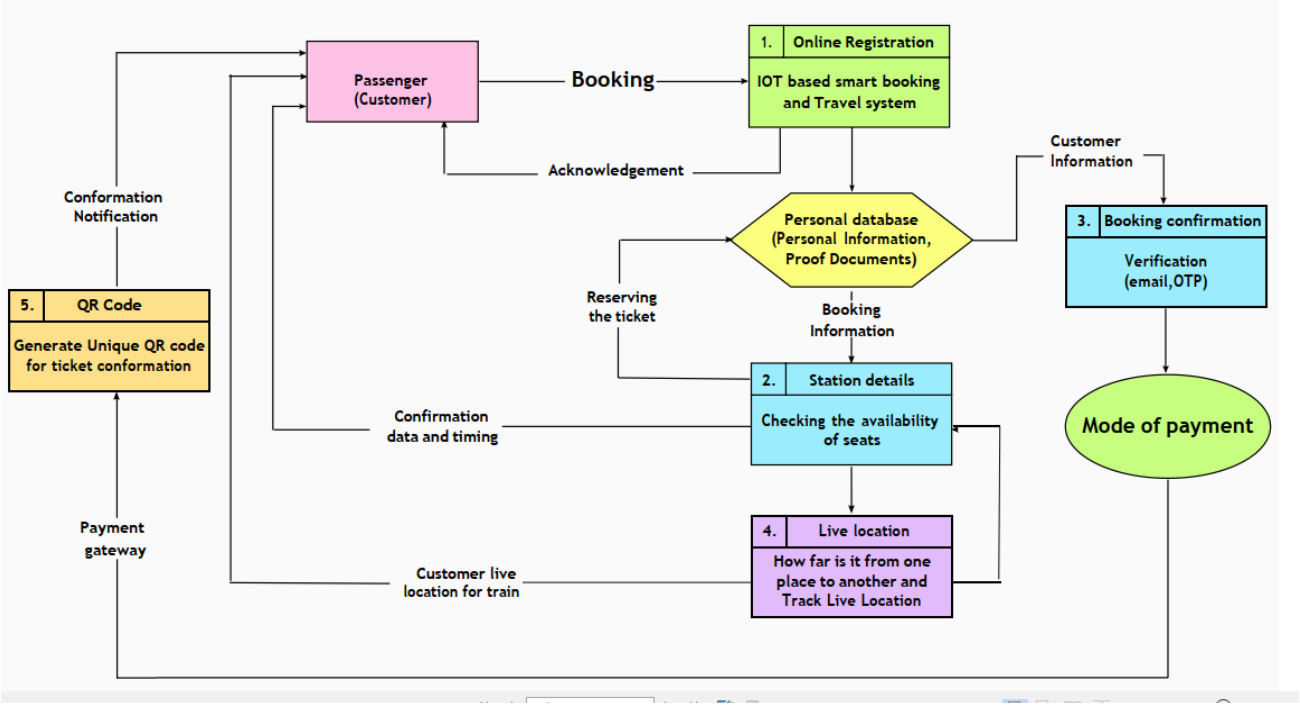
FR-5	**Application**	1.Free Installation via Play Store and App store.
	Installation	2.Website is available for free and will function always.
FR-6	**Application Feedback**	1.Through Web page
		2.Through Phone calls

4.2 Non-Functional requirement

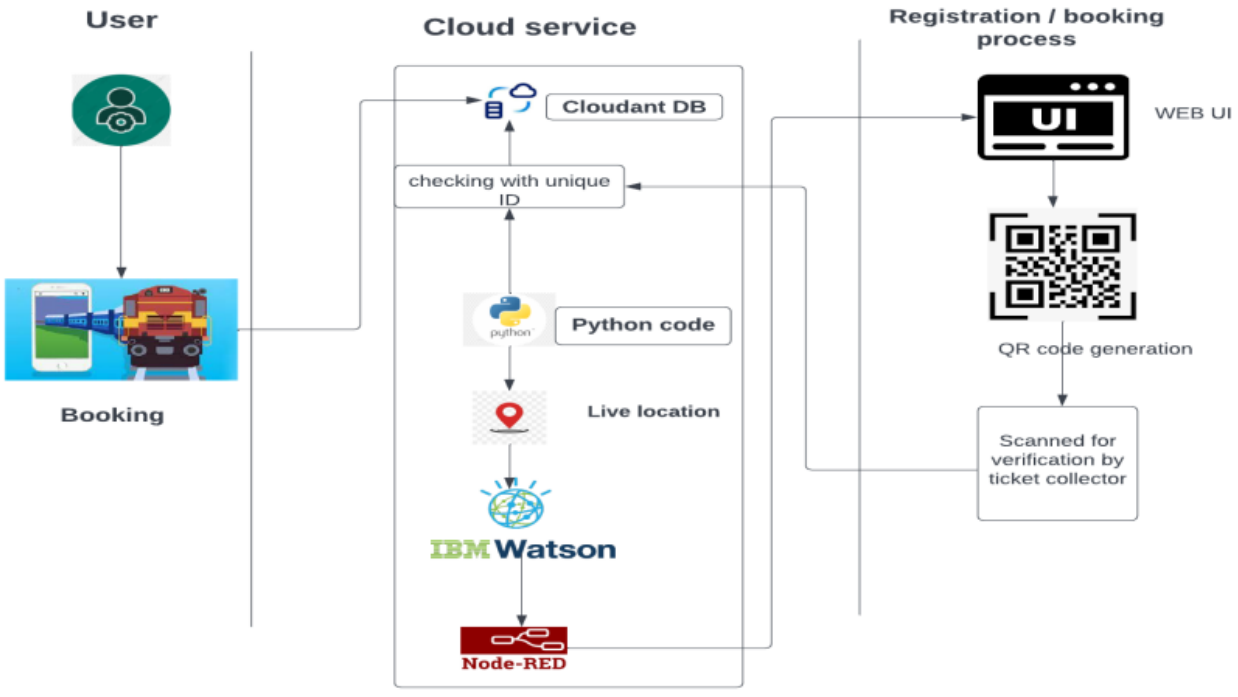
FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	1.Have a Simple and Efficient application demo
		Video.
		2.Easier to use.
		3.If a Traveller has a Mobile Phone,they may
		easily Understand the procedure and make
		Reservations.
NFR-2	**Security**	1.Two-step authorization is required to secure the application.
		2.Username and password will be assigned in accordance with
		user requirements.
NFR-3	**Reliability**	1.Periodic updates should be made to websites and
		applications.
		2.If the booking process is interrupted by an internet outage,
		we offer an offline mode to complete the detail process.
NFR-4	**Performance**	1.The user interface of the web application must be
		user-friendly.
		2. Payment methods should be quick and easy.
NFR-5	**Availability**	1.Provided with the proper train location.
		2.Databases are maintained for passenger history.
		3.Anytime and Anywhere for online ticket booking

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution Architecture



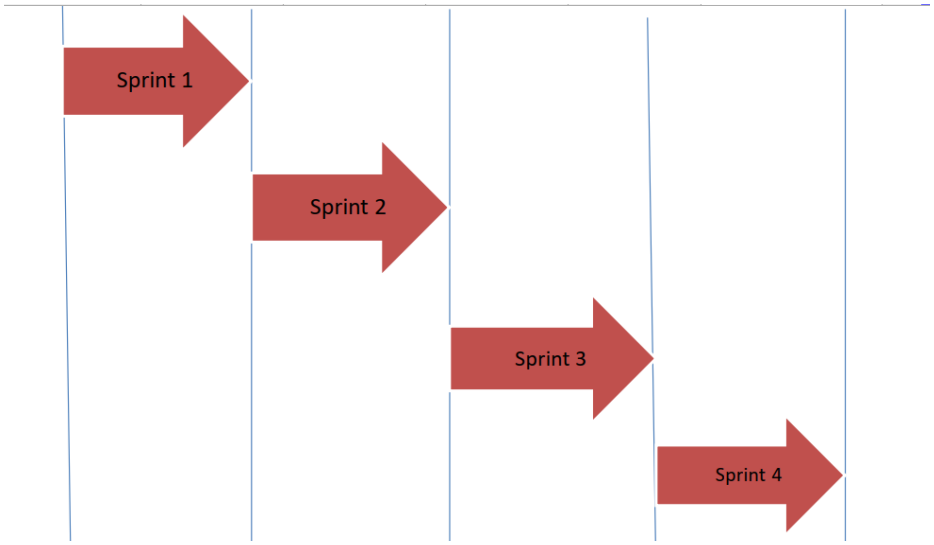
5.3 Customer Journey

6. PROJECT PLANNING & SCHEDULING

6.1 User Stories

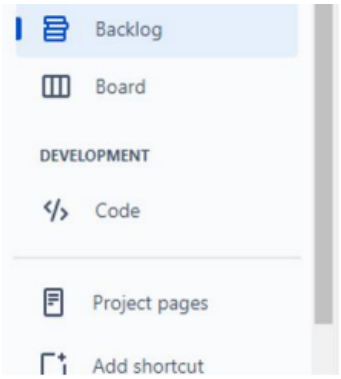
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Nithyashree R
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Maheswari S
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Divya T
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Shanmuga Priya C
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	
	Dashboard					

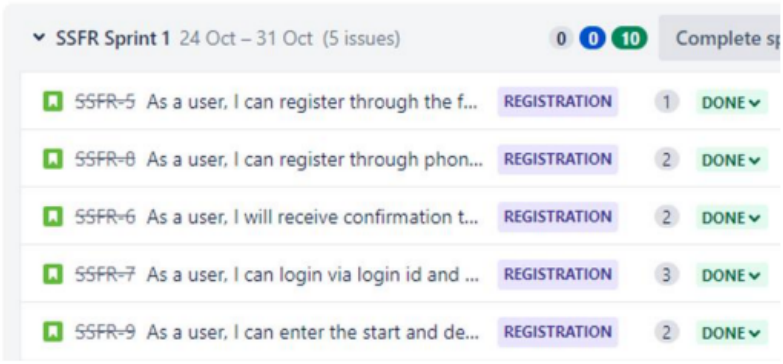
6.2 Sprint Planning & Estimation



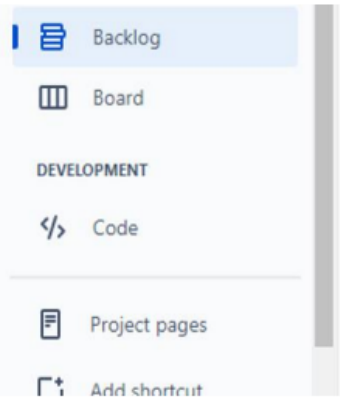
6.3 Reports from JIRA

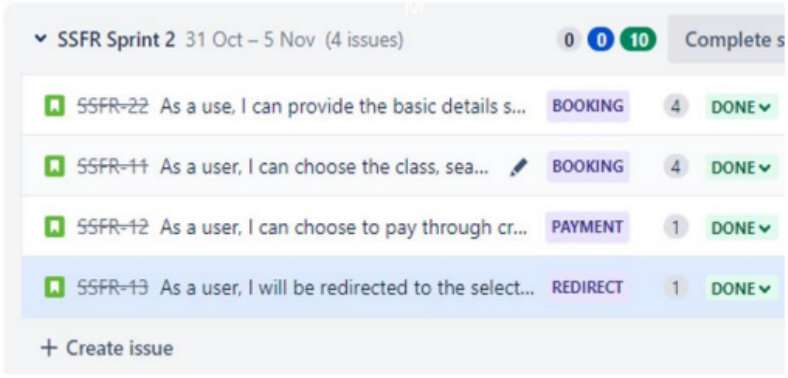
SPRINT 1



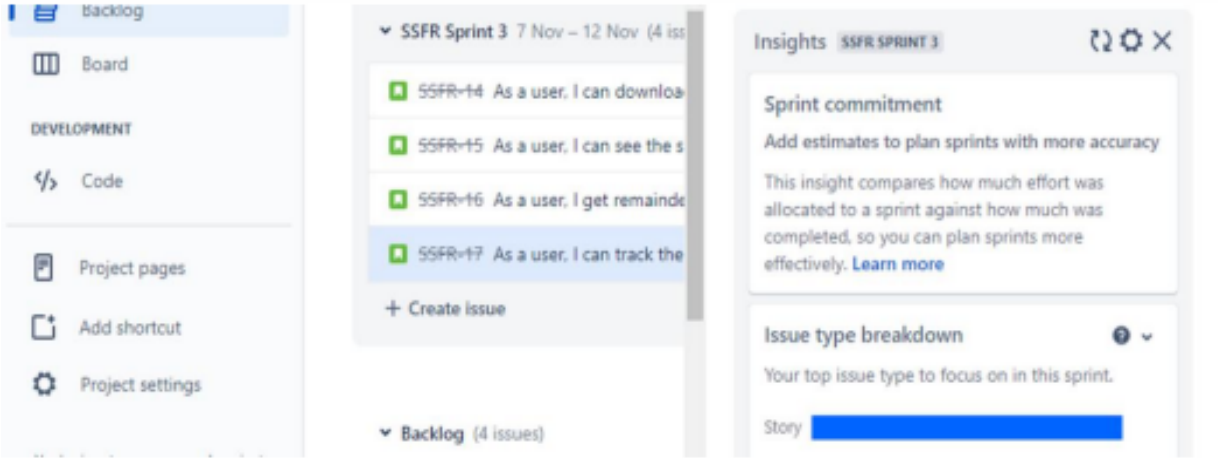


SPRINT 2





SPRINT 3



SPRINT 4

7. CODING & SOLUTIONING

7.1 Feature 1

- IoT device
- IBM Watson Platform
- Node red
- Cloudant DB
- Web UI
- MIT App Inventor
- Python code

7.2 Feature 2

- ❖ Login Verification
- ❖ Ticket Booking
- ❖ Adding rating

8. TESTING AND RESULTS

8.1 Test Cases

Test case 1

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commments	TC for Automation(Y/N)	BUG ID
1	Functional	Registration	Registration through the form by Filling in my details		1.Click on register 2.Fill the registration form 3.click Register		Registration form to be filled is to be displayed	Working as expected	PASS			
2	UI	Generating OTP	Generating the otp for further process		1.Generating of OTP number		user can register through phone numbers and to get otp number	Working as expected	PASS			
3	Functional	OTP verification	Verify user otp using mail		1.Enter gmail id and enter password 2.click submit	Username: railways password: admin	OTP verifed is to be displayed	Working as expected	FAIL			
4	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter into log in page 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: railways password: admin	Application should show 'Incorrect email or password 'validation message.	Working as expected	FAIL			
5	Functional	Display Train details	The user can view about the available train details		1.As a user, I can enter the start and destination to get the list of trains available connecting the above	Username: railways password: admin	A user can view about the available trains to enter start and destination details	Working as expected	PASS			

Test case 2

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID
1	Functional	Booking	user can provide the basicdetails such as a name, number, etc		1. Enter the member's details like name, number.		Tickets booked to be displayed	Working as expected	Pass			
2	UI	Booking seats	Usercan choose the train, starting and ending destination, date of travel.		1. Known to which train is available		known to which the seats are available	Working as expected	Fail			
3	Functional	Payment	user, I can choose to pay through credit Card/debit card/UPI.		1. user can choose payment method 2.payment method		payment for the booked tickets to be done using payment method through either the following methods credit Card/debit card/UPI.	Working as expected	Fail			
4	Functional	Redirection	user can be redirected to the selected		1.After payment the user will be redirected to the previous page		After payment the user will be redirected to the previous page	Working as expected	Pass			

Test case 3

Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
Functional	Ticket generation	A user can download the generated e-ticket for my journey along with the QR code which is used for authentication during my journey.	1.Enter method of reservation 2.Enter name,age,gender 3.Enter how many tickets wants to be booked 4.Also enter the number member's details like name,age,gender	1. Offline/ Online 2. USER21 , 21, M 3. 1 TICKET	Tickets booked to be displayed	Working as expected	Pass				nithyashree
UI	Ticket status	A user can see the status of my ticket Whether it's confirmed/waiting/RAC	1.Known to the status of the tickets booked	CONFIRMED	Known to the status of the tickets booked	Working as expected	Pass				divya
Functional	Remainder notification	A user, I get remainders about my journey, A day before my actual journey.	1.User can get reminder notification	1. Your coach will be s7 ; Seat No. = 626546 . 2. Chart has been prepared ; Your platform no. is 4 ; Arriving	User can get reminder nofication	Working as expected	Pass				maheshwari
Functional	GPS tracking	User can track the train using GPS and can get information such as ETA, Current stop and delay.	1.Tracking train for getting information	1. Your next stop is cbt . 2. Train delay 5 minutes . 3. Destination reach approximate 3 hours .	Tracking process through GPS	Working as expected	Pass				shanmughapriya

Test case 4

Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comm
Functional	Ticket	User can cancel my tickets	1. Tickets to be cancelled	Cancellation confirmed	Tickets booked to be cancelled	Working as	Pass	
UI	Raise	User can raise queries through	1. Raise the queries	Refund duration ?	Raise the queries	Working as	Pass	
Functional	Answer the	User will answer the	1. Answer the queries	Refund will be transfer to	Answer the queries	Working as	Pass	
Functional	Feed	A user will feed information	1. Information feeding on trains	Train delay by 15 minutes .	Information feeding on trains	Working as	Pass	

9. ADVANTAGES

- The passengers can use this application, while they are travelling alone to ensure their safety.
- It is easy to use.
- It has minimized error rate.

10. DISADVANTAGES

- Network issues may arise.

11. CONCLUSION

Almost all the countries across the globe strive to meet the demand for safe, fast, and reliable rail services. Lack of operational efficiency and reliability, safety, and security issues, besides aging railway systems and practices are haunting various countries to bring about a change in their existing rail infrastructure. The global rail industry struggles to meet the increasing demand for freight and passenger transportation due to lack of optimized use of rail network and inefficient use of rail assets. Often, they suffer from the lack in smart technologies and latest technological updates to provide the most efficient passenger services. This is expected to induce rail executives to build rail systems that are smarter and more efficient. The passenger reservation system of Indian Railways is one of the world's largest reservation models. Daily about one million passengers travel in reserved accommodation with Indian Railways. Another sixteen million travel with unreserved tickets in Indian Railways. In this vast system, it is a herculean task to efficiently handle the passenger data, which is a key point of consideration now-a-days. But the implementation of the latest technological updates in this system gradually turns inevitable due to increasing demand for providing the most efficient passenger services. Handling the passenger data efficiently backed by intelligent processing and timely retrieval would help backing up the security breaches. Here we've explored different issues of implementing smart computing in railway systems pertaining to reservation models besides pointing out some future scopes of advancement. Most significant improvements have been evidenced by more informative and user-friendly websites, mobile applications for real-time information about vehicles in motion, and e-ticket purchases and timetable information implemented at stations and stops. With the rise of Industry, railway companies can now ensure that they are prepared to avoid the surprise of equipment downtime. Like mentioned above, the developed application of our project can lead the passenger who can travel safely without any fear.

12. FUTURE SCOPE

This application is ensured for safety for the passengers while they are traveling alone as well as when they travel with their family or friends. In future, this application may also be used by passengers who travel by bus. By further

enhancement of the application the passengers can explore more features regarding their safety.

13. APPENDIX

13.1 Source Code

Python

```
import wiotp.sdk.device
import time
import random
myConfig = {
   "identity": {
      "orgId": "xfxj98",
      "typeId": "railway23",
      "deviceId":"Device1"
   },
   "auth": {
      "token": "987456321"
   }
}

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()

def pub (data):
   client.publishEvent(eventId="status", msgFormat="json",
data=myData,onPublish=None)
   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': 'Train1', 'lat': 17.6340889, 'lon': 78.4745052}
    pub (myData)
    time.sleep (3)
    myData={'name': 'Train1', 'lat': 17.6248626, 'lon': 78.4720259}
    pub (myData)
    time.sleep (3)
    myData={'name': 'Train1', '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 = myCommandCallback
client.disconnect ()
```

Scanner

```
from http import client
import cv2
import pyzbar
from pyzbar.pyzbar import decode
import time

from ibmcloudant.cloudant_v1 import CloudantV1
from ibmcloudant import CouchDbSessionAuthenticator
from ibm_cloud_sdk_core.authenticators import BasicAuthenticator
```

```
authenticator =
BasicAuthenticator('apikey-v2-1oj043bu90m78ng4h2j27w5nob2nvcma6xanc6bk0a7
m', 'daf3c00c2cc182af425a5691a07f7b93')
service = CloudantV1(authenticator=authenticator)

service.set_service_url('https://apikey-v2-1oj043bu90m78ng4h2j27w5nob2nvcma6x
anc6bk0a7m:daf3c00c2cc182af425a5691a07f7b93@932393aa-9f82-4144-9251-2c51
9fb30962-bluemix.cloudantnosqldb.appdomain.cloud')

cap= cv2.VideoCapture(0)
font = cv2.FONT_HERSHEY_PLAIN

while True:
    _, frame = cap.read()
    decodedObjects = 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 (response)
            time.sleep(5)
        except Exception as e:
            print(a)
            print ("Not a Valid Ticket")
            time.sleep(5)

    cv2.imshow("Frame",frame)
    if cv2.waitKey(1) & 0xFF ==ord('q'):
```

```
        break
cap.release()
cv2.destroyAllWindows()
client.disconnect()
```

GitHub

GitHub link:

https://github.com/IBM-EPBL/IBM-Project-43014-1660711952/blob/main/final%20deliverable/demo%20link/Demo%20video_smart%20railways.mp4