SMART SOLUTIONS FOR RAILWAYS

A PROJECT REPORT

Submitted by

TEAM ID – PNT2022TMID45560

TEAM DETAILS

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ABSTRACT

- The developed countries has been implemented smart train using internet of things (IOT).The Indian Railways (IR) carries about 5.5 lakhs passengers in reserved accommodation every day. The Computerised Passenger Reservation System (PRS) facilates the booking and cancellation of tickets from any of the 4000 terminals (i.e. PRS booking window all over the countries).

- These tickets can be booked or cancelled for journeys commencing in any part of India and ending in any other part, with travel time as long as 72hours and distance up to several thousand kilo meters.

- In the given project we will be developing a website which will help users to find train details, book and cancel tickets and the exact rates of their tickets to the desired destination. With the help of online booking people can book their tickets online through internet, sitting in their home by a single click of mouse. Using their credit cards people can easily get their tickets done within minutes.

INTRODUCTION

➢ Project Overview

Our website has various kinds of information that helps regarding booking of tickets via railways . Users will be able to search the train availability ,the exact fare ,the arrival and departure time of the train and they can also book the ticket by using the debit ,credit or master card and after booking the ticket if the user want to cancel it then they can easily do it also. Railway passengers frequently need to know about their ticket reservation status, ticket availability on a particular train or for a place, train arrival or departure details, special trains etc.. Customer information Center at the railway stations are unable to serve such queries at peak periods. The number of the reservation counters available to the passengers and customers are very less. On most of the reservation systems there are long queues, so it takes a long time for any individual to book the ticket. As now there are no call centers facilities available to solve the queries of the passengers. The online railway ticket reservation system aims to develop a web application which aims at providing trains details, trains availability, as well as the facility to book ticket in online for customers.

LITERATURE SURVEY

➢ Existing problem

In the existing reservation system, booking itself includes two types of methodologies. One is PRS System and the other one is Online booking which is provided by IRCTC. In both the cases we need to enter details such as name, age, gender, preference and other things. After that availability will checked and booking will be completed as per the wish. This even includes the payment gateway also.

In the current system there are many disadvantages which are to be rectified. The main thing which comes under is about allocation of lower berths. Even for senior citizens , medically ill and pregnant ladies. During Verification there are possibilities for fake identification also. So there could possibility of unauthenticated travel by stranger also. More over the main disadvantage is about payment for waiting list passengers and un travelled passengers.

References

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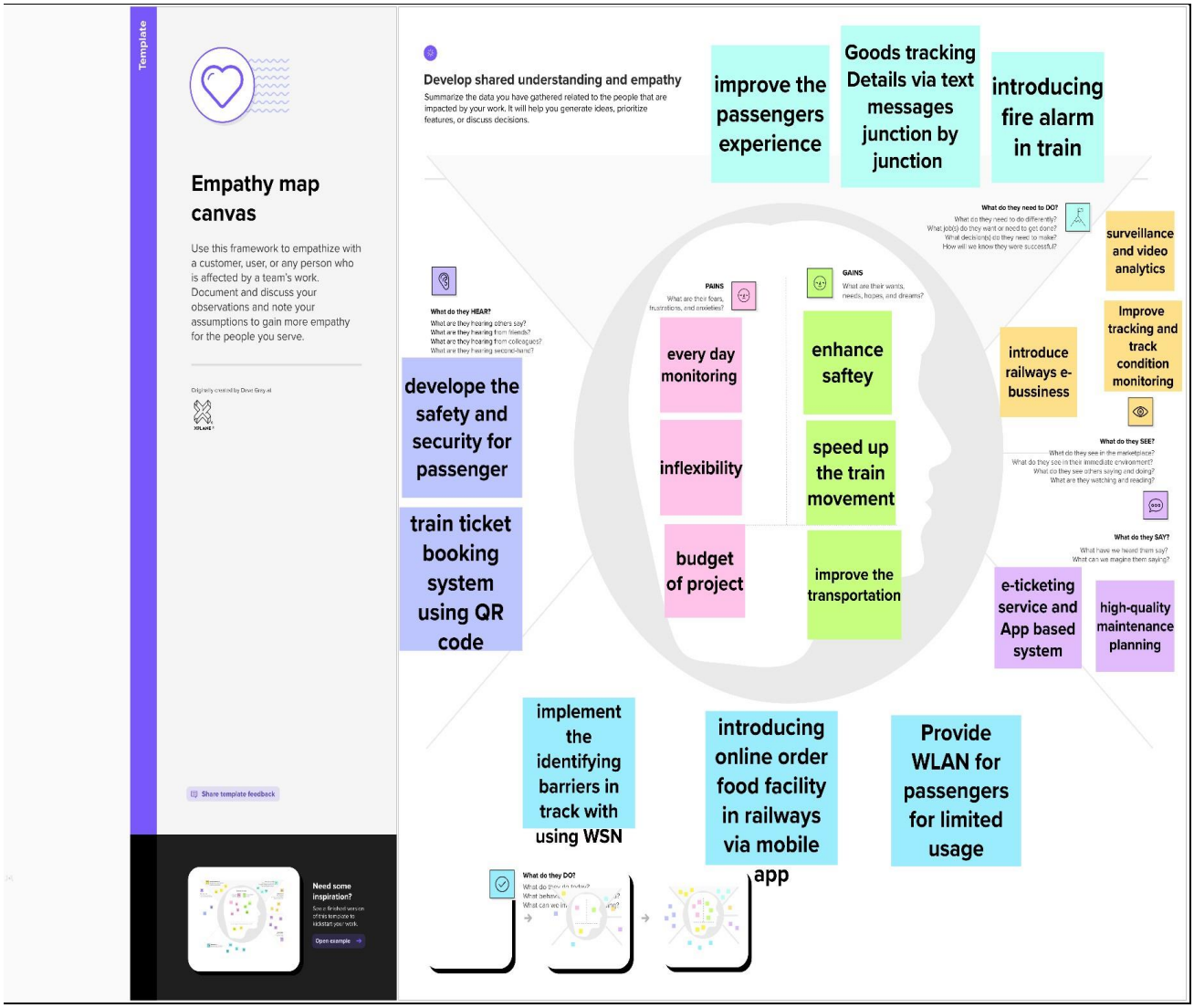
Problem Statement Definition

- Our aim is to make a online application for ticket reservation and seat reservation by using QR code. Smart Solutions For Railways System. Need of big server To make easy of ticket booking. Webpage need to maintained with the ratio with number of users booking ticket.

IDEATION& PROPOSED SOLUTION

Empathy Map Canvas



Ideation & Brainstorming

Template

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Share template feedback

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

In Railways the people worry about time taken for ticket booking,railways system need to be update and adopt it self for modern world

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

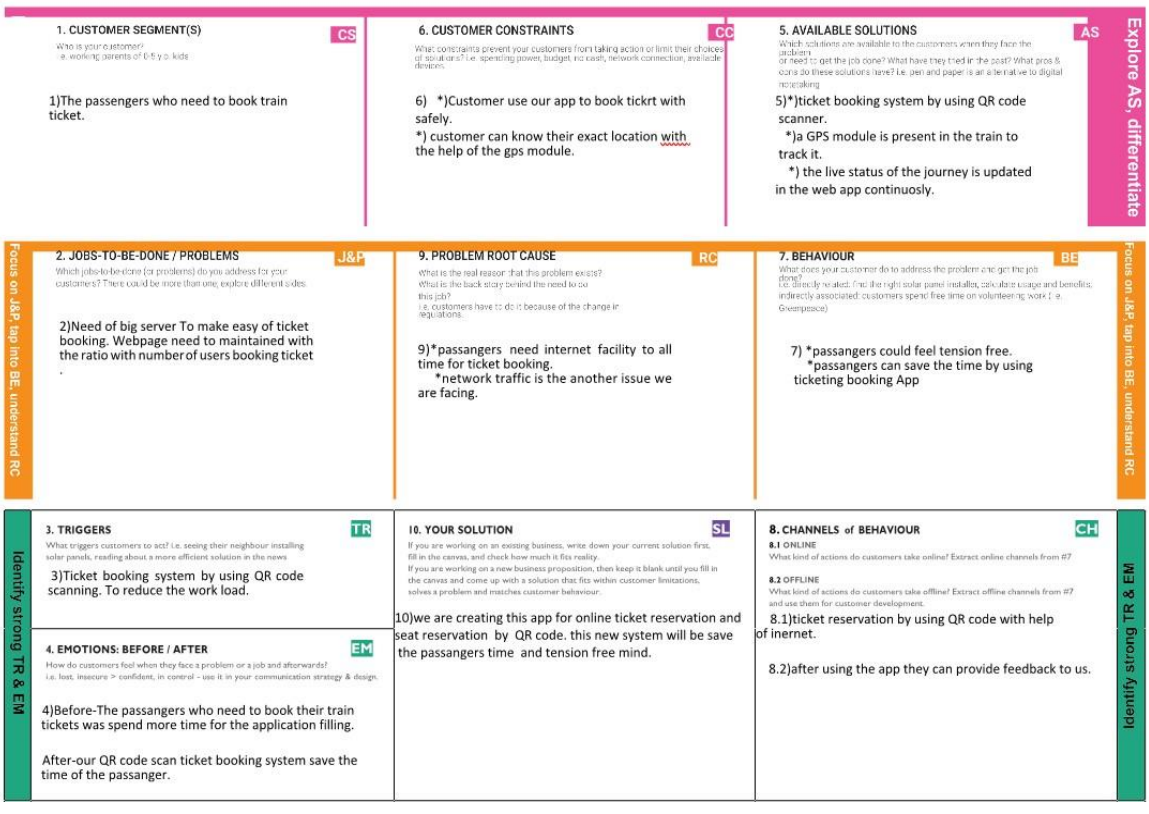
Proposed Solution

S. No	Parameter	Description
1	**Problem Statement (Problem to be solved)**	Ticket reservation. 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	**Idea / Solution description**	Tickets booking system by using QR code scanning. A GPS module is present in the train to track it. The live status of the journey is updated in the Web app continuously. The ticket collectorscan scan the QR code to identify the personal details.
3	**Novelty / Uniqueness**	IOT based on the system. Using IDL python program. IoT can improve the efficiency of rail travel, and the customer experience of all those who use it.Smart sensors can be used to track important assets, manage passenger flow, and enable predictive maintenance.
4	**Social Impact / Customer Satisfaction**	maintenance Reduce work load. Improve safety and secure.Ensuring washroom cleanliness.Using Lux sensors for safety. Predictive and CMMS. booking the train, the person will get a QR code which has to be shown to the Ticket Collector while boarding the train.Supervision systems, such as CCTVs or emergency telephones, also contribute to safety and enhanced comfort. Speed monitoring and control is another important safety application.

5	**Business Model (Revenue Model)**	Monitoring air quality.Monitoring ambient conditions. Strengthen safety and security with improved network and communications. Enhance passenger services to deliver an optimised railway experience.
6	**Scalability of the Solution**	Innovate for superior passenger experience.Increase safety and security for passengers, staff and assets.Improve operational efficiency.

Problem solution fit

Team ID:PNT2022TMID45560



REQUIREMENT ANALYSIS

Functional Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User registration**	• The user registration will be 1st one is the application will installed.All the language will available in this app. Then select the Language.user can see the page of showing enter user name,mobile number, email ID. The page it show verification code. The verification code will through the user email ID. Or sent through the mobile number. User verification code: • The verification code will show it user registered email id.
FR-2	**User Confirmation**	• The verification code will entered to the app. The app will accept the code . The ticket booking home page is showing.
FR-3	**Process of booking**	• When the home page is opened there will be a from and to option. User enter the details. then after that user can able to see the number of trains availability and seats availability. • User can select the particular train and particular seats which we need and click the confirm option.
FR-4	**Payment process**	• Before, the payment will show this page. All the payment plans will available in this app. Like google pay, phone pay, Paytm, etc. • When we select that method it process through selected payment option then payment should be done carefully, then the ticket is confirmed. After confirmation it will return to the page

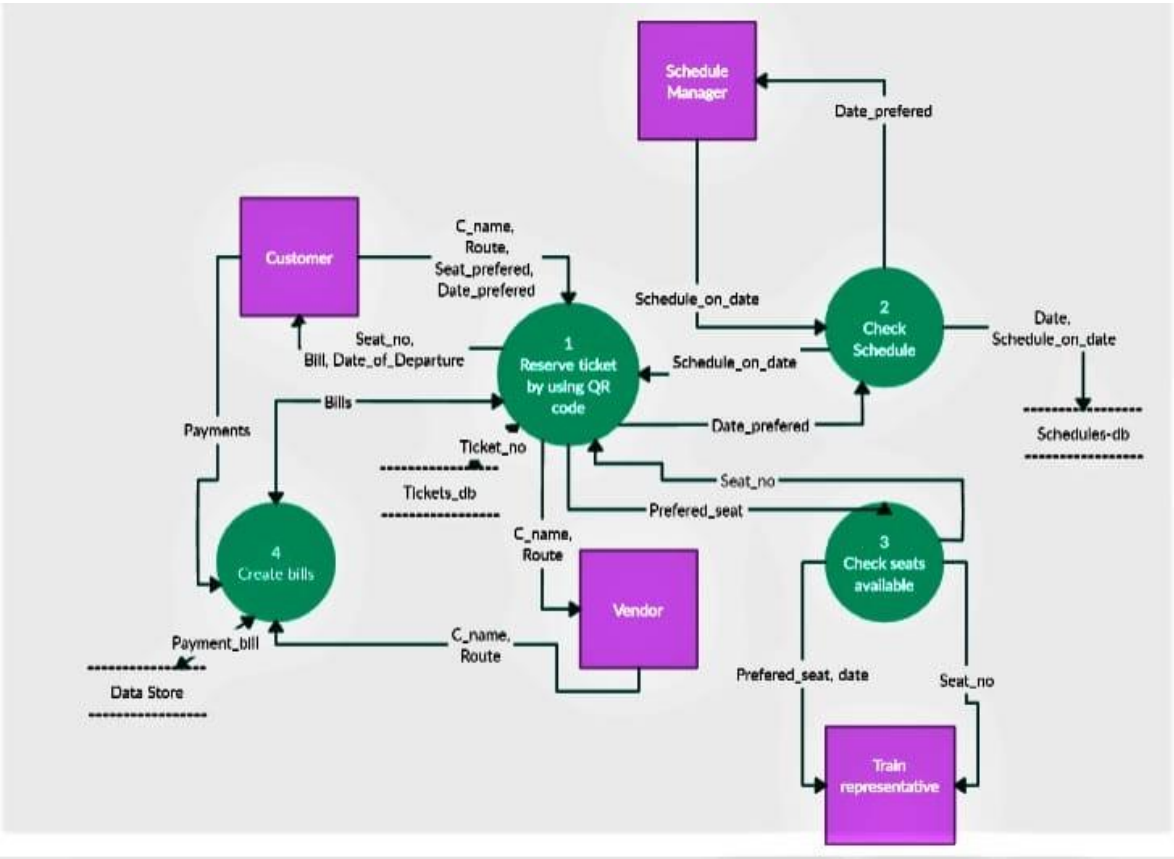
		and we can see the details of booking.
FR-5	**User Confirmation**	• The QR code send through user registered email ID. OR code will scanning. The ticket booking confirmation will get the e-mail id

Non-functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• This app set to easily method . • All the languages will be access .
NFR-2	**Security**	• The permissions access location only. • there will be no other unauthorizedpermission should be entered to it.
NFR-3	**Reliability**	• When the user are entering the details,that time if network connection is disabled. • All the details will be stored automatically. No need to enter thedetails again.
NFR-4	**Performance**	• The app is more secured and it willobtain through the back end . • no unauthorized can access theapplication.
NFR-5	**Availability**	• The QR code only send through the userregistered emai id .
NFR-6	**Scalability**	• All the data will be stored carefully andother issues will be obtain.

PROJECT DESIGN

Data Flow Diagrams



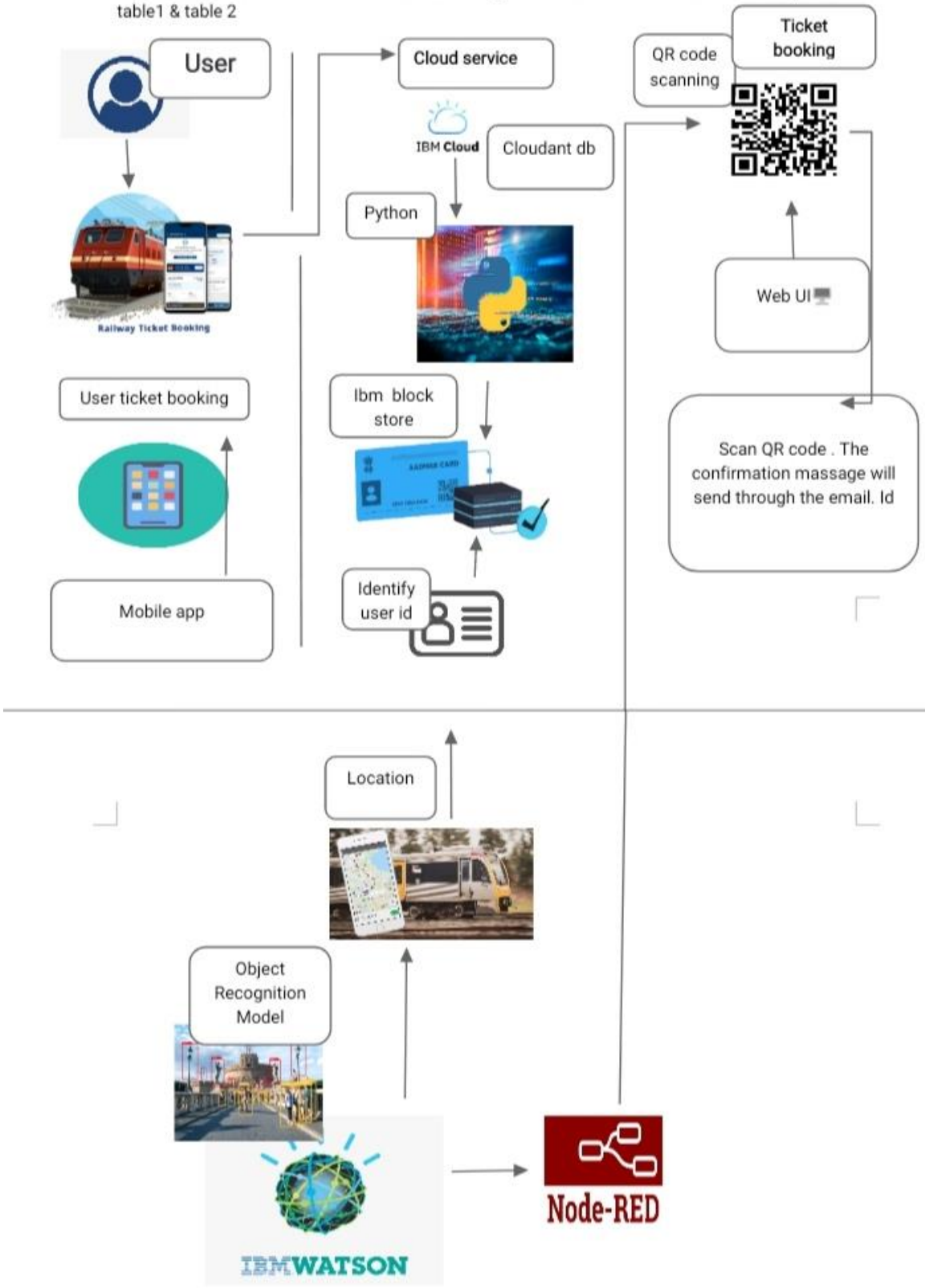
Solution & Technical Architecture

- As trains are one of the most preferred modes of transportation among middle class and impoverished people as it attracts for its amenities. Simultaneously there is an increase at risk from thefts and accidents like chain-snatching, derailment, fire accident.

- . In order to avoid or in better words to stop all such brutality we came up with a solution by providing an application which can be accessed by the user after booking their tickets. With a single click this app addresses issues by sending a text message to TC and RPF as an alert. In our project we use Node-Red service, app-development, IBM cloud platform to store passenger data.

Technical architecture:

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



User Stories

User type	Functional Requirements(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Ticket reservation using QR code	USN-1	The user can reserve for the application by entering the user registered email id, password, and confirming password.	user can access the account / dashboard	High	Sprint-1
Customer (Mobile user)	Ticket reservation using QR code	USN-2	The user will receive confirmationemail once the user have registered for the application.	User can receivethe confirmation email and click confirmation.	High	Sprint-1
Customer (Mobile user)	Ticket reservation using QR code	USN-3	The user can reserved for the application through Facebook.	The user can reserve& access the dashboard with Facebook Login.	Low	Sprint-2
Customer (Mobile user)	Check schedule	USN-4	The user will see the login page.user can entering email & password.	User can log in to theapplication by entering email & password.	High	Sprint-1
Customer (Mobile user)	Seats available	USN-5	The user can check to get seats available.	User can access it using database.	Medium	Sprint-3

PROJECT PLANNING & SCHEDULING

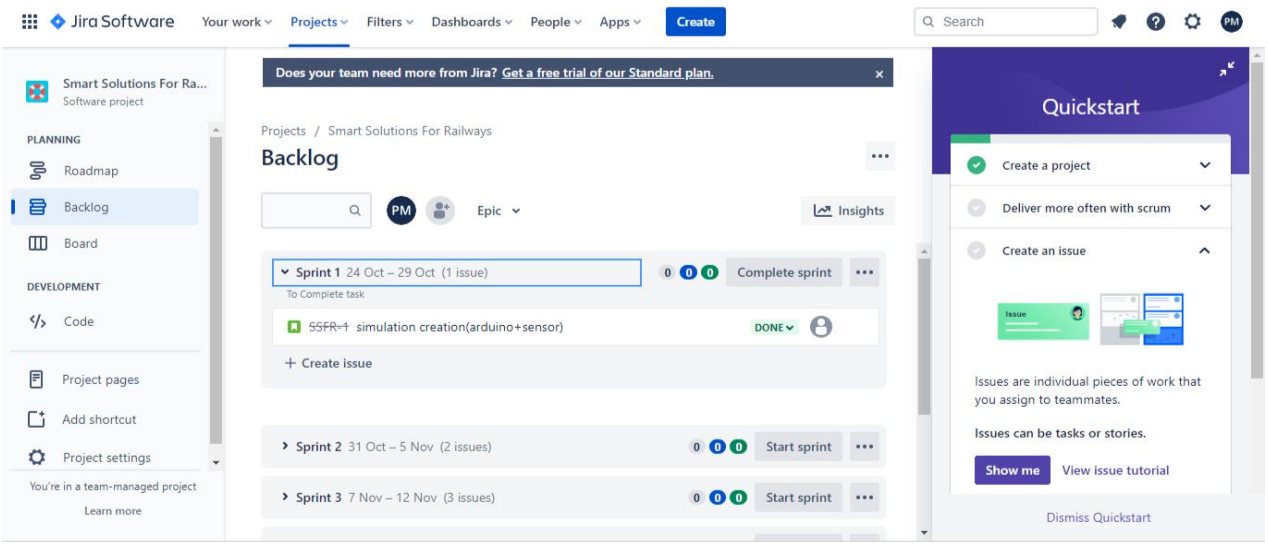
Sprint Planning & Estimation

Step-1	**Identify the problem**
Step-2	**Prepare an abstract, problemstatement**
Step-3	**List required objects needed**

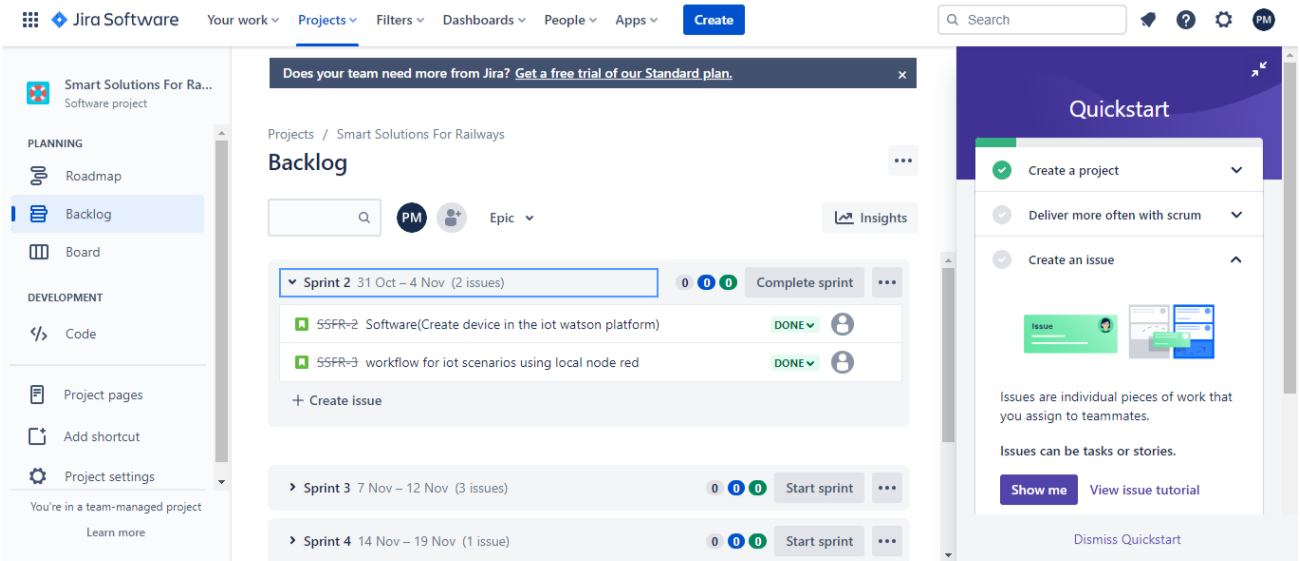
Step-4	**Create a code and run it**
Step-5	**Make a prototype**
Step-6	**Test with the created code and check the designedprototype is working**
Step-7	**Solution for the problem is found**

JIRA REPORT

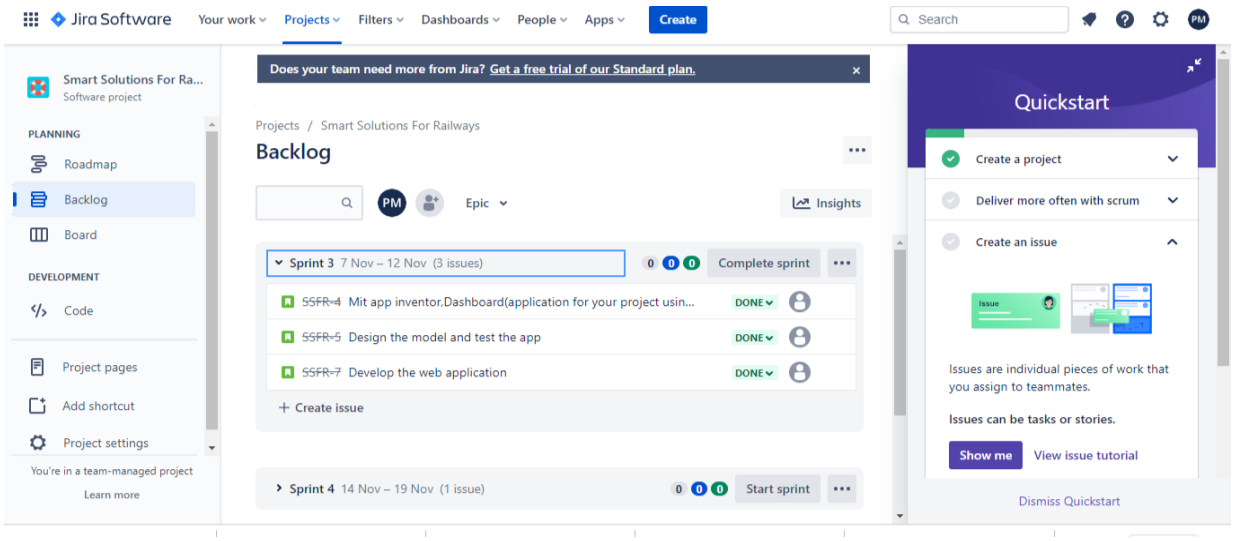
Sprint-1



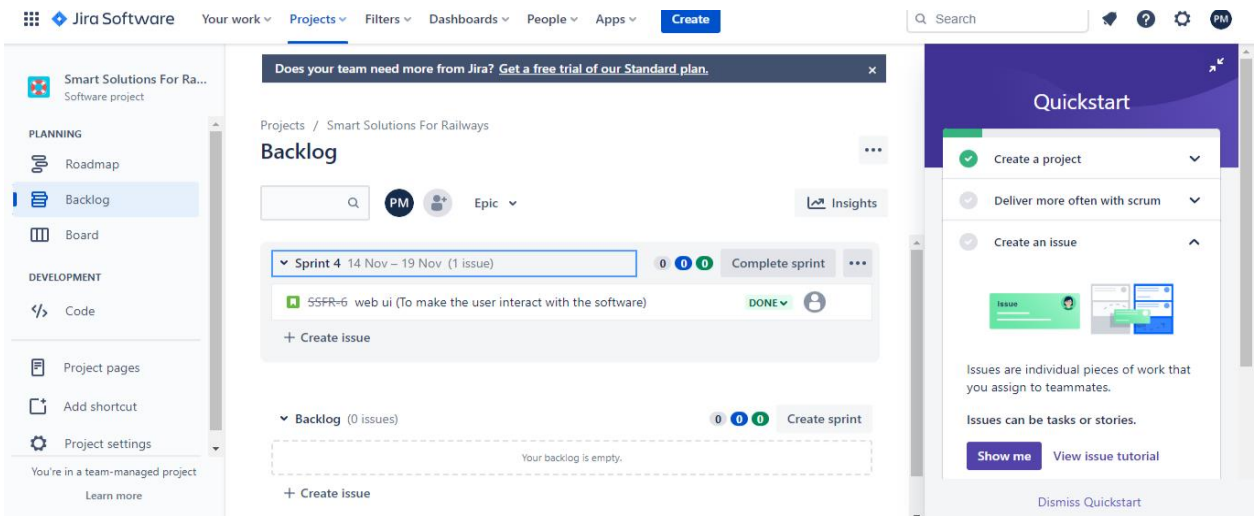
Sprint-2



Sprint-3



Sprint-4



CODING & SOLUTIONING

Feature 1

- IOT Device
- IBM Watson Platform
- Node -RED
- Cloudant DB
- Web UI
- MIT App Inventor
- Python code

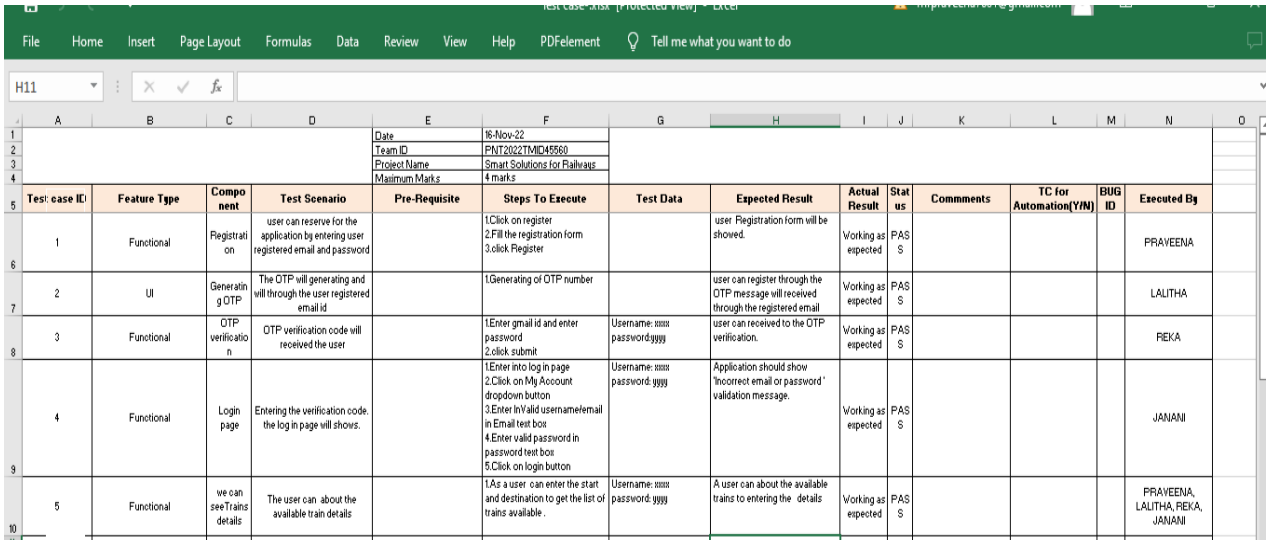
Feature 2

- Login
- Verification

- Ticket Book

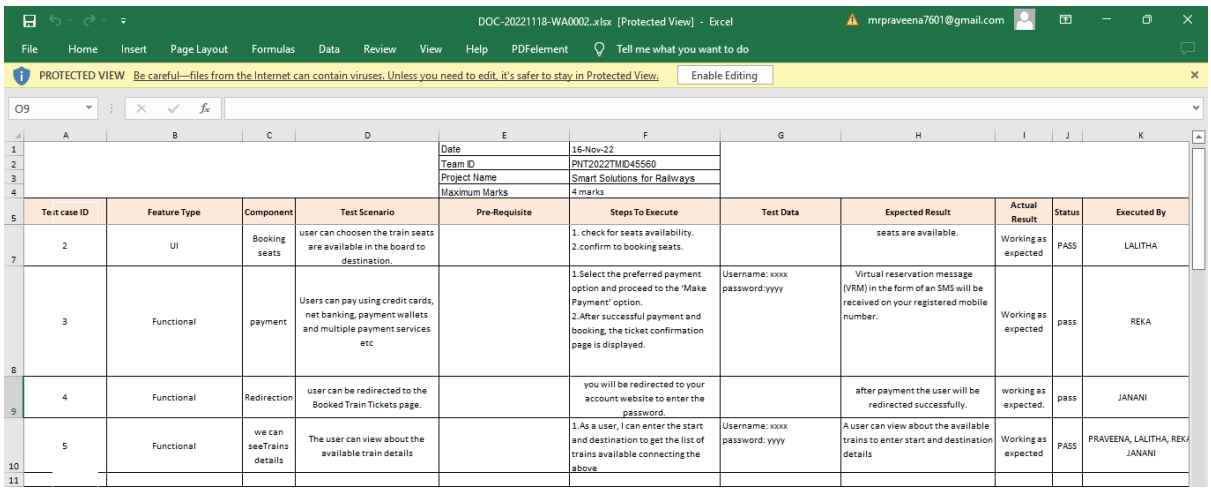
TESTING

Test Case1



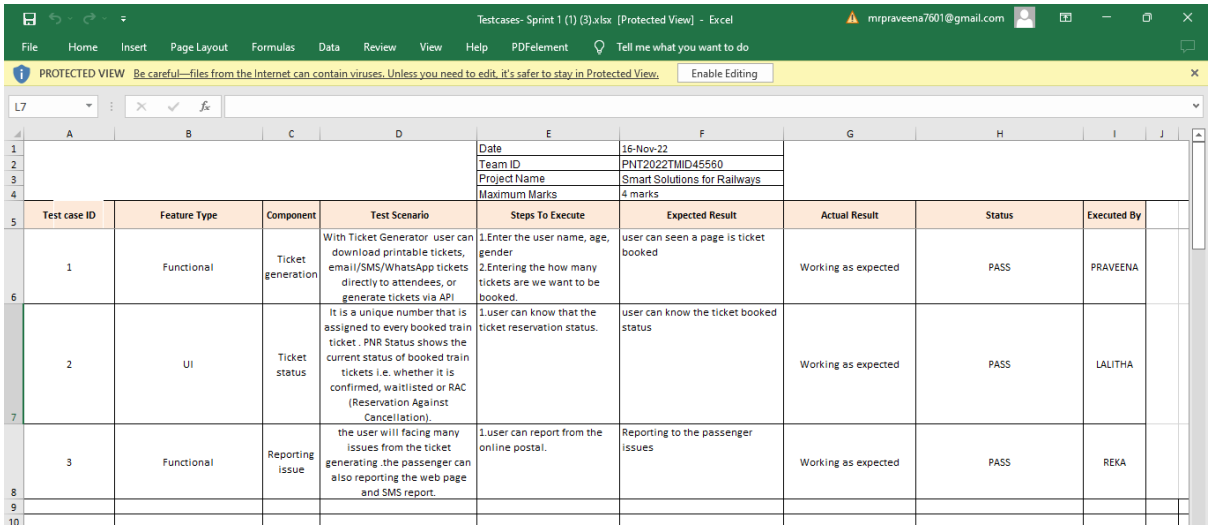
				Date	16-Nov-22								
				Team ID	PNT2022TMID45560								
				Project Name	Smart Solutions for Railways								
				Maximum Marks	4 marks								
Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
1	Functional	Registration	user can reserve for the application by entering user registered email and password		1.Click on register 2.Fill the registration form 3.click Register		user Registration form will be showed.	Working as expected	PASS				PRAVEENA
2	UI	Generating OTP	The OTP will generating and will through the user registered email id		1.Generating of OTP number		user can register through the OTP message will received through the registered email	Working as expected	PASS				LALITHA
3	Functional	OTP verification	OTP verification code will received the user		1.Enter gmail id and enter password 2.click submit	Username: xxxx password:yyyy	user can received to the OTP verification.	Working as expected	PASS				REKA
4	Functional	Login page	Entering the verification code. the log in page will shows.		1.Enter into log in page 2.Click on My Account dropdown button 3.Enter InValid username/email in Email test box 4.Enter valid password in password text box 5.Click on login button	Username: xxxx password: yyyy	Application should show 'Incorrect email or password ' validation message.	Working as expected	PASS				JANANI
5	Functional	we can seeTrains details	The user can about the available train details		1.As a user can enter the start and destination to get the list of trains available .	Username: xxxx password: yyyy	A user can about the available trains to entering the details	Working as expected	PASS				PRAVEENA, LALITHA, REKA, JANANI

Test case2



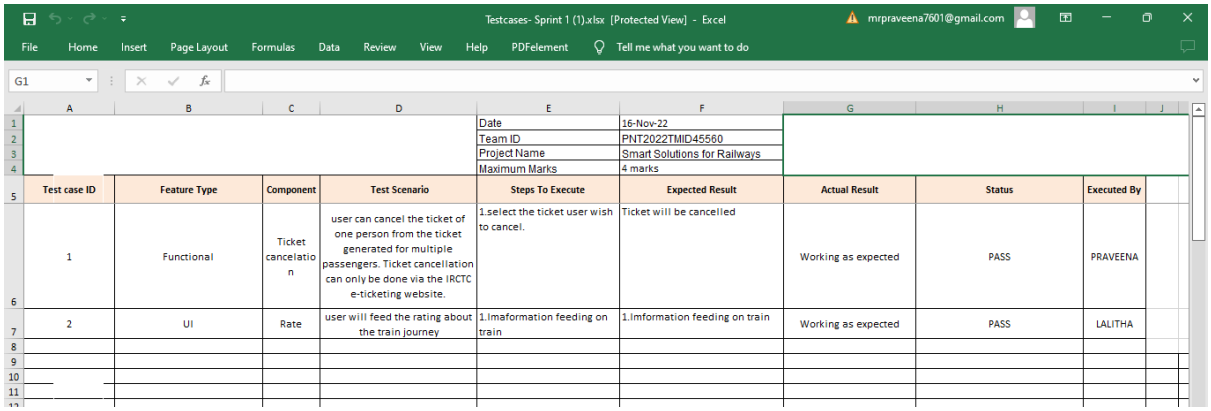
				Date	16-Nov-22					
				Team ID	PNT2022TMID45560					
				Project Name	Smart Solutions for Railways					
				Maximum Marks	4 marks					
Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Executed By
2	UI	Booking seats	user can choosen the train seats are available in the board to destination.		1. check for seats availability. 2.confirm to booking seats.		seats are available.	Working as expected	PASS	LALITHA
3	Functional	payment	Users can pay using credit cards, net banking, payment wallets and multiple payment services etc		1.Select the preferred payment option and proceed to the 'Make Payment' option. 2.After successful payment and booking, the ticket confirmation page is displayed.	Username: xxxx password:yyyy	Virtual reservation message (VRM) in the form of an SMS will be received on your registered mobile number.	Working as expected	pass	REKA
4	Functional	Redirection	user can be redirected to the Booked Train Tickets page.		you will be redirected to your account website to enter the password.		after payment the user will be redirected successfully.	working as expected.	pass	JANANI
5	Functional	we can seeTrains 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: xxxx password: yyyy	A user can view about the available trains to enter start and destination details	Working as expected	PASS	PRAVEENA, LALITHA, REKA JANANI

Test case3



				Date	16-Nov-22			
				Team ID	PNT2022TMID45560			
				Project Name	Smart Solutions for Railways			
				Maximum Marks	4 marks			
Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Expected Result	Actual Result	Status	Executed By
1	Functional	Ticket generation	With Ticket Generator user can download printable tickets, email/SMS/WhatsApp tickets directly to attendees, or generate tickets via API	1.Enter the user name, age, gender 2.Entering the how many tickets are we want to be booked.	user can seen a page is ticket booked	Working as expected	PASS	PRAVEENA
2	UI	Ticket status	It is a unique number that is assigned to every booked train ticket . PNR Status shows the current status of booked train tickets i.e. whether it is confirmed, waitlisted or RAC (Reservation Against Cancellation).	1.user can know that the ticket reservation status.	user can know the ticket booked status	Working as expected	PASS	LALITHA
3	Functional	Reporting issue	the user will facing many issues from the ticket generating .the passenger can also reporting the web page and SMS report.	1.user can report from the online postal.	Reporting to the passenger issues	Working as expected	PASS	REKA

Test case4



				Date	16-Nov-22			
				Team ID	PNT2022TMID45560			
				Project Name	Smart Solutions for Railways			
				Maximum Marks	4 marks			
Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Expected Result	Actual Result	Status	Executed By
1	Functional	Ticket cancelation	user can cancel the ticket of one person from the ticket generated for multiple passengers. Ticket cancellation can only be done via the IRCTC e-ticketing website.	1.select the ticket user wish to cancel.	Ticket will be cancelled	Working as expected	PASS	PRAVEENA
2	UI	Rate	user will feed the rating about the train journey	1.Imaformation feeding on train	1.Imformation feeding on train	Working as expected	PASS	LALITHA

ADVANTAGES

- The passengers can use this application, while they are travelling alone to ensure theirsafety.
- It is easy to use.
- Smart Solutions for railways is designed to reduced the work load of the user and also the use of paper.

DISADVANDAGE

- Network issues may arise.

CONCLUSION

Almost all the countries across the globe strive to meet the demand for safe, fast, and reliablerail 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 service

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 above mentioned, the developed application of our project can lead the passenger who travel can travel safely without any fear

.

FUTURE SCOPE

This application is ensured for safety for the passengers while they are travelling alone as well as they travel with their family or friends. In future, this application may also be used by passengers who travel through bus. By further enhancement of the application the passengers can explore more features regarding their safety.

APPENDIX

Source Code

Ticket booking

```
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId":"i63nvt",
        "devicetypeId":"GPS1",
        "deviceId":"i2345"
    },
    "auth":{
            "token":"abcdefghij"
    }
}

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, qos=0, 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=mycommanCallbak
client.disconnect()
```

QR Code generating

```
import cv2
import numpy as np
import time
import pyzbar.pyzbar as puzbar
from ibmcloudant.cloudant_v1 import cloudantv1
from ibmcloudant import couchDbsessionAuthenticator
from ibm_cloud_sdk_core.Authenticators import BasicAuhtenticator

authenticator=BasicAuthenticator('apikey-v2-
16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz','b0ab119f45d3e6255eabb978
')
service =cloudantv1(authenticator=authenticator)
service.set_service_url('https://apikey-v2-
16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119f45d3e6255eabb978')

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

while True:
    _, frame = cap.read(0)
    decodeObjects = pyzbar.decode(frame)
    for obj in decodeObjects:
        #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:
             responce = service.get_document (
                  db='booking',
                  doc_id = a
```

```
                    ).get_result()
                print(response)
                time.sleep(5)
            except Exception as e:
                print ("Not valid Ticket")
                time.sleep(5)

    cap.imshow("Frame", frame)
    if cv2.waitKey(1) & 0XFF == ord('q'):
      break
cap.release()
cv2.destroyAllWindows()
client.disconnect()
```

GitHub :

https://github.com/IBM-EPBL/IBM-Project-54177-1661764653

Demo Link :

https://youtu.be/gF8JRvmqMKs