NALAIYA THIRAN - IBM PROJECT REPORT

(19EC406T - Professional Readiness for Innovation, Employability and Entrepreneurship)

ON

SMART SOLUTIONS FOR RAILWAYS

TEAM ID: PNT2022TMID23442

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IN

ELECTRONICS AND COMMUNICATION

VELAMMAL ENGINEERING COLLEGE,CHENNAI-66.

(An Autonomous Institution,Affiliated to Anna University, Chennai)

2022-2023

VELAMMAL ENGINEERING COLLEGE
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BONAFIDE CERTIFICATE

Certified that this project report, "**SMART SOLUTIONS FOR RAILWAYS**" is the bonafide work of "**BALAKRISHNAN V(113219041016), MUKESH R(113219041070), ABISHEK KUMAR S(113219041003), SRINATH T(113219041115)**" who carried out the project work under my supervision and industry mentor.

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The report of the project work submitted by the above students in the partial fulfillment for the award of Bachelor of Engineering Degree in **ELECTRONICS AND COMMUNICATION ENGINEERING** of Anna University, Chennai was evaluated and confirmed to be the report of the work done by the above students and then evaluated.

Submitted for Internal Evaluation held on_____/_____/2022.

MENTOR **EVALUATOR**

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CHAPTER 1
INTRODUCTION

1.1 PROJECT OVERVIEW

The SMART SOLUTION FOR RAILWAY project aims to improve the facility to use the easiest way to reserve a ticket through online with the help of QR code scanner.During this project we work on IOT devices and we can gain knowledge about how to work with Watson IOT Platform. Connecting and exchanging the sensor data. Also IBM Cloudant DB is also used. Scan the QR code and retrieve the user details about the reservation of the ticket. Generating the user details in the database connecting to the xampp server for the web page. Storing the data in the Cloudant DB. With the QR code we can generate the required data.

1.2 PURPOSE

- In our project, using the web application by writing a code in html css and js the user details can be created.
- Once the details are created it gets stored in the database.
- Once the user clicks the submit button,the QR code is generated and the unique Id is generated along with the details with the unique id is stored in the Cloudant DB.
- In python code, a ticket collector can scan the QR code and the unique is checked along with the id the passenger provided to check the details of the user.
- Also the live location of the train is tracked by using GPS tracker.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEMS

Author	Title	source	Findings
Naveen Bhargav et al. (2016)	Automatic Fault Detection of Railway Track System Based on PLC (ADOR TAST)	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 et al. (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.
Mansi R. Sarwan et al. (2018)	Self-Powered For Railway Track	IOSR Journal of Engineering (IOSR JEN)	This has resulted in a rapid increase in surveillance of

	Monitoring Using IoT		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.

2.2 PROBLEM STATEMENT AND DEFINITIONS

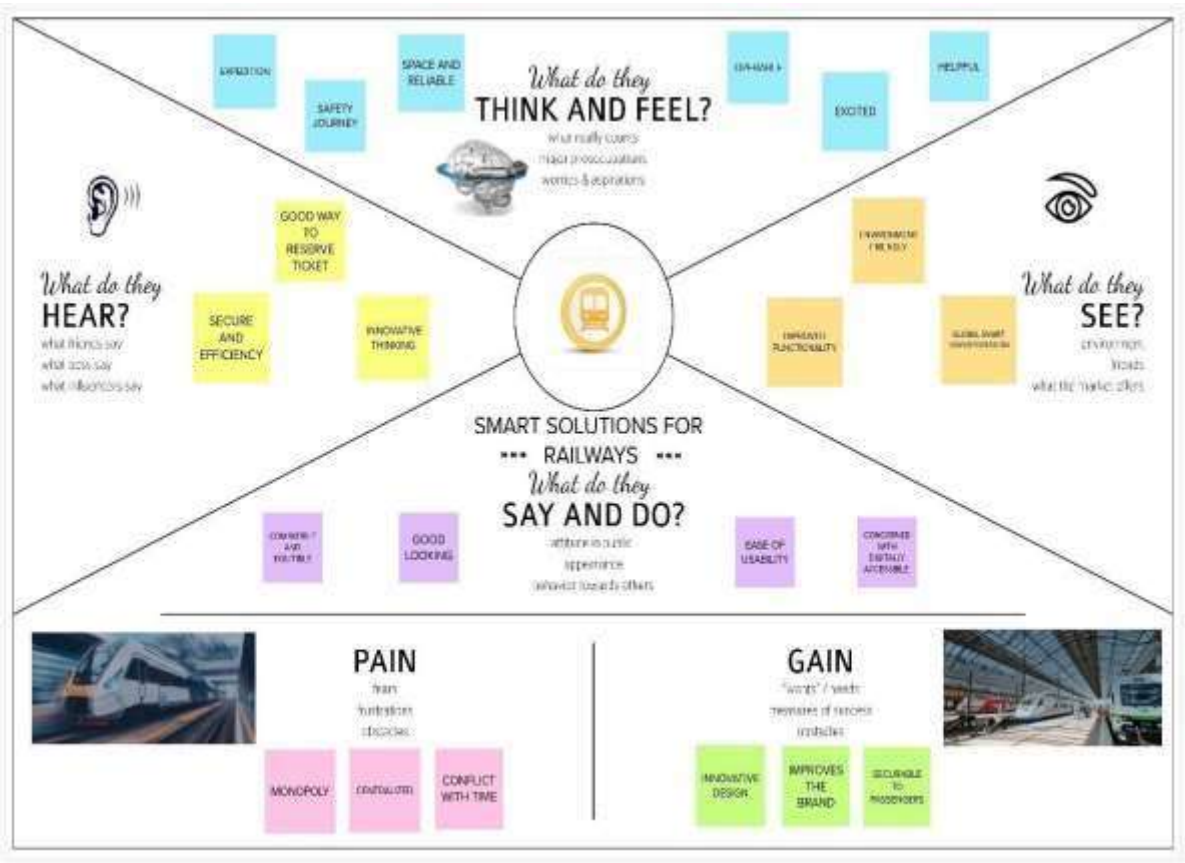
The problem that have been occurred in using the application defines the problem statement. The problem statements include Engagement of dedicated staff/window for Pass/PTO and ticketing, Loss of working time of staff requiring pass, Wastage of lot of Paper, Availability of Pass/PTO and ticketing(in night, away from HQ, for the families).

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Traveller	Book ticket	Ticket has not been provided	There is no unique id given and datas are not stored Properly	Unhappy
PS-2	Passenger	Get my ticketand the location of a train arriving	Couldn't track the location	There is no proper scheme provided	Helpless

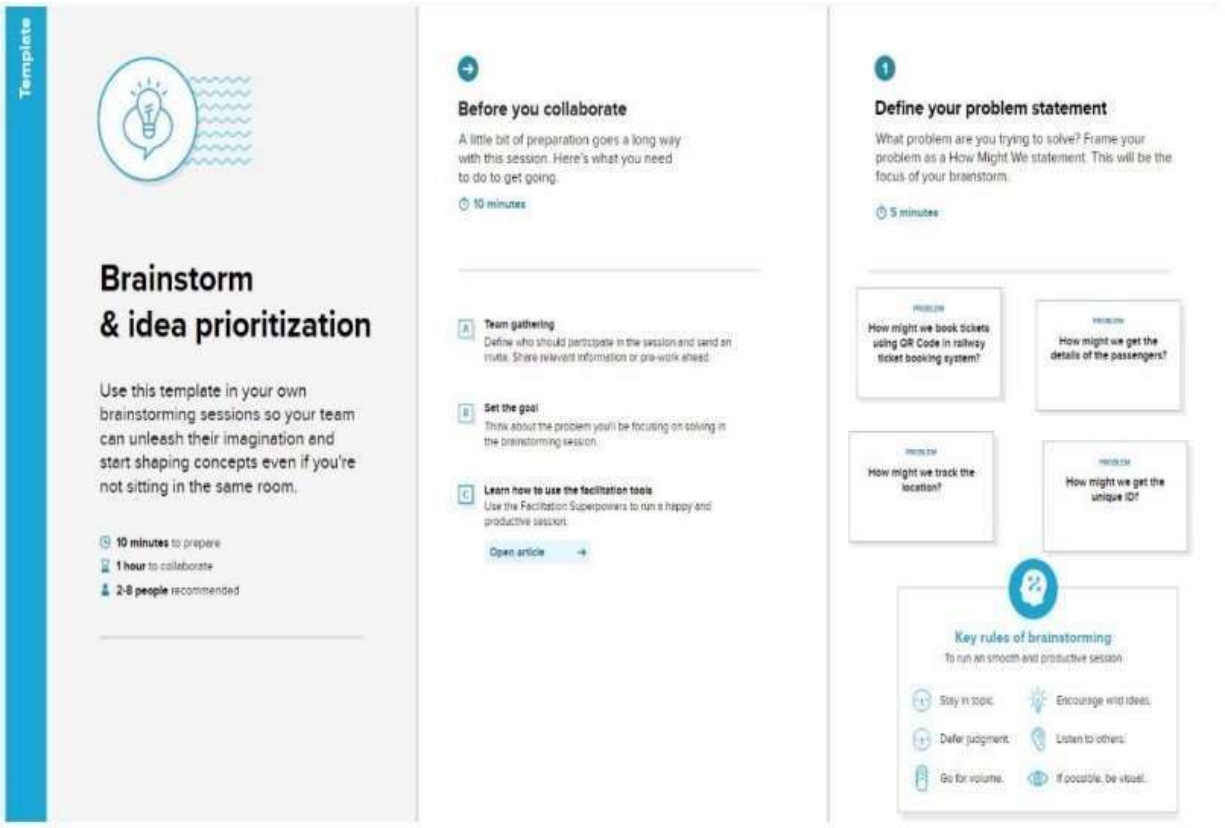
CHAPTER 3

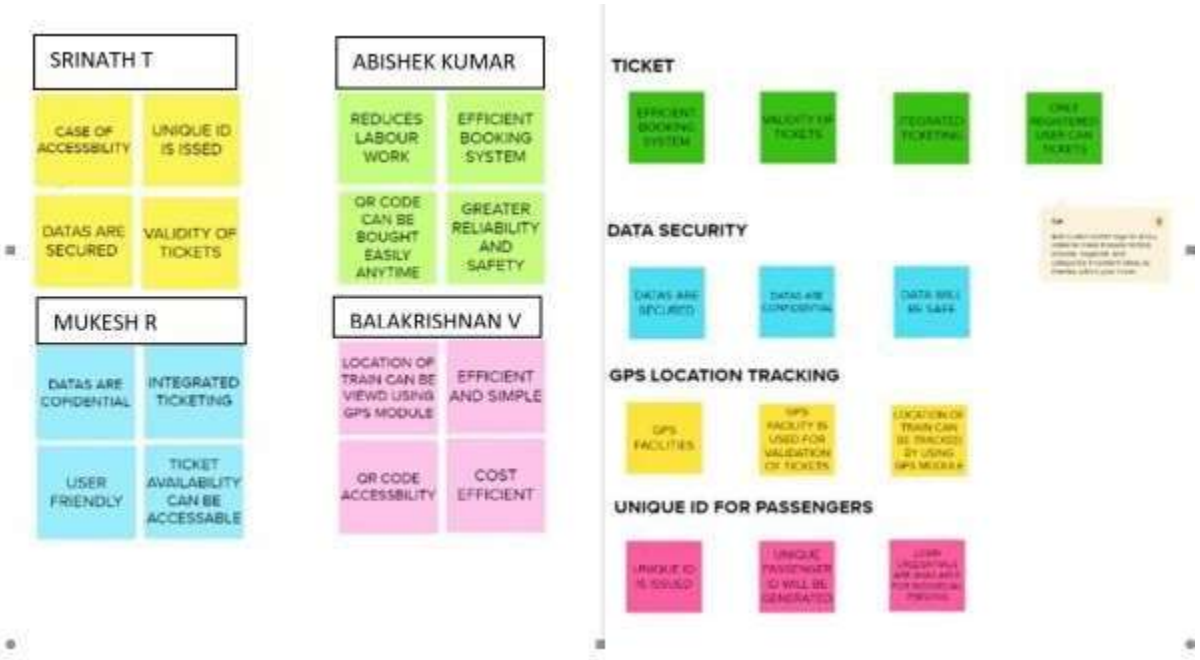
IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING



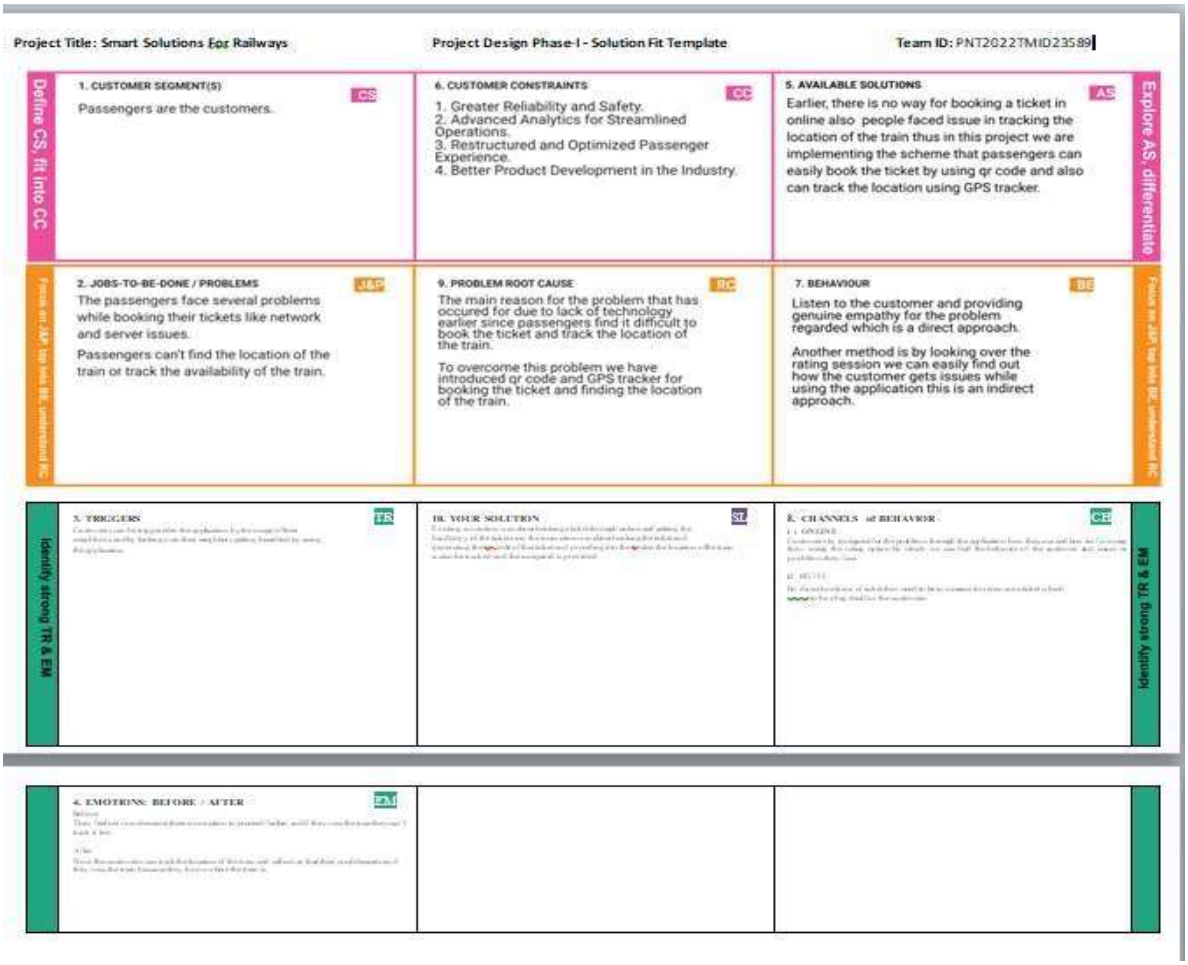


3.3 PROPOSED SOLUTION

S .No	Parameter	Description
1.	Problem Statement (Problem to be solved)	On-site ticket booking may take lot of time and there is a issue of loosing their manual tickets. Even in online booking we should have a copy of ticket as softcopy, in case if that ticket gets erased or lost it will be sometimes difficult to retrieve it. Here we need to show the printed copy or soft copy of tickets and ID card proofs to Ticket checker.
2.	Idea / Solution description	Book tickets using QR Code in railway ticket booking system. We get the details of the passengers. We track the current location of the particular train. We provide unique ID for passengers to secure their information and we will have chatbot for

		customer queries.
3.	Novelty / Uniqueness	➢ Efficient booking system, verifying validity of the ticket and only register user can book the tickets. ➢ Each passenger will be provided by giving a unique ID to them during first login so that their data will be stored and processed securely. ➢ GPS tracking facility will be provided to track the current location ➢ We provide chatbot for customers queries and that will be solved as soon as possible.
4.	Social Impact / Customer Satisfaction	➢ Passenger data will be more securely maintained ➢ Prefect way to reserve tickets ➢ User friendly environment ➢ Query section for customer
5.	Business Model (Revenue Model)	Using chat bot, we can contact user's ticket booking. The chat bot can give instructions to the users based on their location. It will store the customer's details and ticket orders in the database. The chat bot will send a notification to customers if the booking is confirmed. Chat bots can also help in collecting customer feedback.
6.	Scalability of the Solution	This model can be easily adopted among online users and it can be easily deployed. It can be used and accessed by everyone and it can handle the requests from the Customers

3.4 PROBLEM SOLUTION FIT



CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR.NO	FUNCTIONAL REQUIREMENTS	SUB REGISTRATION
FR-1	User Registration	Registration through Form
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User QR code generation	QR code is generated
FR-4	GPS tracker	Location is tracked

4.2 NON FUNCTIONAL REQUIREMENTS

FR.NO	NON FUNCTIONAL REQUIREMENTS	DESCRIPTION
NFR 1	USABILITY	Users can navigate easily
NFR 2	SECURITY	The details are secured in the database
NFR 3	RELIABILITY	Reliable to the users without any failure as it is not fixed to limited number of users
NFR 4	PERFORMANCE	User-friendly

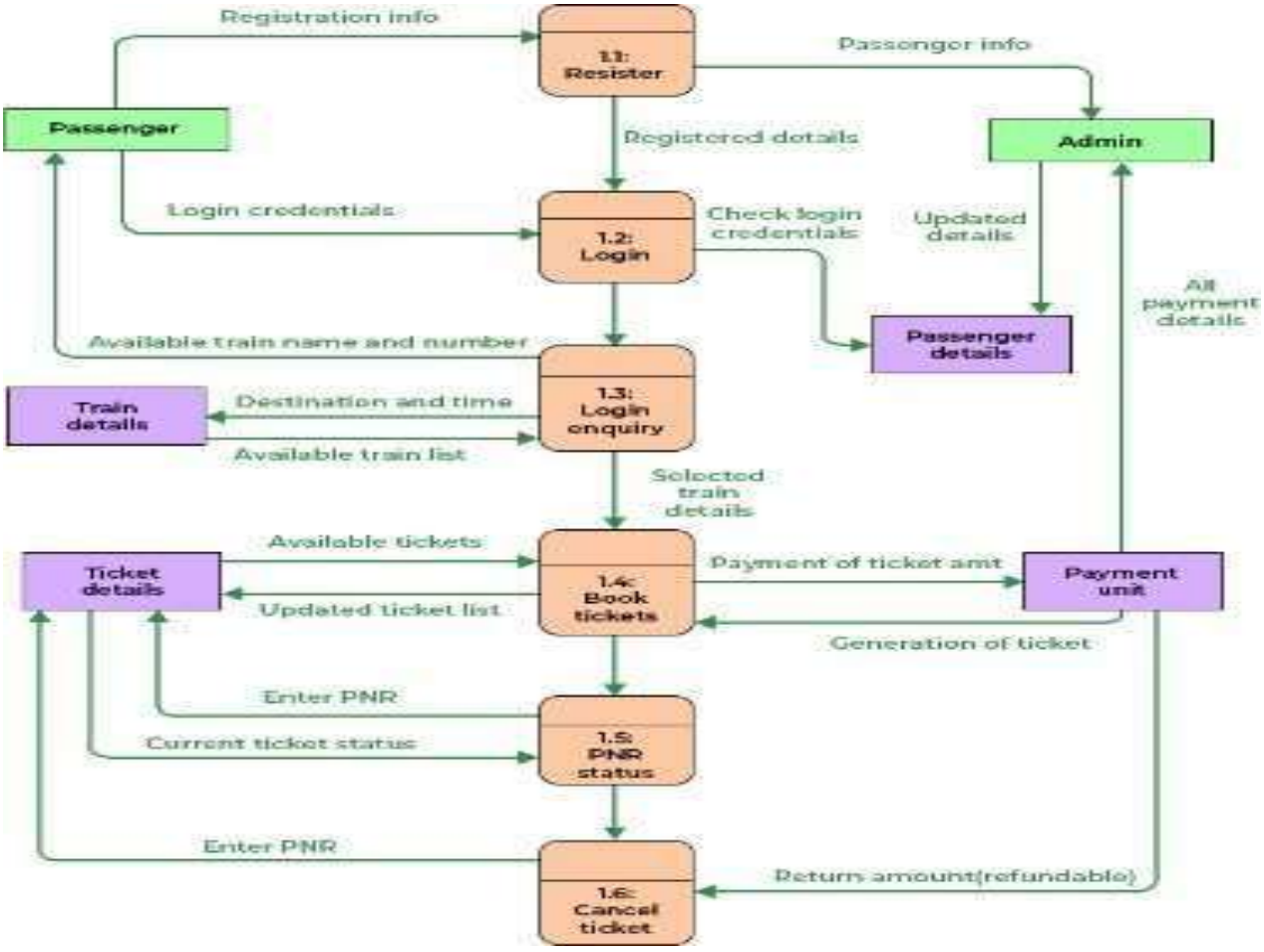
NFR 5	AVAILABILITY	Available any time at the time of ease
NFR 6	SCALABILITY	Support the users with their needs in reserving ticket and tracking the location.

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

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



5.2 SOLUTION AND TECHNICAL ARCHITECTURE

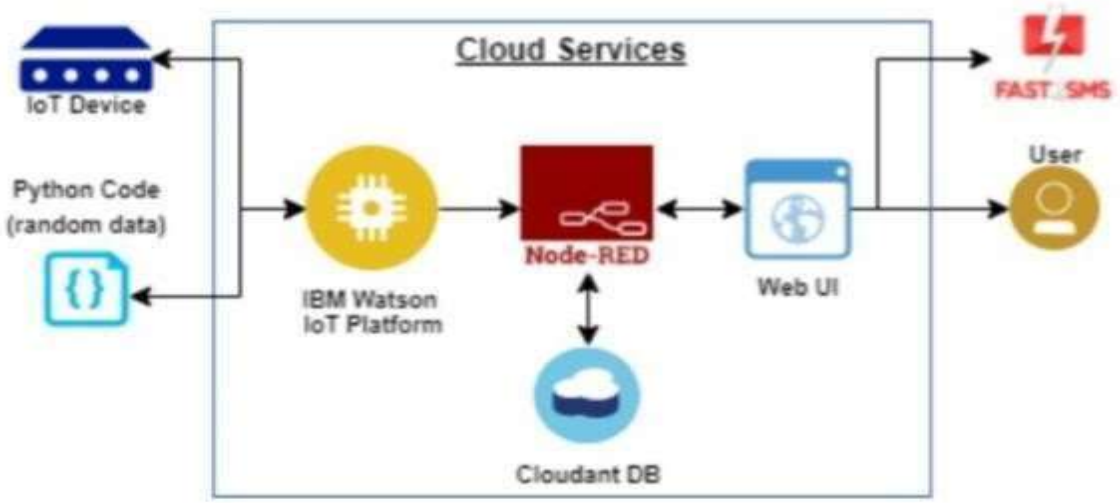
Solution architecture is a complex process with many sub-processes that bridges the gap between business problems and technology solutions. Its goals are to:

● 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.



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Reserving ticket	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)	Reserving ticket	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)	Reserving ticket	USN-3	As a user, I can register for the application and enter the details for reserving the ticket	I can register & access the dashboard with Facebook Login	Low	Sprint-2
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-1
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-1

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

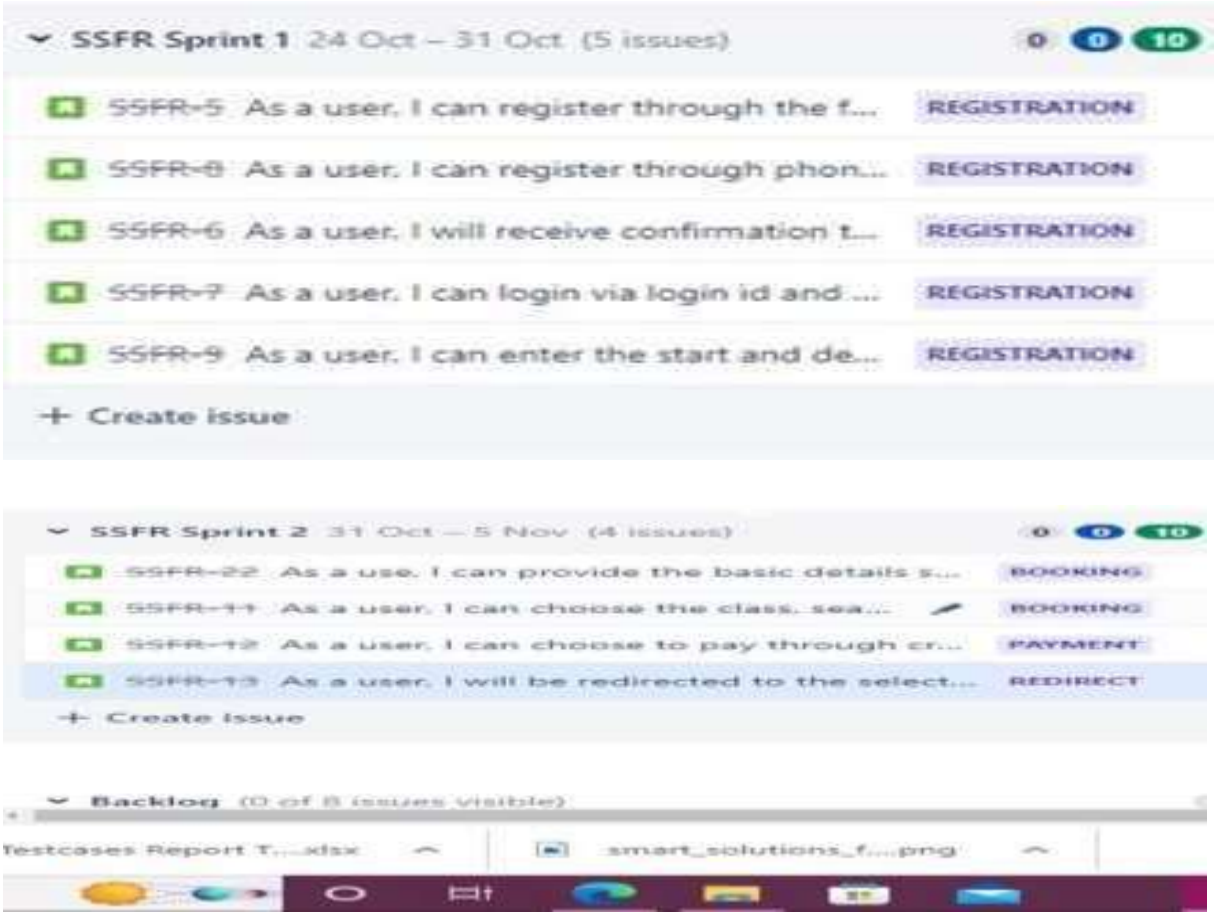
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a passenger, I want to create a login credentials so I can securely access myself service online account.	15	High	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-1	Ticket Conformation	USN-2	As a passenger, I want to check my ticket whether it is conformed or not.	5	Medium	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-2	Payment	USN-3	As a passenger, I want to pay my ticket cost in online payment	15	High	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-3	Booking Status	USN-4	As a passenger, I want to check my ticket once it is conformed.	5	Medium	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-4	Updating Train Information	USN-5	As an admin, I want to check the trains details like when will train reach stations and update Train information.	10	Medium	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B

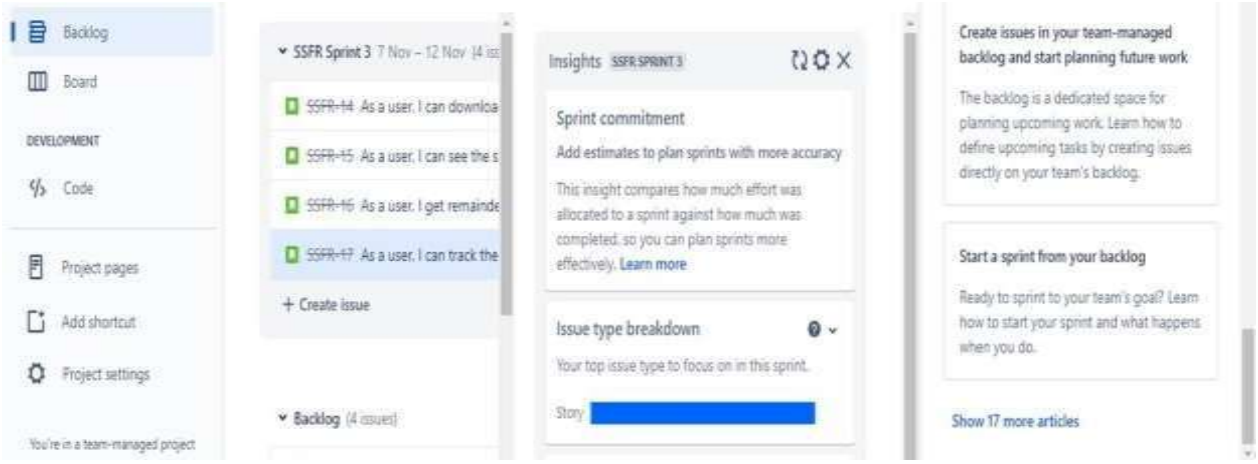
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Verifying Tickets	USN-6	As a TC, I want to check the users whether he/she have tickets or not with scanning the QR code	15	High	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-2	Knowing Current Location details	USN-7	As a passenger, I want to know the train current location.	5	Low	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B
Sprint-4	Raise a compliant	USN-8	As a user, I should able to raise a ticket if something is wrong	10	Medium	Kaviya sree M, Niranjanaa D S, Shakthi C, Varshini Bala B

6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3 REPORTS FROM JIRA SOFTWARE




Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
SSFR Sprint 3 7 Nov – 12 Nov (4 iss
SSFR-14 As a user, I can downloa
SSFR-15 As a user, I can see the s
SSFR-16 As a user, I get remainde
SSFR-17 As a user, I can track the
+ Create issue
Backlog (4 issues)
Insights SSFR SPRINT 3
Sprint commitment
Add estimates to plan sprints with more accuracy
This insight compares how much effort was allocated to a sprint against how much was completed, so you can plan sprints more effectively. Learn more
Issue type breakdown
Your top issue type to focus on in this sprint.
Story
Create issues in your team-managed backlog and start planning future work
The backlog is a dedicated space for planning upcoming work. Learn how to define upcoming tasks by creating issues directly on your team's backlog.
Start a sprint from your backlog
Ready to sprint to your team's goal? Learn how to start your sprint and what happens when you do.
Show 17 more articles


Backlog
Board
DEVELOPMENT
Code
Project pages
Add shortcut
Project settings
SSFR Sprint 4 13 Nov – 20 Nov (4 issues)
0 0 11
SSFR-35 As a user, I can track the train using ... CANCELLATION
SSFR-19 As a user, I can raise queries through... RAISE QUERIES
SSFR-20 As a user, I will answer the questions/... ANS QUERIES
SSFR-21 As a user, I will feed information abou... FEED DETAILS
+ Create issue
Backlog (0 issues)

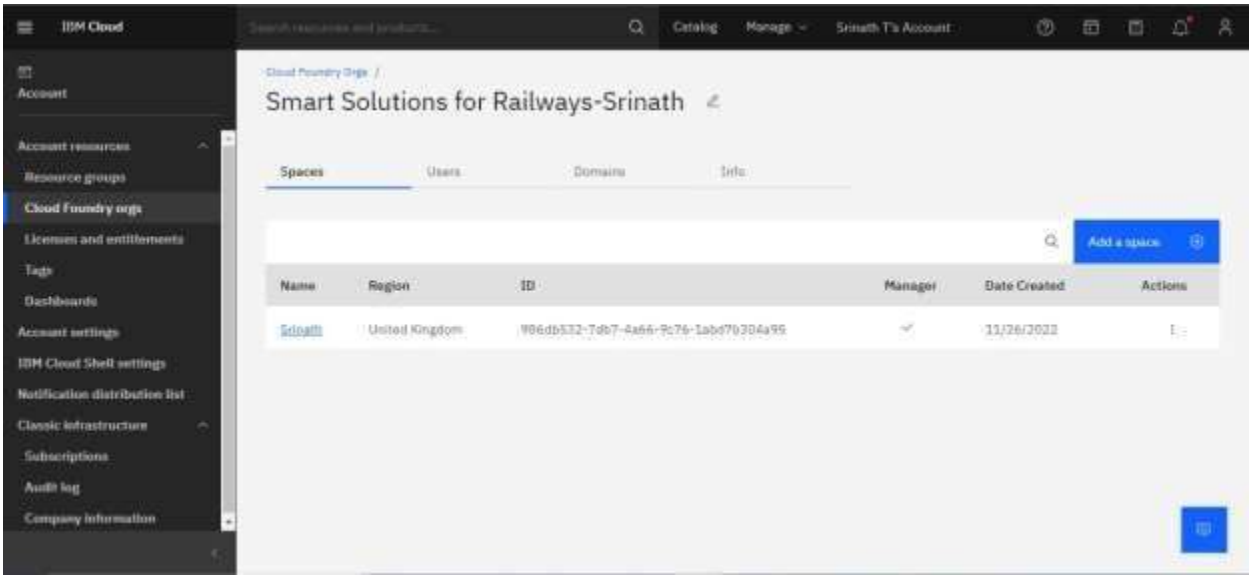
CHAPTER 7

CODING AND SOLUTIONING

Feature 1

Node Red:

Cloudant DB:

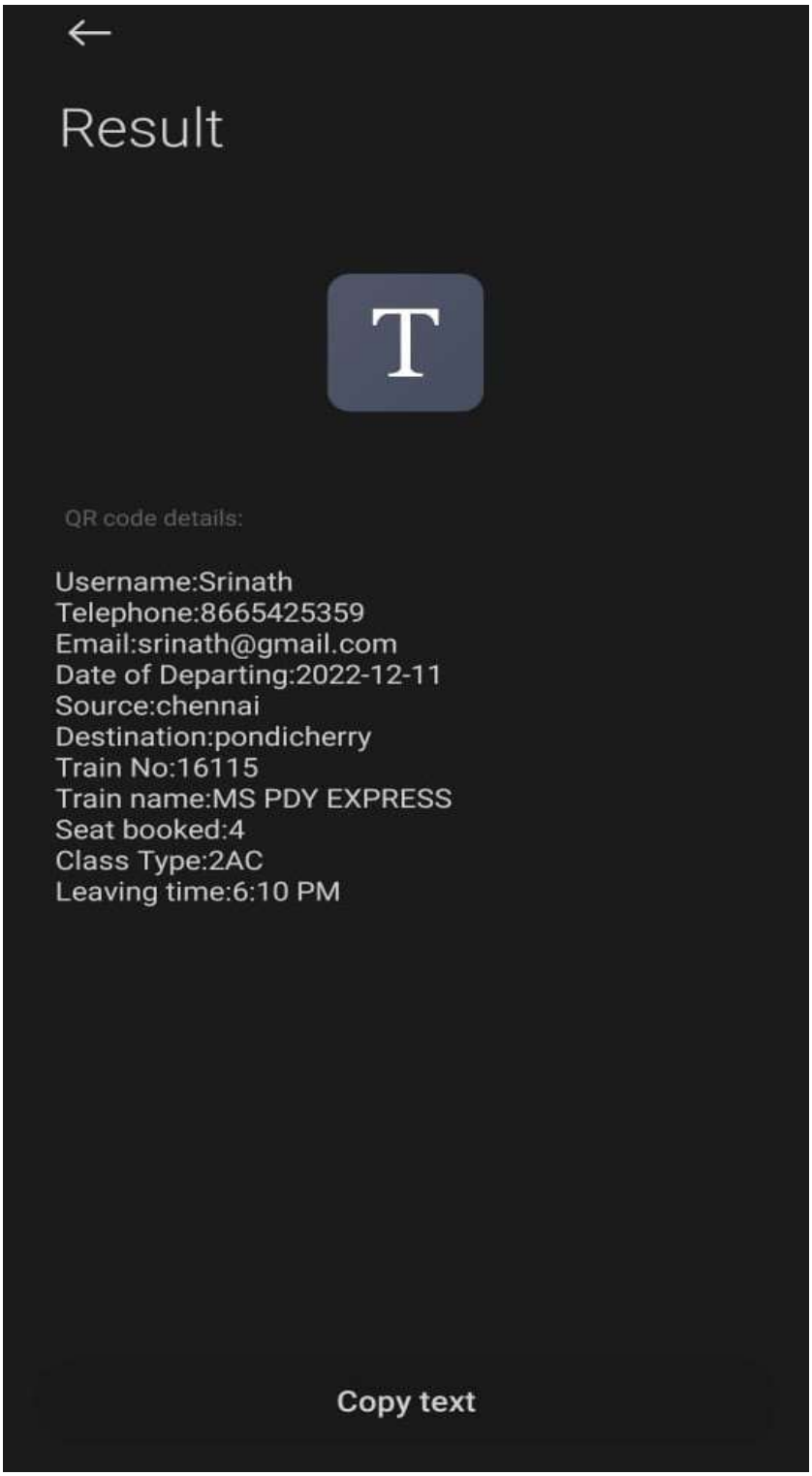


FEATURE 2

HOME PAGE

QR CODE

DETAILS


Result
T
QR code details:
Username:Srinath
Telephone:8665425359
Email:srinath@gmail.com
Date of Departing:2022-12-11
Source:chennai
Destination:pondicherry
Train No:16115
Train name:MS PDY EXPRESS
Seat booked:4
Class Type:2AC
Leaving time:6:10 PM
Copy text

Scan the QRCode and get your train ticket.

A Train Hasn't Started Yet But All Looks Good . 16115 Ms Pdy Express runs between Chennai Egmore (MS) to Puducherry (PDY). This train takes 4H 50M to cover this trip and starts at 18:10 from Chennai Egmore (MS) and reaches Puducherry (PDY) at 22:15. The exact current location of train can be found at RailYatri where you see the train symbol with an animation.

Submit

CHAPTER 8
TESTING

8.1 TEST CASES

A test case has components that describe input, action and an expected response, in order to determine if a feature of an application is working correctly. A test case is a set of instructions on “HOW” to validate a particular test objective/target, which when followed will tell us if the expected behavior of the system is satisfied or not. Characteristics of a good test case:

- Accurate: Exacts the purpose.
- Economical: No unnecessary steps or words.
- Traceable: Capable of being traced to requirements.
- Repeatable: Can be used to perform the test over and over.
- Reusable: Can be reused if necessary.

8.2 USER ACCEPTANCE TEST

The purpose of this document is to briefly explain the test coverage and open issues of the Smart Fashion Application project at the time of the release to User Acceptance Testing (UAT).

DEFAULT 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	13	4	2	3	22
Duplicate	1	0	5	0	4
External	2	4	0	1	7
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	27	15	15	26	82

TEST CASE ANALYSIS

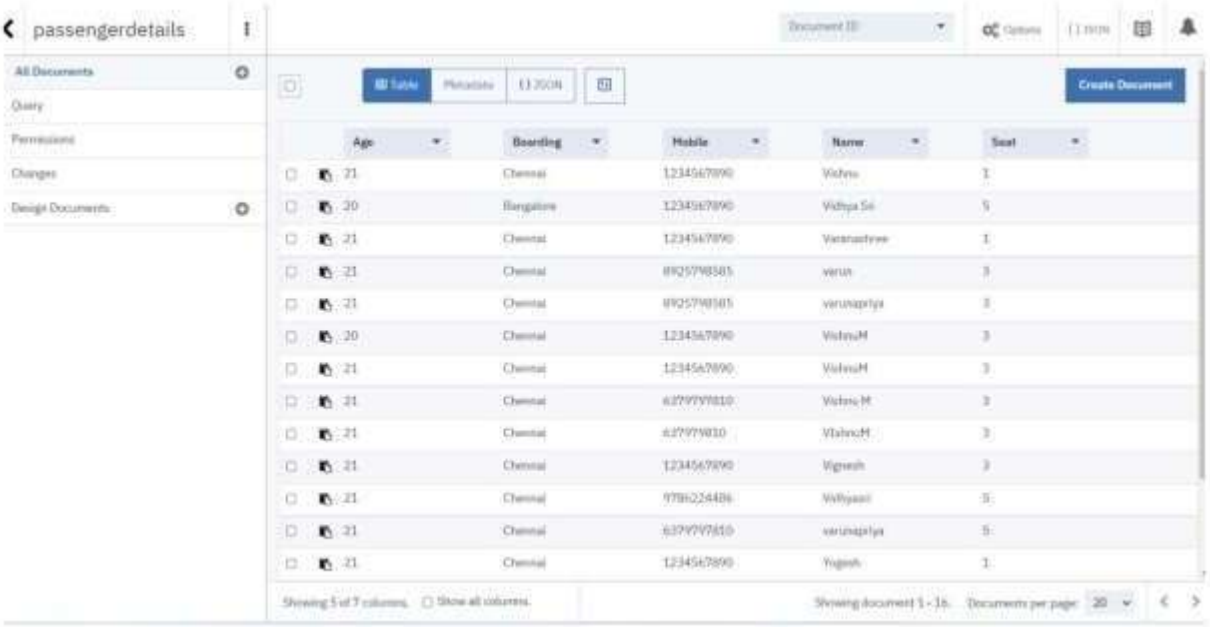
This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	50	0	0	50
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	1	0	0	1

CHAPTER 9

RESULTS

9.1 PERFORMANCE METRICS



CHAPTER 10

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- Openness – compatibility between different system modules, potentially from different vendors.
- Orchestration – ability to manage large numbers of devices, with full visibility over them.
- Dynamic scaling – ability to scale the system according to the application needs, through resource virtualization and cloud operation.
- Automation – ability to automate parts of the system monitoring application.

DISADVANTAGES

- Approaches to flexible, effective, efficient, and low-cost data collection for both railway vehicles and infrastructure monitoring, using regular trains.
- Data processing, reduction, and analysis in local controllers, and subsequent sending of that data to the cloud, for further processing.
- Online data processing systems, for real-time monitoring, using emerging communication technologies.
- Integrated, interoperable, and scalable solutions for railway systems preventive maintenance.

CHAPTER 11

CONCLUSION

Accidents occurring in Railway transportation system cost a large number of lives. So this system helps us to prevent accidents and giving information about faults or cracks in advance to railway authorities. So that they can fix them and accidents cases becomes less. This project is cost effective. By using more techniques they can be modified and developed according to their applications. By this system many lives can be saved by avoiding accidents. The idea can be implemented in large scale in the long run to facilitate better safety standards for rail tracks and provide effective testing infrastructure for achieving better results in the future.

CHAPTER 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.

CHAPTER 13

APPENDIX

Source Code :

Flask algorithm for developing a web application for reserving a ticket

```
from flask import Flask, render_template, request
import qrcode
from PIL import Image
import MySQLdb.cursors
from flask_mysqldb import MySQL
import requests
from bs4 import BeautifulSoup
import pandas as pd
app = Flask(__name__)

app.config["MYSQL_HOST"] = "localhost"
app.config["MYSQL_USER"] = "root"
app.config["MYSQL_PASSWORD"] = "Grapes$1"
app.config["MYSQL_DB"] = "train"
mysql = MySQL(app)
train_no = ""
@app.route('/home', methods = ['POST', 'GET'])
def home():
    if(request.method == 'POST'):
        username = request.form['username']
```

```
        tel = request.form['phoneno']
        email = request.form['email']
        date = request.form['date']
        source = request.form['source']
        destination = request.form['destination']
        seat = request.form['seat']
        trainname = request.form['trainname']
        classname = request.form['classType']
        cursor = mysql.connection.cursor(MySQLdb.cursors.DictCursor)
        cursor.execute('SELECT train_id, startTime, endTime,
SourceStation, DestinationStation FROM traintable WHERE train_name
= % s', (trainname,))
        trainDetails = cursor.fetchone()
        price = trainprice(source, destination, classname)
        price  = price * int(seat)
        train_id = str(trainDetails.get('train_id'))
        print(train_id)
        global train_no
        train_no = train_id
        details =
"Username:"+username+"\nTelephone:"+tel+"\nEmail:"+email+"\nDate
of
Departing:"+date+"\nSource:"+source+"\nDestination:"+destination+"\n
Train No:"+train_id+"\nTrain name:"+trainname+"\nSeat
booked:"+seat+"\nClass Type:"+classname+"\nLeaving
time:"+str(trainDetails.get('startTime'))
```

```
        img = qrcode.make(details)
        # trainLocation(train_id)
        img.save('D:\\ELCOT\\Downloads\\Train-ticket-booking-system-main\\Train-ticket-booking-system-main\\Ibm Project-SSFR\\static\image\\qrcode.jpg')
        filename = 'qrcode.jpg'
        return render_template('qrcode.html', filename = filename, locatiom = "")
    return render_template('indexs.html')
def trainprice(source, destination, classname):
    if (source == 'chennai' and destination == 'hyderbad') or (source == 'hyderbad' and destination == 'chennai'):
        if(classname == '1AC'):
            return 1450
        elif(classname == '2AC'):
            return 1200
        elif(classname == 'FC'):
            return 800
        elif(classname == 'SL'):
            return 700
        elif(classname == '2S'):
            return 600
        else:
            return 450
    elif (source == 'chennai' and destination == 'kolkata') or (source ==
```

```
'kolkata' and destination == 'chennai'):
        if(classname == '1AC'):
            return 2450
        elif(classname == '2AC'):
            return 2200
        elif(classname == 'FC'):
            return 1800
        elif(classname == 'SL'):
            return 1700
        elif(classname == '2S'):
            return 1200
        else:
            return 1000
    elif (source == 'chennai' and destination == 'pondicherry') or (source
== 'pondicherry' and destination == 'chennai'):
        if(classname == '1AC'):
            return 450
        elif(classname == '2AC'):
            return 200
        elif(classname == 'FC'):
            return 150
        elif(classname == 'SL'):
            return 120
        elif(classname == '2S'):
            return 100
```

```
        else:
            return 90
    elif (source == 'kolkata' and destination == 'hyderbad') or (source ==
'hyderbad' and destination == 'kolkata'):
        if(classname == '1AC'):
            return 1450
        elif(classname == '2AC'):
            return 1200
        elif(classname == 'FC'):
            return 800
        elif(classname == 'SL'):
            return 700
        elif(classname == '2S'):
            return 600
        else:
            return 450
    elif (source == 'pondicherry' and destination == 'hyderbad') or (source
== 'hyderbad' and destination == 'pondicherry'):
        if(classname == '1AC'):
            return 1250
        elif(classname == '2AC'):
            return 1000
        elif(classname == 'FC'):
            return 800
        elif(classname == 'SL'):
```

```
            return 700
        elif(classname == '2S'):
            return 600
        else:
            return 450
    elif (source == 'kolkata' and destination == 'pondicherry') or (source
== 'pondicherry' and destination == 'kolkata'):
        if(classname == '1AC'):
            return 2950
        elif(classname == '2AC'):
            return 2300
        elif(classname == 'FC'):
            return 2100
        elif(classname == 'SL'):
            return 1900
        elif(classname == '2S'):
            return 1500
        else:
            return 1000
    else:
        return 1000


@app.route('/location', methods=['GET', 'POST'])
def trainLocation():
    url = "https://www.railyatri.in/live-train-status/"+train_no
```

```
    print(type(train_no))


    htmldata = getdata(url)
    soup = BeautifulSoup(htmldata, 'html.parser')


    data = []
    for item in soup.find_all('script', type="application/ld+json"):
        data.append(item.get_text())
    print(len(data))
    df = pd.read_json(data[2])
    print(df["mainEntity"][0]['acceptedAnswer']['text'])
    return render_template("qrcode.html", filename = '/qrcode.jpg',
location = df["mainEntity"][0]['acceptedAnswer']['text'])
def getdata(url):
    r = requests.get(url)
    return r.text
app.debug = True
app.run(port=5000)
```

GITHUB LINK-

https://github.com/IBM-EPBL/IBM-Project-22359-1659850322/tree/main

PROJECT DEMO LINK-

https://drive.google.com/file/d/1TTLFyVdeEO4ed1rZ0yL00FDp97QivG-g/view

CHAPTER 14
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