SMART SOLUTIONS FOR RAILWAYS

TEAM ID:PNT2022TMID42281

1. INTRODUCTION:

1.1 Project Overview:

Smart Solutions for railways is designed to reduced the work load of the user and also the use of paper. The concept behind this idea is that the ticket is digitalised in the form of QR codes. The users have to register thier information in the website which is a prerequisite for booking the train. The users are able to choose their seats. After choosing the seats the website gives the user some options like E-catering service, wakeup call, etc. If the user has choosen the wake-up call option then they are tracked using the GPS during their journey and before reaching their destination they will be given a call to their registered mobile numbers.

1.2 Purpose:

The main purpose of the project is to make the railway ticket booking system more efficient and secure. This project can satisfy the user by allowing them to book their seats that are preferred by them. This project allow the users to preorder the foods they require during their journey.

2. LITERATURE SURVEY:

2.1 Existing problem:

>>The workload of the user, as well as the use of paper, are always high in railways.

>>The main disadvantage of booking train tickets is that you cannot see the available seats before making your reservation.

>>During ticket collection, the TTR requests the user's identity card for future reference.

>>However, if they fail to bring their identity card with them on the journey, they will be fined for travelling in the train without identification.

>>In speaking of filling-out the form, the user's personal details are not mentioned as being safe.

2.2 References:

1.	Automatic Fault detection of Railway Track system Based on PLC(ADOR TAST).	Naveen Bhargav	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. Precise location of a heavy freight train and its main parameters.
2.	Railway track fault detection system using IR sensors and Bluetooth technology.	Siva Rama Krishna. B	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. Applications of modern predictive control methods, analysis tools and techniques for condition monitoring systems.

3.	Expert systems	Rabatel	Anomaly detection in complex maintaiance operation. Precision is in all case above 90% limiting both the number of false alarms and the number of undetected anomalies.

4.	State-of-the-art, analytics, sensor fusion and big data.	Thanduri	Precise location of a heavy freight train and its main parameters. Adjust the maintenance needs and track speed limits dynamically using embedded sensors. Experimental results of the implementation.
5.	State-of-the-art	Soh	Different strategies for preventive maintenance scheduling problem: hybrid genetic algorithms, ontology-based modeling, heuristic approaches and strategic gang scheduling. Big Data Maintenance decisions regarding railway tracks, all parts of the track can be monitored with appropriate intervals while maintaining the processing load within feasible limit.
6.	Expert systems, DSS, ontologies	Turner	Knowledge based systems to develop a prototype for maintenance scheduling. WSN, Zigbee Monitoring system for slab track infrastructures using an energy consumption optimization strategy. WSN, remote monitoring Monitor the slope deformation, the variation in the internal stress and the PPV (Peak Particle Velocity) in an existing slope adjacent to a railway track. WSN Early warning system for infrastructure surveillance and threat detection.

7.	Key update scheme Secure key establishment for train-to-infrastructure networking.	Bennetts	Secure key establishment for train-to-infrastructure networking. State-of-the-art Securing railways: plans against the identified threats.
8.	Sensors, ultrasonic probeheads, numerical models	Kouroussis	Overview about the static and dynamic behaviour of ballasted railway tracks in SHM. Estimation of stress transfer from the train passage to the track using predictive numerical models. State-of-the-art, WSN General applications, SHM network topology and deployments, hardware/software properties, communication protocols and standards; and energy harvesting solutions. State-of-the-art, WSN Integration of different types of sensors for SHM. State-of-the-art, WSN Qualitative and quantitative analysis of WSN requirements, accurate timing and synchronized sensing for high sampling rate sensors. Sensors, ultrasonic probeheads, numerical models Tests over a railway truss bridge.

9.	Artifificial intelligence, dynamic programming and genetic algorithm	Franceschinis	Development and experimental results of a liquid level sensor based on a fifiber Bragg grating for monitoring differential settlement of railway track. WSN, feature extraction Analysis of the vibration patterns caused by trains passing by. Time-synchronized network for SHM, the design includes channel measurements, network topology and architecture, physical and MAC layer design and network discovery. Performance evaluation show maximum sampling synchronization jitter values within 1μs for sensor nodes belonging the same base station, and 2μs for nodes of different base stations. Modeling the physical topology optimization for SHM.
10.	Video analytics, artificial intelligence	Tutcher	Security management system integrating heterogeneous intrusion detection, access control, intelligent video-surveillance and sound detection devices. Probability of detection of at least the 80% for most alarms (including motion detection, unattended luggage, yellow line crossing) and a false alarm rate of less 10 nuisance alarms per day. Comprehensive video surveillance and management platform, successfully applied in the operation of Suzhou Subway Line 1. Framework with detection models for the evaluation of threat detection.

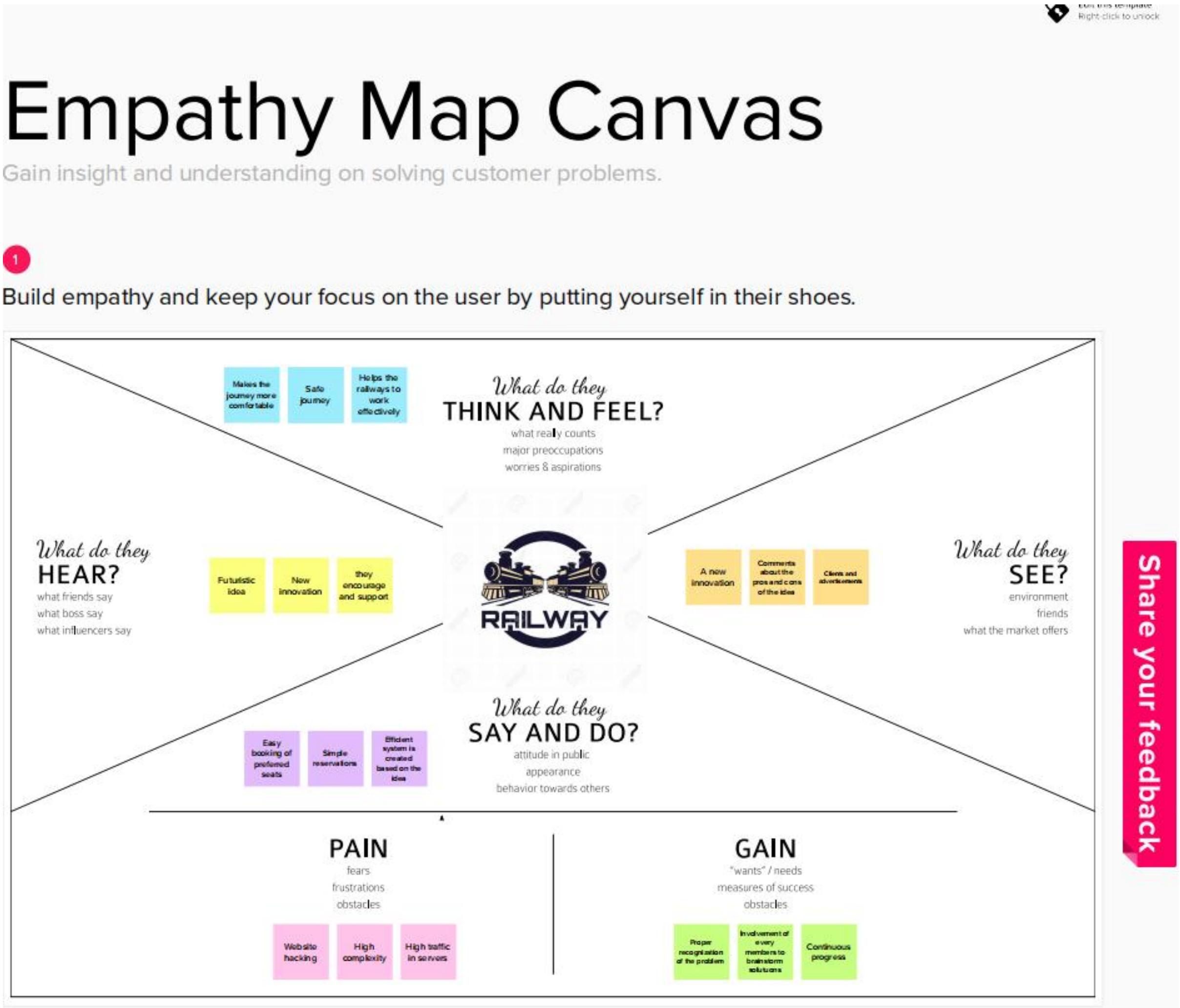
11.	Dynamic forecasting, stochastic comparison	Hamid	Revenue management in intermodal transportation. Resource management for containerized cargo-transportation.
12.	Multi-commodity flflow problem, probabilistic mathematical model	Sirikijpanichkul	Monitoring of rolling bearing in freight trains, comparison of different routing protocols and use of data compression and coding schemes based on lifting integer wavelet and Embedded Zerotree Wavelet (EZW) algorithms. Monitoring of freight trains transporting hazardous materials. Analysis on network performance by measuring the packet loss rate on different nodes in two working conditions: train standing in the station and train running. Performance monitoring of track transitions under different loading environments. Identifification of different factors contributing towards this differential movement, as well as development of design and maintenance strategies to mitigate the problem. bilevel optimization Revenue management for rail freight using bilevel mathematical formulation which encompasses pricing decisions and network planning.

2.3 Problem Statement:

The workload of the user, as well as the use of paper, are always high in railways. The main disadvantage of booking train tickets is that you cannot see the available seats before making your reservation. If the user forgets to buy a ticket before boarding the train, they will be unable to continue their journey. During ticket collection, the TTR requests the user's identity card for future reference. However, if they fail to bring their identity card with them on the journey, they will be fined for travelling in the train without identification. Other users, unlike locals, are unable to know their specific reach of their destination, and on long journeys, they may become sleepy without knowledge of the arrival of their train at the specific destination. In speaking of filling out the form, the user's personal details are not mentioned as being safe.

3. IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:



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Right click to unlock

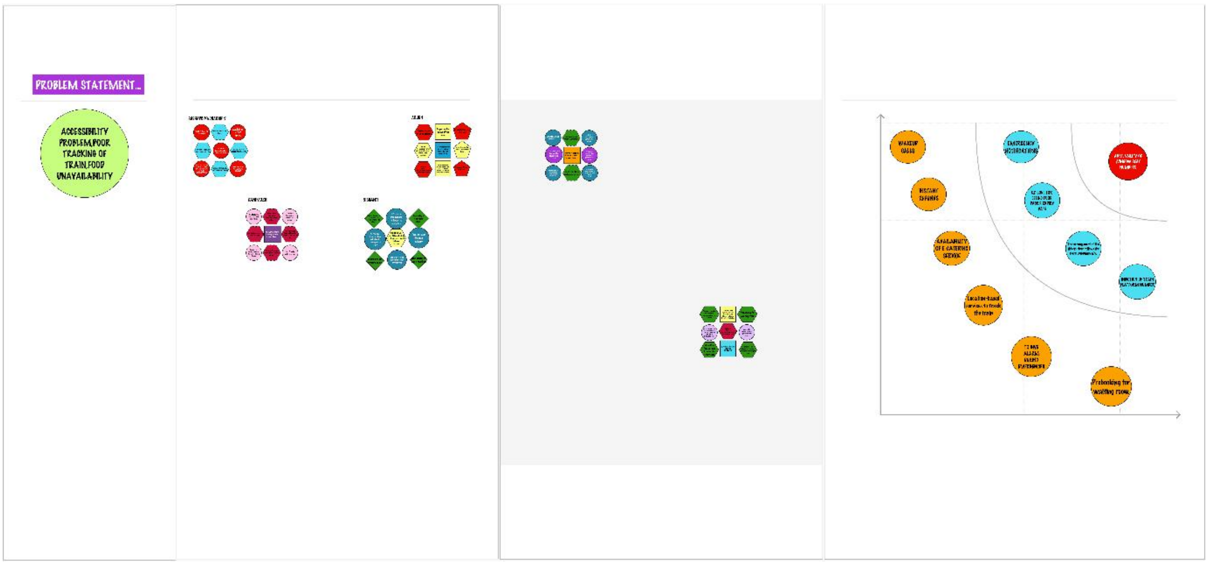
Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.

3.2 Ideation & Brainstorming:


PROBLEM STATEMENT...
ACCESSIBILITY PROBLEM,POOR TRACKING OF TRAIN,FOOD UNAVAILABILITY
WAKEUP CALLS
EMERGENCY NOTIFICATIONS
AVAILABILITY OF E-CATERING SERVICE
Location-based services to track the train
Prebooking for waiting room.

3.3 Proposed Solution:

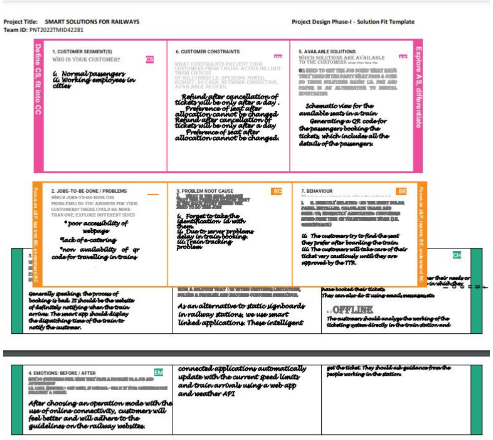
Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To create a satisfiable online train ticket booking system.

2.	Idea / Solution description	First a website is created in which the customers are required to register their details, so that they are able choose the train which they prefer.The trains which are available are listed by the website based on the the customer's preference.The customers are shown the number of avaliable in each compartments from which they will choose which compartment that they prefer but the ticket will be provided at random from their choosen compartment.The ticket registration details and a unique QR code will be provided to the customers after registering and paying for the ticket through the website.The website allows the customers to track it via GPS from half hour before its prescribed departure time.The customers are required to confirm their seats by using the QR code given to them by the website using a QRcode scanner.They are able to track the train till it reaches their destination.
3.	Novelty / Uniqueness	The customers are able to track the train throughout their journey using the website.There is an emergency option in the website which directly informs the traveling ticket examiner who can if required can contact the driver.The customers are able to view and order the types of food provided in the train using the website.
4.	Social Impact / Customer Satisfaction	Provides variety of options and better security.
5.	Business Model (Revenue Model)	Various trains register their details in the train and the website is approved by the railway division of that state.
6.	Scalability of the Solution	Depends on the approval of the railway division of the area to be used and also the number of trains registered in the website and the information that they shared with the website.

3.4 Problem Solution fit:



Project Title: SMART SOLUTIONS FOR RAILWAYS

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Project Design Phase-I - Solution Fit Template

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

WHO IS YOUR CUSTOMER?

i. Normal passengers
ii. Working employees in cities

6. CUSTOMER CONSTRAINTS

WHAT CONSTRAINTS PREVENT YOUR CUSTOMERS FROM TAKING ACTION OR LIMIT THEIR CHOICES OF SOLUTIONS? I.E. SPENDING POWER, BUDGET, NO CASH, NETWORK CONNECTION, AVAILABLE DEVICES.

Refund after cancellation of tickets will be only after a day .
Preference of seat after allocation cannot be changed
Refund after cancellation of tickets will be only after a day
Preference of seat after allocation cannot be changed.

5. AVAILABLE SOLUTIONS

WHICH SOLUTIONS ARE AVAILABLE TO THE CUSTOMERS when they face the [illegible]

Schematic view for the available seats in a train
Generating a QR code for the passengers booking the tickets, which includes all the details of the passengers.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS

WHICH JOBS-TO-BE-DONE (OR PROBLEMS) DO YOU ADDRESS FOR YOUR CUSTOMERS? THERE COULD BE MORE THAN ONE; EXPLORE DIFFERENT SIDES

*poor accessibility of webpage
*lack of e-catering
*non availability of qr code for travelling in trains

9. PROBLEM ROOT CAUSE RC

i. Forget to take the identification id with them.
ii. Due to server problems delay in train booking.
iii. Train tracking problem

7. BEHAVIOUR BE

ii. The customers try to find the seat they prefer after boarding the train.
iii. The customers will take care of their ticket very cautiously until they are approved by the TTR.

Focus on J&P, tap into BE, understand RC

CH

Generally speaking, the process of booking is bad. It should be the website of definitely notifying when the train arrives. The smart app should display the dispatching time of the train to notify the customer.

As an alternative to static signboards in railway stations, we use smart linked applications. These intelligent connected applications automatically update with the current speed limits and train arrivals using a web app and weather API

[illegible] their needs or [illegible] in which they have booked their tickets.
They can also do it using email, messages, etc.

OFFLINE

The customers should analyze the working of the ticketing system directly in the train station and get the ticket. They should ask guidance from the people working in the station.

4. EMOTIONS: BEFORE / AFTER EM

After choosing an operation mode with the use of online connectivity, customers will feel better and will adhere to the guidelines on the railway websites.

4. REQUIREMENT ANALYSIS:

4.1 Functional requirement:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Ticket booking	Booking through website Booking through developed application Booking through form in the railway station
FR-2	User Confirmation	Generation of e-ticket Generation of QR code
FR-3	Database management	Storing the details of the journey in the server
FR-4	GPS	Tracking the location of the train at any instant
FR-5	GSM	To get a wakeup call prior to the destination
FR-6	E-Catering	Providing foods for the registered passengers

4.2 Non-Functional requirements:

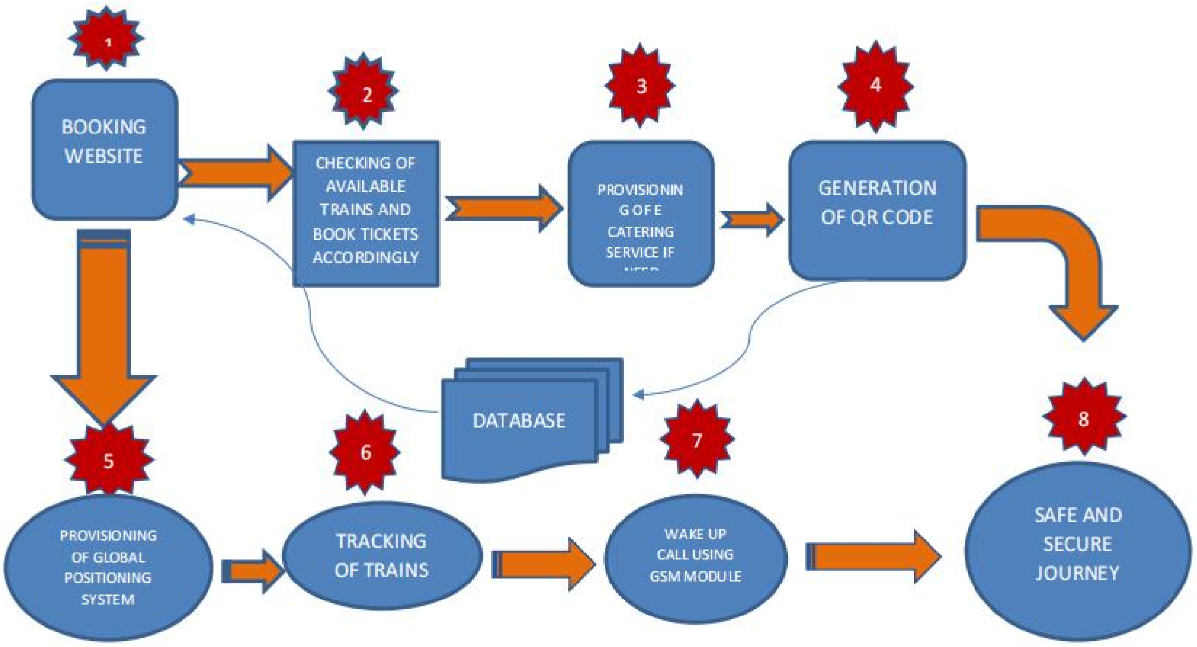
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Availability of digital tickets instead of carrying the physical one.
NFR-2	Security	As there is a train tracking facility , It will be an safe journey.
NFR-3	Reliability	Data are saved in the secured server so they doesn't provide any loopholes for the hackers.
NFR-4	Performance	No server crash or server down even many numbers of users access the website at the same time.

NFR-5	Availability	Accessibility through website or application.
NFR-6	Scalability	Easily accessible website with high reliability.

5. PROJECT DESIGN:

5.1 Data Flow Diagrams:


1
BOOKING WEBSITE
2
CHECKING OF AVAILABLE TRAINS AND BOOK TICKETS ACCORDINGLY
3
PROVISIONIN G OF E CATERING SERVICE IF
4
GENERATION OF QR CODE
DATABASE
5
PROVISIONING OF GLOBAL POSITIONING SYSTEM
6
TRACKING OF TRAINS
7
WAKE UP CALL USING GSM MODULE
8
SAFE AND SECURE JOURNEY

5.2 Solution & Technical Architecture:

Technical Architecture:

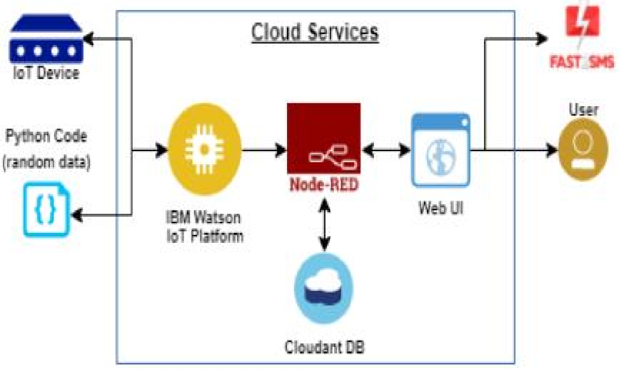


Table -1: Components &Technologies:

S.NO	Component	Description	Technology
1.	User Interface	Interaction between user and application	Python
2.	Application logic- 1	Get input from the user and store it	Python
3.	Application Logic -2	Datas are stored in the cloudant DB	Cloudant DB -cloud storage
4.	Database	No Structured Query Language or any other DBMS is used to store the user data in the database	IBM Cloudant DB
5.	Cloud Database	All the database are stored in the cloud	IBM Cloudant DB -cloud storage
6.	File Storage	The mobile app must have at least of 10MB space	Local file system
7.	External API-1	Grouping of all the iot devices	IBM Node Red
8.	Infrastructure (server, cloud)	Application deployment on local system/cloud local service configuration or cloud service configuration	Local, IBM Watson cloud

Table-2: Application Characteristics:

S.NO	Characteristic	Description	Technology
1.	Open-source Frame works	NODE-RED	Node.js
2.	Security Implementations	Individual datas of the client are stored safely in Db by giving specific Id	Cloudant DB
3.	Scalable Architecture	Easily accessible website with high reliability	Cloud and data centres, gateways, sensors
4.	Availability	The webpage is available and accessible at all times	IBM Cloud
5.	Performance	No server crash or server down even many numbers of users access the website at the same time.	IBM Watson

5.3 User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (Mobile user)	Registration	USN-1	As a user, I can register in the website by entering my email,phone number,e-aadhar copy and some of my personal details.	The user can access their account without any problem.	High

		USN-2	As a user, I observed that the website has very few security-related problems.	The user will receive a confirmation email whenever their account is accessed and their private information is not leaked to others.	High
		USN-3	As a user, I can register in the website using my Google account.	The user can register & access the dashboard with Google account Login	Low
		USN-4	As a user, I can freely browse the choices of trains available to me and also their ticket vacancy.	The website should work smoothly when the user is browsing and provide results which satisfy the users.	High
	Login	USN-5	As a user, I can log into the website using my email and the password that I have set.Then I will have to enter a verification code which is sent to my email.	If the user has entered their email,password and verification code then they can login to their account smoothly.If they have forgot their password then forgot password option is also given.	High
	Profile	USN-6	As a user I can access my profile easily if I have logged into the website.	The user can change their personal information whenever they want effortlessly.	High
Customer (Web user)		WUSN-1	As web user I am able to access the website and browse my options without logging in but to book tickets I have to register in the website.	The website should provide satisfactory results to the web user and should not crash suddenly.	High

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer Care Executive		CCE-1	As a customer care executive I can always contact customer using the phone number or the email address given in the website.I can also know about their problems in the website by acessing the issue option.	The customer care executive should be able assist the users by easily communicating with them.	High
Administrator		AMIN-1	As a administrator I am able to access the list of users who have logged in to the website.	The details of the user should be given to the administrator impeccably when they request it.	High
		ADMIN-2	As a administrator I can access the number tickets which have been registered for a particular train.	The details about the number of tickets registered and the remaining tickets in a particular trian is accessible to the administrator along with the registered user's information.	High

6. PROJECT PLANNING & SCHEDULING:

6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint1	User Registration	USN-1	Users can Register for the app by providing or entering the E-mail, Phone number and desired password	8	High	SUDHA PRIYADHARSHINI.B

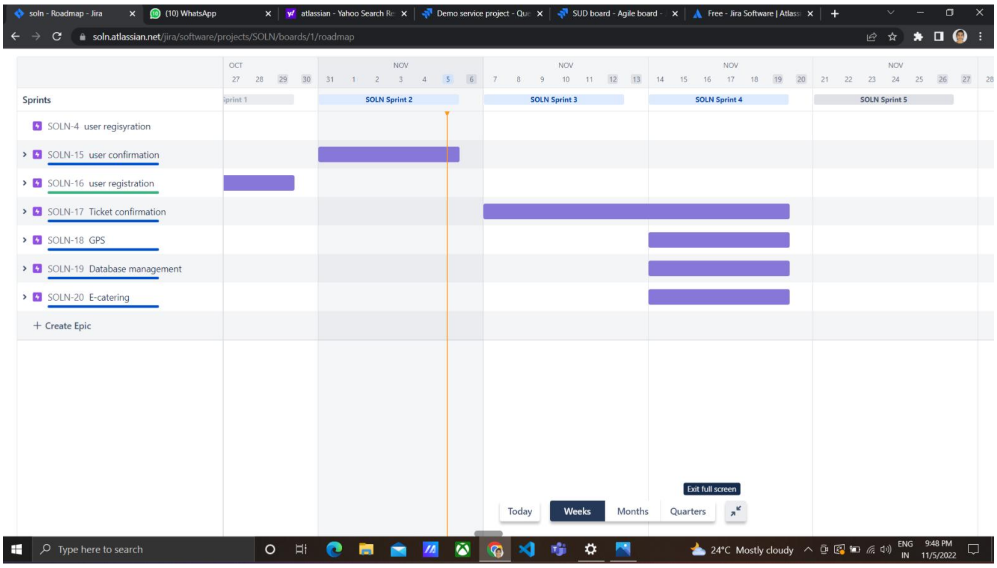
			and confirming the given password.			
Sprint2		USN-2	After entering, the Acknowledgement will be provided by the E-mail.	13	High	NISHANTH.G
Sprint4		USN-3	We can also register through website, developed application.	2	Medium	KANIMOZHI.M
Sprint1	Journey details	USN-1	Users should provide the date of Journey and from and to details.	1	High	NISHANTH.G
Sprint1	Select trains	USN-1	Users should select the desired train.	2	High	KANIMOZHI.M
Sprint3	Book and add passenger	USN-1	Providing necessary details such as name, age for booking.	13	Medium	ARJUN.M.P
Sprint2	payment	USN-1	Payment can be done using credit, debit & UPI.	2	High	SUDHA PRIYADHARSHINI.B
Sprint1	User Confirmation	USN-1	Can receive the confirmation through E-mail.	2	Medium	NISHANTH.G
Sprint2		USN-2	Can also receive OTP if you have registered through phone number.	2	Medium	SUDHA PRIYADHARSHINI.B
Sprint3	Ticket confirmation	USN-1	Your ticket is available at your email if it is confirmed.	5	High	KANIMOZHI.M
Sprint4	GPS	USN-2	Using GPS, live location of the train will be provided to passenger.	3	Medium	SUDHA PRIYADHARSHINI.B
Sprint4	Database	USN-3	All the details of the passenger are stored in server.	5	Medium	KANIMOZHI.M
Sprint4	E-catering	USN-4	Using E-catering, foods are provided to the passengers who have registered.	1	Medium	ARJUN.M.P

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	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	17	6 Days	31 Oct 2022	05 Nov 2022	17	05 Nov 2022
Sprint-3	18	6 Days	07 Nov 2022	12 Nov 2022	18	12 Nov 2022
Sprint-4	11	6 Days	14 Nov 2022	19 Nov 2022	11	19 Nov 2022

6.3 Reports from JIRA:

ROADMAP:

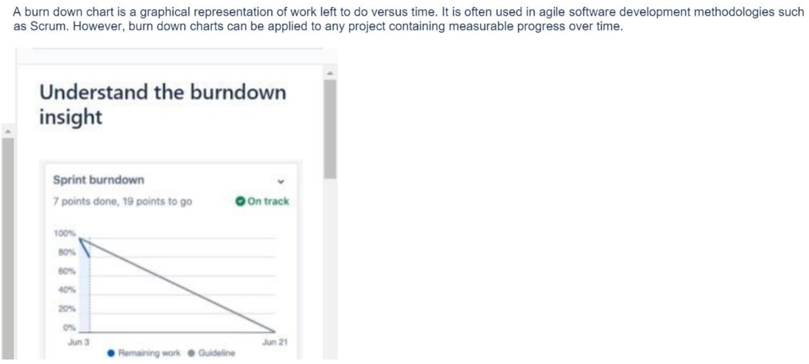


soln.atlassian.net/jira/software/projects/SOLN/boards/1/roadmap

Sprints

- SOLN-4 user regisyration
- SOLN-15 user confirmation
- SOLN-16 user registration
- SOLN-17 Ticket confirmation
- SOLN-18 GPS
- SOLN-19 Database management
- SOLN-20 E-catering

BURNDOWN CHART:



A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

Understand the burndown insight

Sprint burndown

7 points done, 19 points to go

7. CODING & SOLUTIONING:

FUNCTION NODE COMMAND TO INDICATE THE AVAILABLE SEATS:

```
var a=global.get('a')
var s= []
for(let i=0;i<a.length==0;i++){
s.push(a[i])
}
if(s.length==0){
msg.options=[{"No seats available":0}]
}
else{
msg.options= s
}
msg.payload= s
return msg;
```

FUNCTION NODE COMMAND TO CHOOSE THE AVAILABLE SEATS:

```
var s=global.get('s')
var a=global.get('a')
function reg(x){
for(let i=0;i<a.length;i++){
if(a[i]==x){
a.splice(i,1)
}
}
}
if(s==1){
global.set('s1',s)
reg(s)
}
else if(s==2){
global.set('s2',s)
reg(s)
}
else if(s==3){
global.set('s3',s)
reg(s)
}
else if(s==4){
global.set('s4',s)
reg(s)
}
else if(s==4){
global.set('s4',s)
reg(s)
}
return msg;
```

FUNCTION NODE COMMAND TO STORE DATA IN DATABASE:

```
var m=global.get('m')
var d=new Date();
var utc=d.getTime()+(d.getTimezoneOffset()*60000);
var offset=5.5;
newDate=new Date(utc+(3600000*offset));
var n=newDate.toISOString()
var date=n.slice(0,10)
var time=n.slice(11,19)
var d1=date+','+time
msg.payload={
"_id":d1,
"Name":m.Name,
"Age":m.Age,
"Mobile":m.Num,
"boarding":global.get('b'),
"destination":global.get('d'),
"Seat":global.get('s')
}
return msg;
```

PYTHON SCRIPT TO SCAN QR CODE:

```
import cv2
import numpy as np
import time
import pyzbar.pyzbar as pyzbar
from pyzbar.pyzbar import decode
from ibmcloudant.cloudant_v1 import CloudantV1
from ibmcloudant import CouchDbSessionAuthenticator
from ibm_cloud_sdk_core.authenticators import BasicAuthenticator
authenticator = BasicAuthenticator('apikey-v2-
125rwcp4ifi6zz2ly1cq0kakyjn98du2ysgc72h53lzi',
'af693938842290ec2c254461754447b5')
service = CloudantV1(authenticator=authenticator)
service.set_service_url('https://apikey-v2-
125rwcp4ifi6zz2ly1cq0kakyjn98du2ysgc72h53lzi:af693938842290ec2c25446175444
7b5@82d87499-
4395-4f46-a190-6a186bee5051-bluemix.cloudantnosqldb.appdomain.cloud')
cap= cv2.VideoCapture(0)
font = cv2.FONT_HERSHEY_PLAINwhile True:
_, frame = cap.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(response)
time.sleep(5)
except Exception as e:
print("NOT A VALID TICKER")
time.sleep(5)
cv2.imshow("Frame",frame)
if cv2.waitKey(1) & 0xFF ==ord('q'):
break
cap.release()
cv2.destroyAllWindows()
client.disconnect()
```

PYTHON CODE FOR GPS:

```
import wiotp.sdk.device
import time
import random
myConfig = {
"identity": {
"orgId": "dks66l",
"typeId": "Sudha",
"deviceId":"45"
},
"auth": {
"token": "sudha2002@"}
}
```

```
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':13.08363 , 'lon': 80.27080}
pub (myData)
time.sleep (2)
myData={'name': 'Train2', 'lat': 12.40797, 'lon': 79.81410}
pub (myData)
time.sleep (2)
myData={'name': 'Train1', 'lat': 11.83331, 'lon': 79.37465}
pub(myData)
time.sleep(6)
myData={'name': 'Train1', 'lat': 11.59664, 'lon': 78.69899}
pub (myData)
time.sleep (6)
myData={'name': 'Train1', 'lat': 11.63431, 'lon': 78.11122}
pub (myData)time.sleep (6)
myData={'name': 'Train1', 'lat': 11.32207, 'lon': 77.61684}
pub (myData)
time.sleep (6)
myData={'name': 'Train1', 'lat': 11.03107, 'lon': 76.96864}
pub (myData)
time.sleep (6)
client.commandCallback = myCommandCallback
client.disconnect ()
```

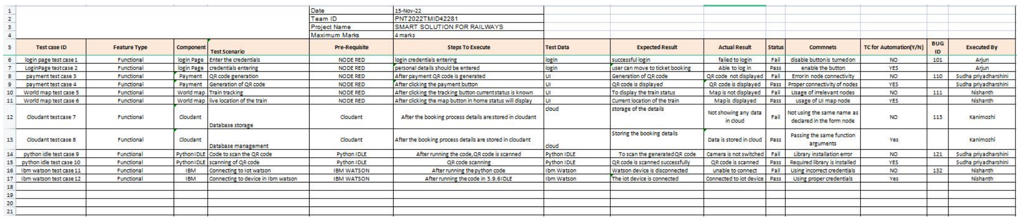
PYTHON CODE FOR TRACKING TRAIN:

```
import wiotp.sdk.device
import time
import random
myConfig = {
"identity": {
"orgId": "dks66l",
"typeId": "Sudha",
"deviceId":"45"
},
"auth": {
"token": "sudha2002@"
}
}
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':13.08363 , 'lon': 80.27080}
pub (myData)
time.sleep (2)
myData={'name': 'Train2', 'lat': 12.40797, 'lon': 79.81410}
pub (myData)
time.sleep (2)
myData={'name': 'Train1', 'lat': 11.83331, 'lon': 79.37465}
pub(myData)
time.sleep(6)myData={'name': 'Train1', 'lat': 11.59664, 'lon': 78.69899}
pub (myData)
time.sleep (6)
myData={'name': 'Train1', 'lat': 11.63431, 'lon': 78.11122}
pub (myData)
time.sleep (6)
myData={'name': 'Train1', 'lat': 11.32207, 'lon': 77.61684}
pub (myData)
time.sleep (6)
myData={'name': 'Train1', 'lat': 11.03107, 'lon': 76.96864}
pub (myData)
time.sleep (6)
client.commandCallback = myCommandCallback
client.disconnect ()
```

8. TESTING:

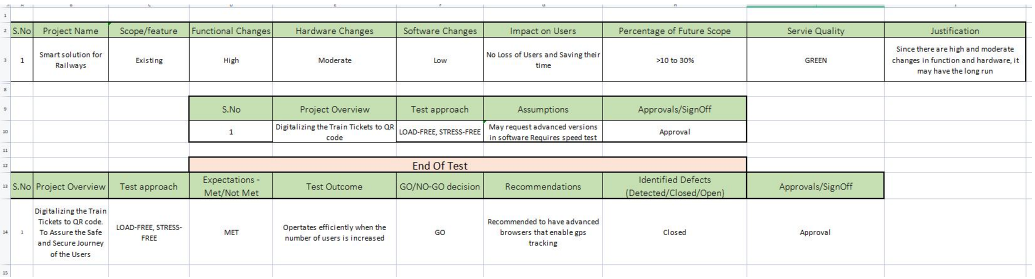
8.1 Test Cases:



Date	15-Nov-22
Team ID	PNT2022TMID42281
Project Name	SMART SOLUTION 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	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
login page test case 1	Functional	login Page	Enter the credentials	NODE RED	login credentials entering	login	successful login	failed to login	Fail	disable button is turned on	NO	101	Arjun
LoginPage test case 2	Functional	login Page	credentials entering	NODE RED	personal details should be entered	login	user can move to ticket booking	Able to log in	Pass	enable the button	YES		Arjun
payment test case 3	Functional	Payment	QR code generation	NODE RED	After payment QR code is generated	UI	Generation of QR code	QR code not displayed	Fail	Error in node connectivity	NO	110	Sudha priyadharshini
payment test case 4	Functional	Payment	Generation of QR code	NODE RED	After clicking the payment button	UI	QR code is displayed	QR code is displayed	Pass	Proper connectivity of nodes	YES		Sudha priyadharshini
World map test case 5	Functional	World map	Train tracking	NODE RED	After clicking the tracking button current status is known	UI	To display the train status	Map is not displayed	Fail	Usage of irrelevant nodes	NO	111	Nishanth
World map test case 6	Functional	World map	live location of the train	NODE RED	After clicking the map button in home status will display	UI	Current location of the train	Map is displayed	Pass	usage of UI map node	YES		Nishanth
Cloudant test case 7	Functional	Cloudant	Database storage	Cloudant	After the booking process details are stored in cloudant	cloud	storage of the details	Not showing any data in cloud	Fail	Not using the same name as declared in the form node	NO	113	Kanimozhi
Cloudant test case 8	Functional	Cloudant	Database management	Cloudant	After the booking process details are stored in cloudant	cloud	Storing the booking details	Data is stored in cloud	Pass	Passing the same function arguments	Yes		Kanimozhi
python idle test case 9	Functional	Python IDLE	Code to scan the QR code	Python IDLE	After running the code, QR code is scanned	Python IDLE	To scan the generated QR code	Camera is not switched	Fail	Library installation error	NO	121	Sudha priyadharshini
python idle test case 10	Functional	Python IDLE	scanning of QR code	Python IDLE	QR code scanning	Python IDLE	QR code is scanned successfully	QR code is scanned	Pass	Required library is installed	YES		Sudha priyadharshini
Ibm watson test case 11	Functional	IBM	Connecting to Iot watson	IBM WATSON	After running the python code	Ibm Watson	Watson device is disconnected	unable to connect	Fail	Using incorrect credentials	NO	132	Nishanth
Ibm watson test case 12	Functional	IBM	Connecting to device in Ibm watson	IBM WATSON	After running the code in 3.9.6 IDLE	Ibm Watson	The iot device is connected	Connected to iot device	Pass	Using proper credentials	Yes		Nishanth

8.2 User Acceptance Testing:



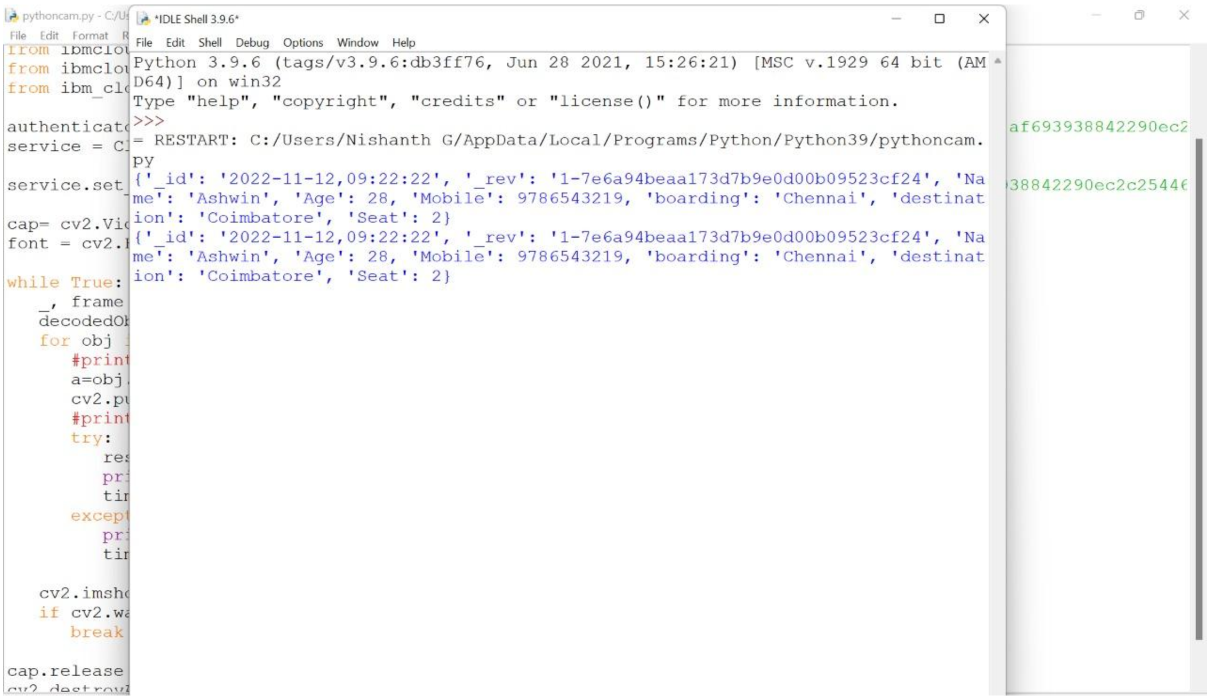
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact on Users	Percentage of Future Scope	Servie Quality	Justification
1	Smart solution for Railways	Existing	High	Moderate	Low	No Loss of Users and Saving their time	>10 to 30%	GREEN	Since there are high and moderate changes in function and hardware, it may have the long run

S.No	Project Overview	Test approach	Assumptions	Approvals/SignOff
1	Digitalizing the Train Tickets to QR code	LOAD-FREE, STRESS-FREE	May request advanced versions in software Requires speed test	Approval

End Of Test

S.No	Project Overview	Test approach	Expectations - Met/Not Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	Digitalizing the Train Tickets to QR code. To Assure the Safe and Secure Journey of the Users	LOAD-FREE, STRESS-FREE	MET	Opertates efficiently when the number of users is increased	GO	Recommended to have advanced browsers that enable gps tracking	Closed	Approval

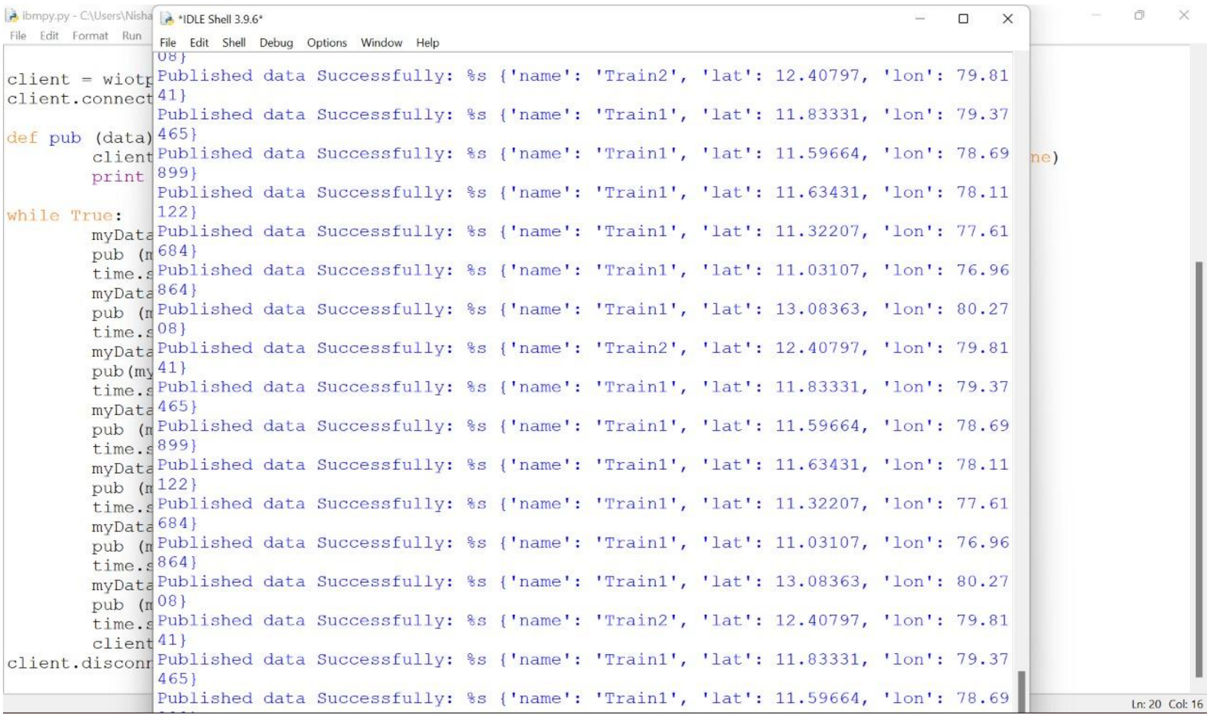
9. RESULTS:



```
Python 3.9.6 (tags/v3.9.6:db3ff76, Jun 28 2021, 15:26:21) [MSC v.1929 64 bit (AM
D64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/Nishanth G/AppData/Local/Programs/Python/Python39/pythoncam.
py
{'_id': '2022-11-12,09:22:22', '_rev': '1-7e6a94beaa173d7b9e0d00b09523cf24', 'Na
me': 'Ashwin', 'Age': 28, 'Mobile': 9786543219, 'boarding': 'Chennai', 'destinat
ion': 'Coimbatore', 'Seat': 2}
{'_id': '2022-11-12,09:22:22', '_rev': '1-7e6a94beaa173d7b9e0d00b09523cf24', 'Na
me': 'Ashwin', 'Age': 28, 'Mobile': 9786543219, 'boarding': 'Chennai', 'destinat
ion': 'Coimbatore', 'Seat': 2}
```

```
from ibmclou
from ibmclou
from ibm_clo

authenticato
service = Cl

service.set_

cap= cv2.Vic
font = cv2.F

while True:
    _, frame
    decodedOb
    for obj i
        #print
        a=obj.
        cv2.pu
        #print
        try:
            res
            pri
            tin
        except
            pri
            tin

    cv2.imsho
    if cv2.wa
        break

cap.release
cv2.destroyA
```

```
af693938842290ec2
38842290ec2c2544(
```



ibmpy.py - C:\Users\Nisha
File Edit Format Run
IDLE Shell 3.9.6
File Edit Shell Debug Options Window Help
Ln: 20 Col: 16

```
08}
Published data Successfully: %s {'name': 'Train2', 'lat': 12.40797, 'lon': 79.81
41}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.83331, 'lon': 79.37
465}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.59664, 'lon': 78.69
899}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.63431, 'lon': 78.11
122}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.32207, 'lon': 77.61
684}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.03107, 'lon': 76.96
864}
Published data Successfully: %s {'name': 'Train1', 'lat': 13.08363, 'lon': 80.27
08}
Published data Successfully: %s {'name': 'Train2', 'lat': 12.40797, 'lon': 79.81
41}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.83331, 'lon': 79.37
465}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.59664, 'lon': 78.69
899}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.63431, 'lon': 78.11
122}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.32207, 'lon': 77.61
684}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.03107, 'lon': 76.96
864}
Published data Successfully: %s {'name': 'Train1', 'lat': 13.08363, 'lon': 80.27
08}
Published data Successfully: %s {'name': 'Train2', 'lat': 12.40797, 'lon': 79.81
41}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.83331, 'lon': 79.37
465}
Published data Successfully: %s {'name': 'Train1', 'lat': 11.59664, 'lon': 78.69
```

10. ADVANTAGES & DISADVANTAGES:

Advantages of Online Booking Systems in further Digitalized Method:

1. **Your business is open around the clock:**

Customers who make a decision to book a tour or rental don't want to wait until you are in the office they want to lock in the activity on their own schedule. Using an online booking system means that your business is open 24 hours a day, seven days a week.

2. **You can maximize reservations:**

Customers who book their own reservations are more likely to show up, making no-shows a thing of the past. If a customer does need to cancel, the spot automatically opens online, giving another customer the chance to book it. By maximizing your reservations, you won't leave unused activity spots or rentals on the table.

3. **You get paid quicker:**

With an online booking system, you can require customers to prepay for activities and rentals. This puts money into your pocket faster.
With an online booking system, you can require customers to prepay for activities and rentals. This puts money into your pocket faster and helps make sure that on the day of the event you don't have to worry about payment giving you and your customers more time to have fun.

4. **You're not tied to a phone:**

If a customer calls a tour or activity company and gets routed to voicemail, they may call back later or they may call their second-choice. Online booking means you capture more potential business because reservations and information are always available. It also means you won't get caught in a dreaded game of telephone tag.

5. **You can effortlessly up-sell add-ons:**

You can always add more guides, offer more activities, or expand your hours to grow your business, but all of those take work. By adding additional perks to your customers, you can easily add extra revenue for your business. Fun extras like photo packages or memorabilia, you can include options to these items in your online booking checkout.

6. **It's easy to manage your calendar:**

Online booking systems allow you to check your reservations and availability wherever you are using any mobile device. You always know the status of your business, and your schedule can be easily managed from a convenient location.

7. **You get valuable insight about your business:**

An online booking system provides you with a dashboard of analytics that help you grow your business. Quickly determine your most popular sellers, the most requested time slots, or even the most popular add-ons by using an online booking system with robust insights. Take advantage of knowing what your customers want most — saving you time and money on offerings that don't help your business grow.

Disadvantages of Online Booking Systems in further Digitalized Method:

1. **You need Internet access:**

If you run tours and activities in remote areas where you aren't able to get on the Internet, online booking might not be for you. You'll need reliable Internet access to check your reservations and to add bookings that are made online.
The good news for Peek Pro users is that our mobile apps work offline. This means that you can connect to the internet, sync your bookings, and go to areas with bad reception. In those areas, it doesn't even matter if your internet cuts out – the Peek Pro apps will work.

2. **You need to be ready for an influx of new customers:**

Online booking software is a great way to attract new customers, many of whom prefer booking online from their computers and mobile devices. However, if you're running a small operation without enough staff members or resources to expand your activities, growing too quickly may pose a challenge.

3. **Not all online booking systems are created equal:**

If you choose a provider that offers poor customer service or only a few features, an online solution might be frustrating — especially when you're ready to grow your business. It’s important to do your homework upfront and choose an online booking system that is committed to supporting you and your business for the long haul.

4. **Avoid booking systems that don’t bring you new quality customers:**

If you’re going to invest in a new technology platform and take the time to train your staff, we recommend you choose a booking system that fits all of your business needs — including bringing you a stream of new, high-quality customers. Some booking systems include distribution channels, but they may not attract quality customers who will give you great reviews and refer your business to friends. Make sure you do your research to find a booking system that guarantees a consistent stream of quality customers.

11. CONCLUSION:

The Benefit of this approach is that the Smart Solutions for railways is designed to reduced the work load of the user and also the use of paper. The concept behind this idea is that the ticket is digitalised in the form of QR codes. The users have to register thier information in the website which is a prerequisite for booking the train. The users are able to choose their seats. After choosing the seats the website gives the user some options like E-catering service, wakeup call, etc. If the user has choosen the wake-up call option then they are tracked using the GPS during their journey and before reaching their destination they will be given a call to their registered mobile numbers.

12. FUTURE SCOPE:

This work will be considered as the basement of making the world better in the future. The main purpose of the project is to make the railway ticket booking system more efficient and secure. This project can satisfy the user by allowing them to book their seats that are preferred by them. This project allow the users to preorder the foods they require during their journey.

13. APPENDIX:

>>The workload of the user, as well as the use of paper, are always high in railways.

>>The main disadvantage of booking train tickets is that you cannot see the available seats before making your reservation.

>>During ticket collection, the TTR requests the user's identity card for future reference.

>>However, if they fail to bring their identity card with them on the journey, they will be fined for travelling in the train without identification.

>>In speaking of filling-out the form, the user's personal details are not mentioned as being safe.

GitHub & Project Demo Link:

https://github.com/IBM-EPBL/IBM-Project-329-1658288490

https://drive.google.com/file/d/1Pz0wQ1Q-x-R64aynPZDsaURoDgeYCMhz/view?usp=drivesdk