

Project Report

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1.INTRODUCTION

1.1 PROJECT OVERVIEW

SMART SOLUTIONS FOR RAILWAYS is to manage Indian Railways is the largest railway network in Asia and additionally world's second largest network operated underneath a single management. Due to its large size, it is difficult to monitor the cracks in tracks manually. This paper deals with this problem and detects cracks in tracks with the help of ultrasonic sensor attached to moving assembly with help of stepper motor. Ultrasonic sensor allows the device to moves back and forth across the track and if there is any fault, it gives information to the cloud server through which railway department is informed on time about cracks and many lives can be saved. This is the application of IoT, due to this it is cost effective system. This effective methodology of continuous observation and assessment of rail tracks might facilitate to stop accidents. This methodology endlessly monitors the rail stress, evaluate the results and provide the rail break alerts such as potential buckling conditions, bending of rails and wheel impact load detection to the concerned authorities.

1.2 PURPOSE

Internet is basically system of interconnected computers through network. But now its use is changing with changing world and it is not just confined to emails or web browsing. Today's internet also deals with embedded sensors and has led to development of smart homes, smart rural area, e-health care's etc. and this introduced the concept of IoT . Internet of Things refers to interconnection or communication between two or more devices without human-tohuman and humanto-computer interaction. Connected devices are equipped with sensors or actuators perceive their surroundings. IOT has four major components which include sensing the device, accessing the device, processing the information of the device, and provides application and services. In addition to this it also provides security and privacy of data . Automation has affected every aspect of our daily lives. More improvements are being

introduced in almost all fields to reduce human effort and save time. Thinking of the same is trying to introduce automation in the field of track testing. Railroad track is an integral part of any company's asset base, since it provides them with the necessary business functionality. Problems that occur due to problems in railroads need to be overcome. The latest method used by the Indian railroad is the tracking of the train track which requires a lot of manpower and is time-consuming

2.LITERATURE SURVEY

PAPER NAME	AUTHOR	YEAR	METHODOLOGY	MERITS	DEMERITS
Passenger Monitoring Model for easily Accessible Public City Trams/Trains.	Roman Khoeblal, Teeravisit Laohapensaeng, Rounsang Chaisricha roen	2015	Passenger monitoring, passenger control RFID distance reading, ticket control, RFID ticket inspection.	It is possible to travel cross country with a single public transportation card, using transport systems of several transport operators.	Applicable only for passenger monitoring
Application of smart computing in Indian Railway Systems.	Parag Chatterjee , Asoke Nath	2014	By Interlinking unique identification system with train ticket reservation system by using video surveillance, rail sensors, biometric input devices and multimedia displays	Reduces manual effort in passenger data entry. Provides security verification	Significant investment is needed Risk of database.

Android Suburban Railway Ticketing with GPS as Ticket Checker.	Sana Khoja, Maithili Kadam	2012	Android, SQLite, Cloud Database, ASR, QR Code.	E-Ticket facility, enabling reuse and replacement of components.	QR Codes before the user enters or leaves the station, where the user can have access which
					is risk in ticket booking.
Novel Approach for Smart Indian Railways.	Sujith Kumar, K.M.Yathendra Parvan, V.Sumathy, Thejeswari C.K	2017	Digitalization, Smart Railways, Aadhar Card, Smartphone, Identity Verification.	Employ a mobile application through which passengers can access various ticketing options in user friendly and efficient manner.	Biometric database is risk of hacking.

3. IDEATION AND PROPOSED SOLUTION

A Review on IOT based automated seat allocation and verification using QR code.	Sarvath Saba, Sharon Philip, Shriharsha , Mukund Naik, Sudeep Sherry	2022	The system lets the passenger to have a comfortable journey by checking the temperature first for normal and then the count for avoid crowd using the QR Code.	This model proposes a radical change in train operation and passenger experience. One of the many steps towards a more digitized society as a part of the “Digital India” movement proposed in 2015 by the Prime Minister.	The system is not fool-proof and requires a dramatic change in the existing system in terms of the people allowed on platforms, etc. but baby steps matter.	3.1
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EMPATHY MAP CANVAS

Smart Solutions for RailWays



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Before you collaborate

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

0 10 minutes

Team gatt'ring session send an Share relevant Define who should participate in the information or p.e-work ahead.

Set etc goal

Think about the gvoitem you'jl be focusing solving the session.

Lern how to the feilitation toolb to run a happy and productive use tyk Facilitation Stoerpowers session.

0

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
How can we define a rest system for the user and give them a simple way to track their personal expenses?

Key rules of brainstorming

To run on smooth and productive session

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

3.2 IDEATION & BRAINSTORMING

Step1:

Step 2:



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 Collaborate to 2-8 people recommended

Open

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

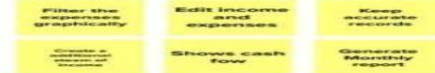
TIP

You can select a sticky note and hit the pencil (which is sketch) icon to start drawing!

Sowbhakari E S



Chandeep G



Saran Kumar S



Vishnu T

**Step-3: Idea Prioritization**

O

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

Importance
If each of these tasks could get done, without any difficulty or cost, which would have the most positive impact?

Send email alert on exceeding expenses

Notify about monthly bill payments

Create reports

Track expenses

Detailed report at end of each month

Secure Access to data

Update wallet balance based on expenses

Users are able to plan budget Show date their and time of transaction

3.3 PROPOSED SOLUTION:

S.NO	Parameters	Description1
1.	Problem statement (problem to be solved)	<ul style="list-style-type: none"> To design a webpage where public can view and book tickets and to enable proper less ticket verification To track the live location of all the trains To increase smart facilities in railways to ensure passenger safety and comfort
2.	Idea/solution description	<ul style="list-style-type: none"> GPS tracker is placed in the train so that the passengers can track the location of the train even it is delayed. Passengers can book their tickets using the website which is possible at anytime, anywhere. Smart ticketing to avail seasons so that physical work is eradicated.
3.	novelty/uniqueness	<ul style="list-style-type: none"> Automated waiting list clearance
		<ul style="list-style-type: none"> Health monitoring to loco pilot Qr based entry and exit into stations

4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> • No Queuing to get tickets and burdenless because of e-tickets. • Elimination of dilemma whether the train has left or yet to arrive. • Can get the status and avail of e seasons • instead of visiting the station physically every time.
5.	Business model (Revenue model)	Transaction Revenue Model
6.	Scalability of the solution	The booking and tracking software can support a large number of customers. The automations can be implemented in a large scale.

3.4 PROBLEM SOLUTION FIT

1. Customer Segment The passengers travelling in the train	6. Customer Limitations <ul style="list-style-type: none"> • Health Concern • Safety and Comfort • Timing Concerns 	5. Available Solution Emergency train stopping Location updation in stations
2. Problems/Pains <ul style="list-style-type: none"> • Existing ticket checking methods must be made contactless • The train location tracking must be made more accurate • More automations can be brought in trains 	9. Problem Root Cause The investment in improving railway sectors is less and also research in this area is limited	7. Behaviour Directly related: The comfort and safety of people. Saves a lot of waiting time Indirectly related: Reduces the manpower involved and makes railways computer based
3. Triggers to Act Seeing people without tickets. Making people aware of the best of automation	10. Your Solution <ul style="list-style-type: none"> • To enable QR based ticket verification 	8. Channels During their journey in the train
4. Emotions Before: Frustration, Unsatisfied	<ul style="list-style-type: none"> • To track and update the live location of all the trains using GPS module To increase smart facilities in	

After: Happy, feeling safe and secure

•
railways

4. REQUIREMENT ANALYSIS

4.1. FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Passenger ticket booking	Booking through the online railway mobile app and website.
FR-2	Booking Confirmation	Booking Confirmation via Email Booking Confirmation via SMS
FR-3	Passenger objections and feedback	Through the online application, SMS, and email to the respective authority.
FR-4	Passenger schedule	Passenger can see their train timing through the mobile app
FR-5	Passenger Emergency	Passengers in an Emergency, in case of accidents, natural disasters, or theft during the journey can complain through online, applications, emergency call,,sms and email

4.2. NON-FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
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NFR-1	Usability	<p>Within periodic maintenance, we can detect cracks in the railway track. which will be highly usable on remote railway tracks.</p>
NFR-2	Security	<p>Accidents and property damage can be prevented with the help of our smart sensors which immediately send the fault to the pilot and administration.</p>
NFR-3	Reliability	<p>Traffic lights and signalling can be made accurately with the help of sensors. so it is more reliable.</p>
NFR-4	Performance	<p>Communication plays a vital role in transferring the crack-detected signal to the responsible authority so that they can take appropriate measures within a short span.</p>
NFR-5	Availability	<p>Our idea is to make the crack alert to all the trains passing through that fault-prone area.</p>

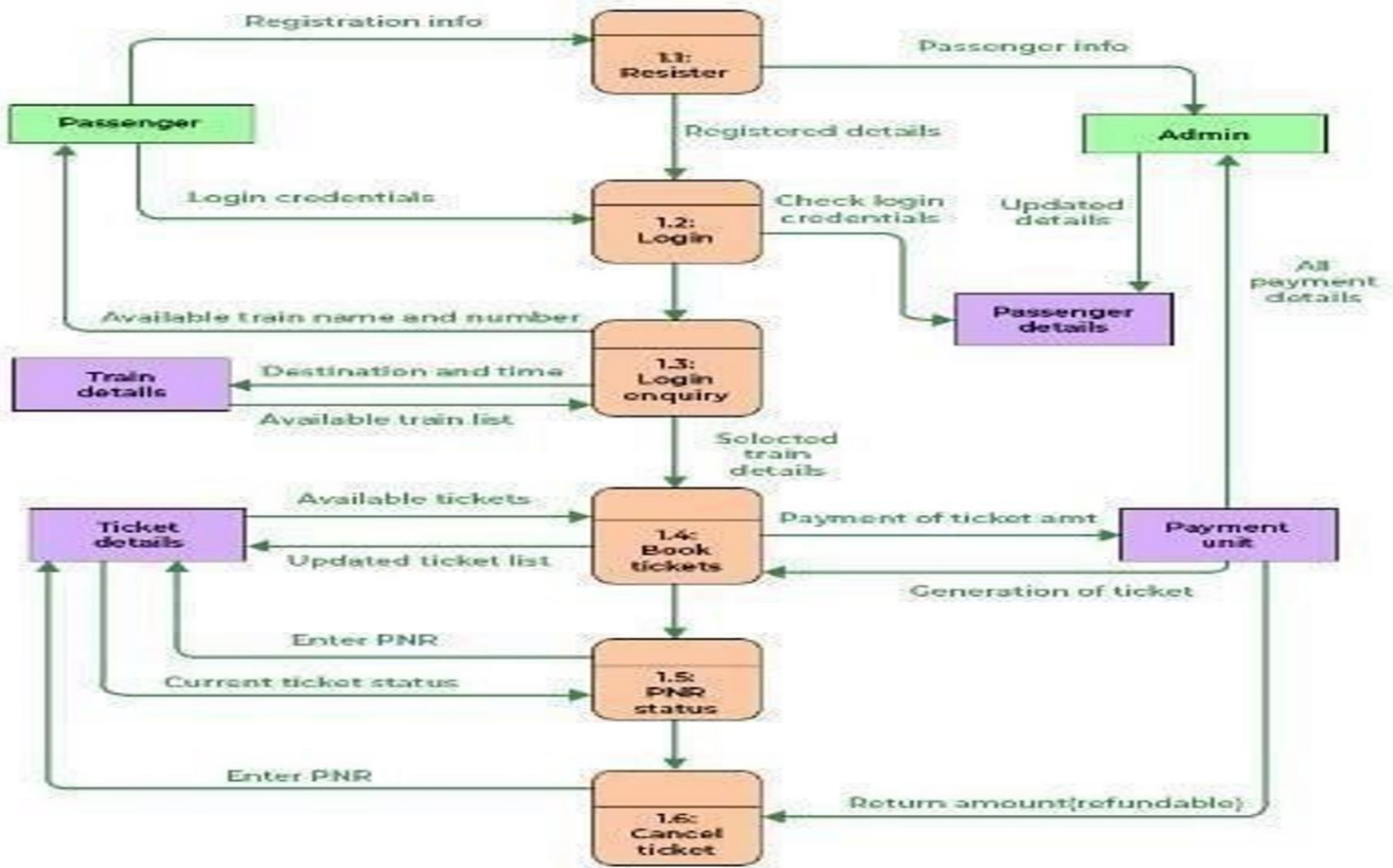
5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

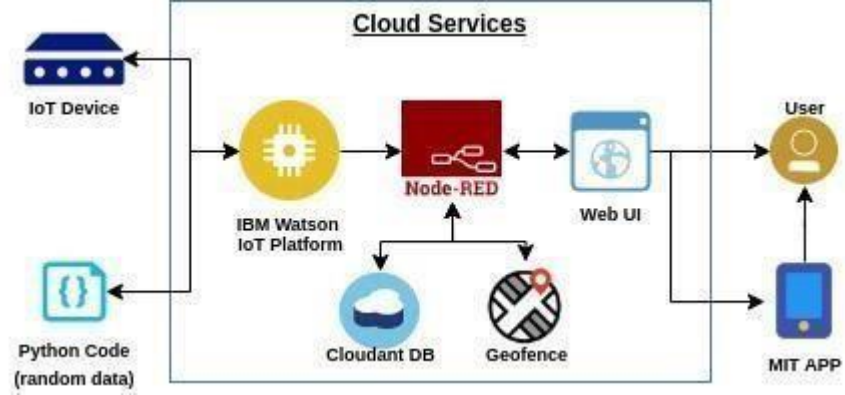
Our project is based on IoT & cloud, which makes the pilot and authority updated every single sec. Adhoc is easy to handle.

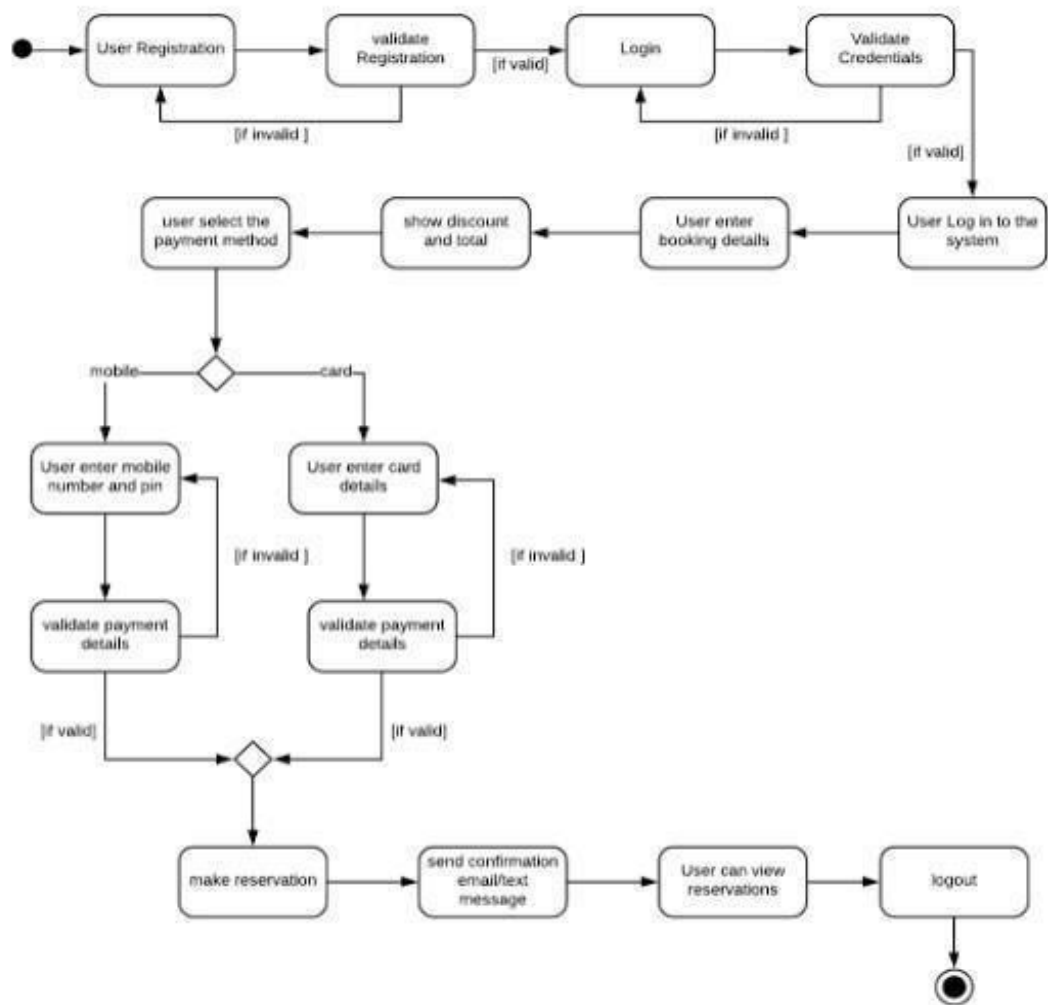
BLE Updates for Office are ready to be installed, but first we need to close some apps.

Update now



5.2 SOLUTION & TECHNICAL ARCHITECTURE





5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
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
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

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
Customer (Mobile user)	Dashboard	Users	The details will be stored safely	I can access it using database
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
Customer Care Executive	Connecting the service provider	customer	Connects with the service by logging in	Can get connected with the server
Administrator	Provides the services	admin	The data is given by the user	Can add or update the data provided by the user

6. PROJECT PLANNING AND SCHEDULING

6.1. SPRINT PLANNING& ESTIMATION

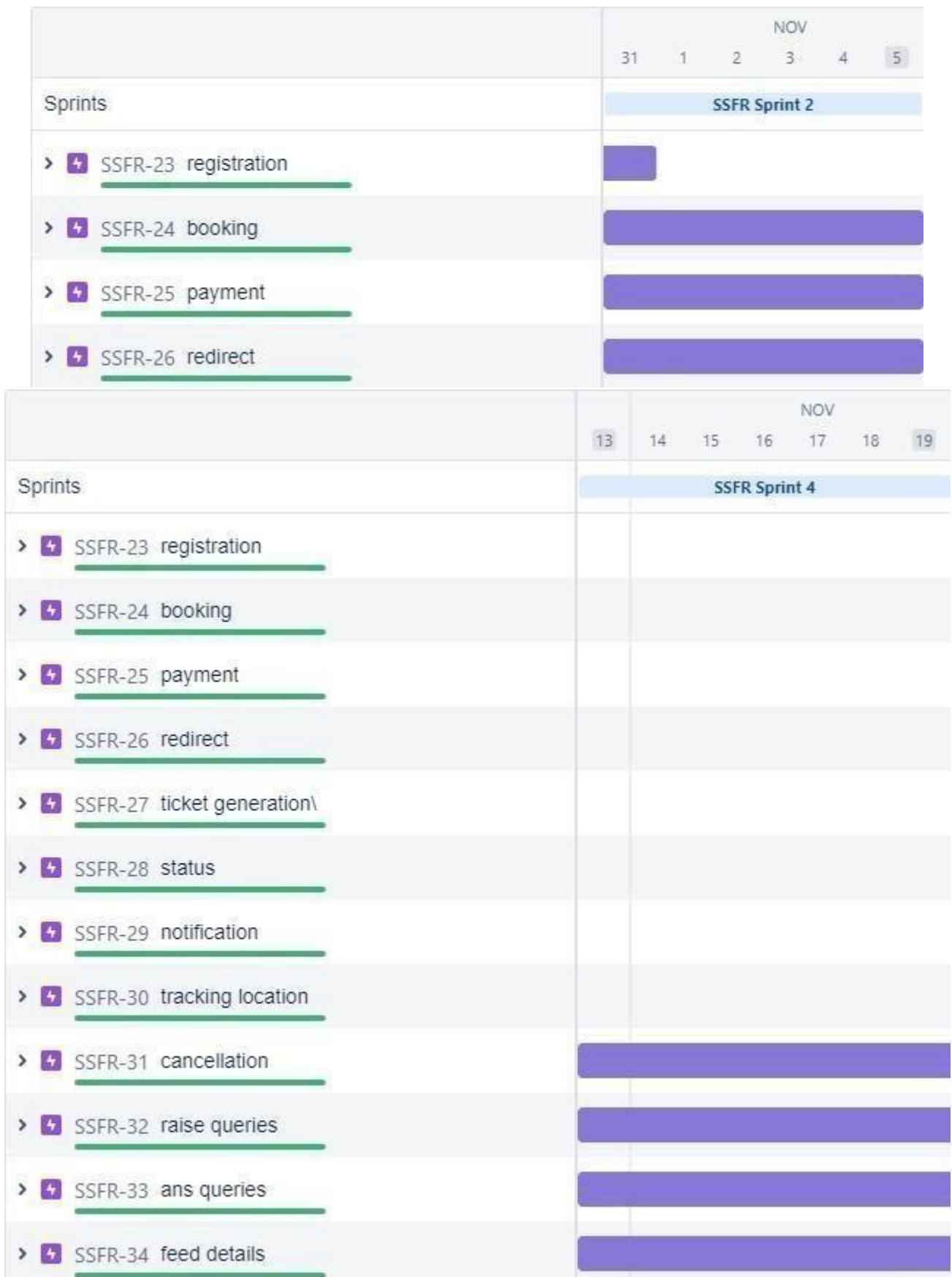
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register through the form by Filling in my details	2	High	Nivetha
Sprint-1		USN-2	As a user, I can register through phone numbers, Gmail, Facebook or other social sites	1	High	snekha
Sprint-1	Conformation	USN-3	As a user, I will receive confirmation through email or OTP once registration is successful	2	Low	archana
Sprint-1	login	USN-4	As a user, I can login via login id and password or through OTP received on register phone number	2	Medium	gowri
Sprint-1	Display Train details	USN-5	As a user, I can enter the start and destination to get the list of trains available connecting the above	1	High	Nivetha
Sprint-2	Booking	USN-6	As a use, I can provide the basic details such as a name, age, gender etc...	2	High	snekha
Sprint-2		USN-7	As a user, I can choose the class, seat/berth. If a preferred seat/berth isn't available I can be allocated based on the availability	1	Low	archana
Sprint-2	Payment	USN-8	As a user, I can choose to pay through credit Card/debit card/UPI.	1	High	gowri
Sprint-2		USN-9	As a user, I will be redirected to the selected	2	High	nivetha

Sprint-3	Ticket generation	USN-10	As a user, I can download the generated e- ticket for my journey along with the QR code which is used for authentication during my journey.	1	High	gowri
Sprint-3	Ticket status	USN-11	As a user, I can see the status of my ticket	2	High	archana
			Whether it's confirmed/waiting/RAC.			
Sprint-3	Remainders notification	USN-12	As a user, I get remainders about my journey A day before my actual journey.	1	High	snekha
Sprint-3	Ticket cancellation	USN-13	As a user, I can track the train using GPS and can get information such as ETA, Current stop and delay	2	High	nivetha
Sprint-4		USN-14	As a user, I can cancel my tickets if there's any Change of plan	1	High	archana
Sprint-4	Raise queries	USN-15	As a user, I can raise queries through the query box or via mail.	2	Medium	gowri
Sprint-4	Answer the queries	USN-16	As a user, I will answer the questions/doubts Raised by the customers.	2	High	nivetha
Sprint-4	Feed details	USN-17	As a user, I will feed information about the trains delays and add extra seats if a new compartment is added.	1	High	snekha

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	5 Nov 2022
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-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



7.CODING AND SOLUTIONING

7.1. FEATURE 1

- IOT device
- IBM Watson platform
- Node red
- Cloudbant DB
- Web UI
- Geofence MIT App
- Python code

7.2. FEATURE 2

- Registration
- Login
- Verification
- Ticket Booking
- Payment
- Ticket Cancellation
- Adding Queries

7.3. DATABASE SCHEMA

```
labl_0 = Label(base, text="Registration form",width=20,font=("bold",  
20)) labl_0.place(x=90,y=53)
```

```
lb1= Label(base, text="Enter Name", width=10, font=("arial",12))  
lb1.place(x=20, y=120) en1= Entry(base) en1.place(x=200, y=120)
```

```
lb3= Label(base, text="Enter Email", width=10, font=("arial",12))  
lb3.place(x=19, y=160) en3= Entry(base) en3.place(x=200, y=160)
```

```
lb4= Label(base, text="Contact Number", width=13,font=("arial",12))  
lb4.place(x=19, y=200) en4= Entry(base) en4.place(x=200, y=200)
```

```
lb5= Label(base, text="Select Gender", width=15, font=("arial",12))  
lb5.place(x=5, y=240) var = IntVar()
```

```
Radiobutton(base, text="Male", padx=5,variable=var,  
value=1).place(x=180, y=240)
```

```
Radiobutton(base, text="Female", padx =10,variable=var,  
value=2).place(x=240,y=240)
```

```
Radiobutton(base, text="others", padx=15, variable=var,  
value=3).place(x=310,y=240)
```

```
list_of_cntry = ("United States", "India", "Nepal", "Germany") cv =
```



```
StringVar() drplist= OptionMenu(base, cv, *list_of_centry)
drplist.config(width=15) cv.set("United States") lb2= Label(base,
text="Select Country", width=13,font=("arial",12))
lb2.place(x=14,y=280)
drplist.place(x=200, y=275)
```

```
lb6= Label(base, text="Enter Password", width=13,font=("arial",12))
lb6.place(x=19, y=320) en6= Entry(base, show='*') en6.place(x=200,
y=320)
```

```
lb7= Label(base, text="Re-Enter Password",
width=15,font=("arial",12)) lb7.place(x=21,
y=360) en7 =Entry(base, show='*')
en7.place(x=200, y=360)
```

```
Button(base, text="Register", width=10).place(x=200,y=400)
base.mainloop()
```

```
def generateOTP() :
```

```
    # Declare a digits variable
    # which stores all digits    digits
    = "0123456789"
    OTP = ""
```

```
    # length of password can be changed    #
    by changing value in range    for i in
    range(4) :
        OTP += digits[math.floor(random.random() * 10)]
```

```

return OTP

# Driver code if __name__ == "__main__"
:
    print("OTP of 4 digits:", generateOTP())

digits="0123456789" OTP="" for i in
range(6):
    OTP+=digits[math.floor(random.random()*10)] otp
= OTP + " is your OTP" msg= otp s = smtplib.SMTP('smtp.gmail.com',
587)
s.starttls()
s.login("Your Gmail Account", "You app password") emailid
= input("Enter your email: ")
s.sendmail('&&&&&&&&&&',emailid,msg
) a = input("Enter Your OTP >>: ") if a == OTP:    print("Verified")
else:
    print("Please Check your OTP again") roo

```

RESULTS

.1.PERFORMANCE METRICS



10.ADVANTAGES &DISADVANTAGES

10.1.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, leading to better performance and lower operation costs.

10.2.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.

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.

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

