SMART SOLUTIONS FOR RAILWAYS

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`

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ABSTRACT

Even with greatest of ideas to avoid railway accidents, many trains accidents still happen worldwide. This paper shares an idea on how to avoid train collision by using an automated control incorporated in the trains. In this proposed paper we have implemented ideas such as pre-crashing using RFID sensor, ultrasonic sensor in-order to choose an array of commands which would run as per the conditional algorithm created in the microcontroller. We would also have a EPM to control the speed of the motor to lessen speed. This system will be more efficient since it was fully automated and also it was cost effective

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LIST OF ABBREVIATIONS

IoT	: INTERNET OF THINGS
GPS	: GLOBAL POSITIONING SYSTEM
FR	: FUNCTIONAL REQUIREMENTS
NFR	: NON-FUNCTIONAL REQUIREMENTS
DFD	: DATA FLOW DIAGRAM
MQTT	: MQ TELEMETRY TRANSPORT
SQL	: STRUCTURED QUERY LANGUAGES
STT	: SECURITY TRANSACTIONS TAX
DB	: DATABASE
RFID	: RADIO FREQUENCY IDENTIFICATION
UAT	: USER ACCEPTANCE TESTING
WIFI	: WIRELESS FIDELITY
CCTV	: CLOSED CIRCUTE TELEVISION
IP	: INTERNET PROTOCOL
USN	:USER STORY NUMBER
LED	: LIGHT EMITTING DIODE
LDR	: LIGHT DEPENDENT RESISTER
GSM	: GLOBAL SYSTEM FOR MOBILE COMMUNICATION
SMS	: SHORT MESSAGE SERVISE
TTR	THRESHOLD TRANSACTION REPORT

CHAPTER 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 humanto-human and human-to-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

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING SYSTEM

In the Existing train tracks are manually researched. LED (Light Emitting Diode) and LDR (Light Dependent Resister) sensors cannot be implemented on the block of the tracks]. The input image processing is a clamorous system with high cost and does not give the exact result. The Automated Visual Test Method is a complicated method as the video color inspection is implemented to examine the cracks in rail track which does not give accurate result in bad weather. This traditional system delays transfer of information. Srivastava et al.,(2017) proposed a moving gadget to detect the cracks with the help of an array of IR sensors to identify the actual position of the cracks as well as notify to nearest railway station . Mishra et al., (2019) developed a system to track the cracks with the help of Arduino mega power using solar energy and laser. A GSM along with a GPS module was implemented to get the actual location of the faulty tracks to inform the authorities using SMS via a link to find actual location on Google Maps. Rizvi Aliza Raza presented a prototype in that is capable of capturing photos of the track and compare it with the old database and sends a message to the authorities regarding the crack detected. The detailed analysis of traditional railway track fault detection techniques is explained in table.

2.2 REFERENCES

1. D. Hesse, “Rail Inspection Using Ultrasonic Surface Waves” Thesis, Imperial College of London, 2007.

2. Md. Reya Shad Azim1 , Khizir Mahmud2 and C. K. Das. Automatic railway

6 track switching system, International Journal of Advanced Technology, Volume 54, 2014.

2. S. Somalraju, V. Murali, G. saha and V. Vaidehi, “Title-robust railway crackdetection scheme using LED (Light Emitting Diode) - LDR (Light Dependent Resistor) assembly IEEE 2012.

3. S. Srivastava, R. P. Chourasia, P. Sharma, S. I. Abbas, N. K. Singh, “Railway Track Crack detection vehicle”, IARJSET, Vol. 4, pp. 145-148, Issued in 2, Feb 2017.

4. U. Mishra, V. Gupta, S. M. Ahzam and S. M. Tripathi, “Google Map Based

Railway Track Fault Detection Over the Internet”, International Journal of Applied Engineering Research, Vol. 14, pp. 20-23, Number 2, 2019.

5. R. A. Raza, K. P. Rauf, A. Shafeeq, “Crack detection in Railway track

usingImage processing”, IJARIIT, Vol. 3, pp. 489-496, Issue 4, 2017.

6. N. Bhargav, A. Gupta, M. Khirwar, S. Yadav, and V. Sahu, “Automatic Fault Detection of Railway Track System Based on PLC (ADOR TAST)”, International Journal of Recent Research Aspects, Vol. 3, pp. 91-94, 2016.

2.3 PROBLEM STATEMENT DEFINITION

Among the various modes of transport, railways is one of the biggest modes of transport in the world. Though there are competitive threats from airlines,luxury buses, public transports, and personalized transports theproblem statement is to answer the question “What are the problems faced by the passengers while travelling by train at station and on board”.

CHAPTER 3

IDEATION AND PROPOSED SOLUTON

3.1 EMPATHY MAP CANVAS

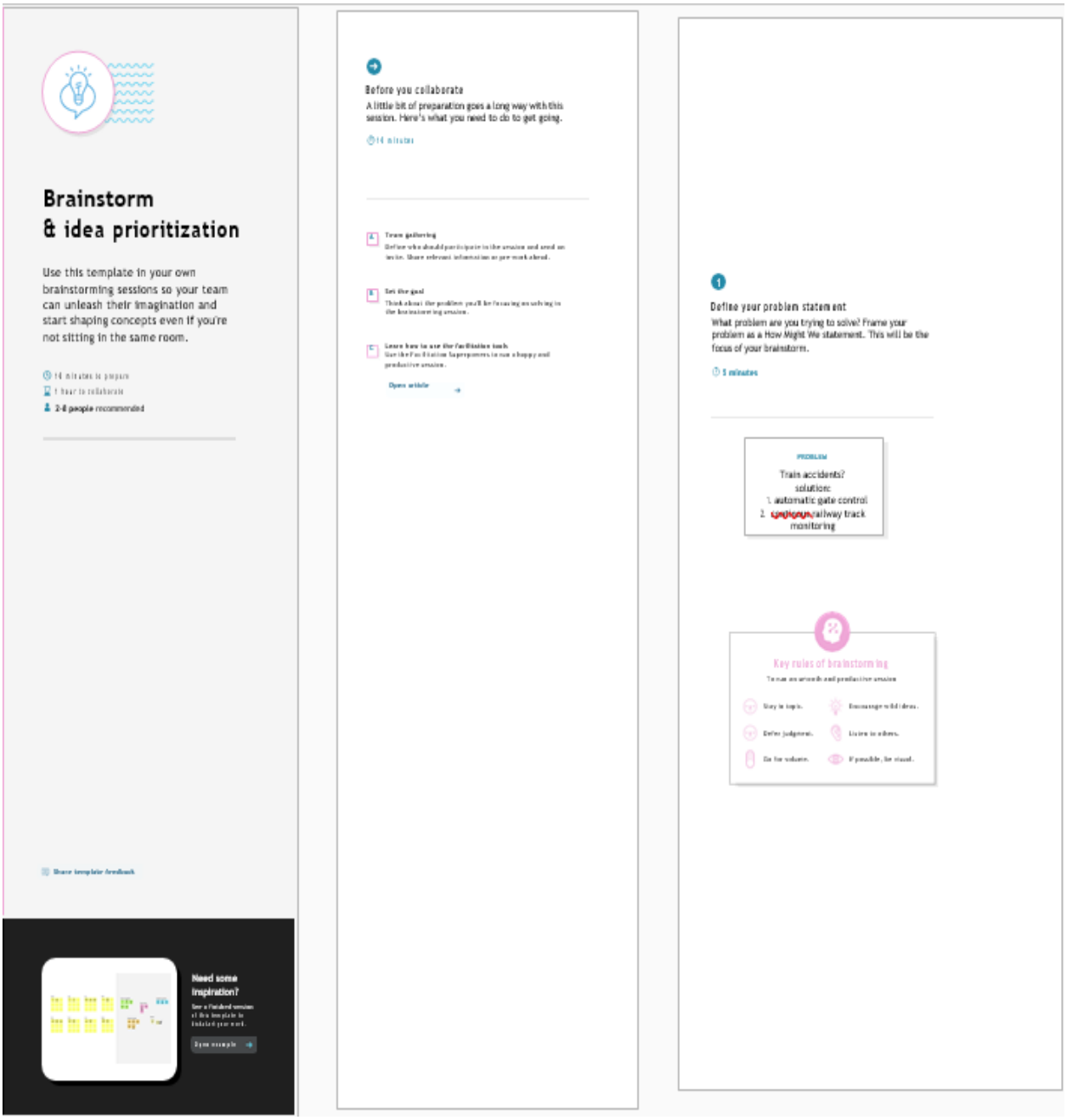

Fig 3.1.1 Empathy Map

3.2 IDEATION & BRAINSTORMING

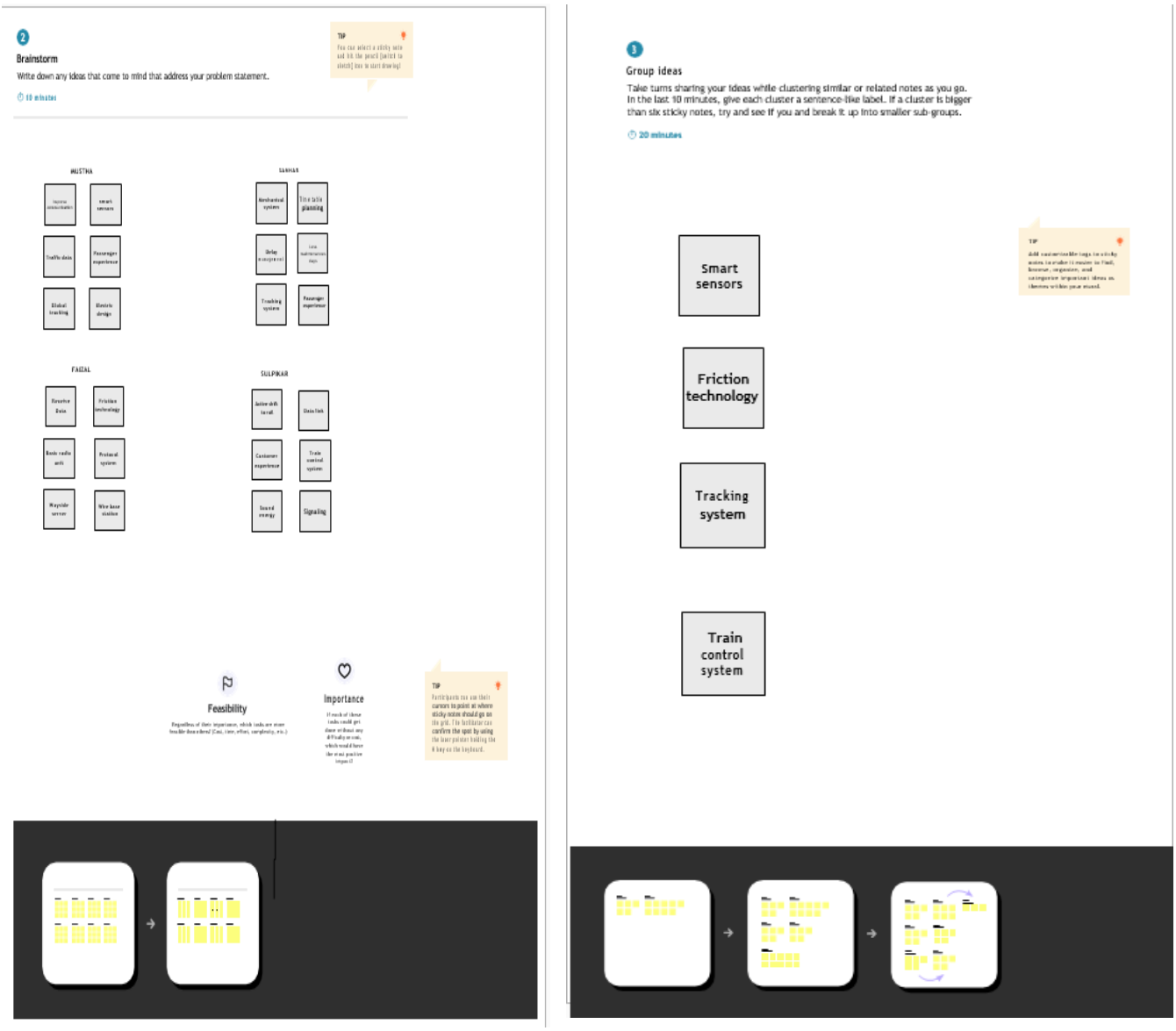

Fig 3.2.1 BRAINSTORMING & GROUP IDEAS

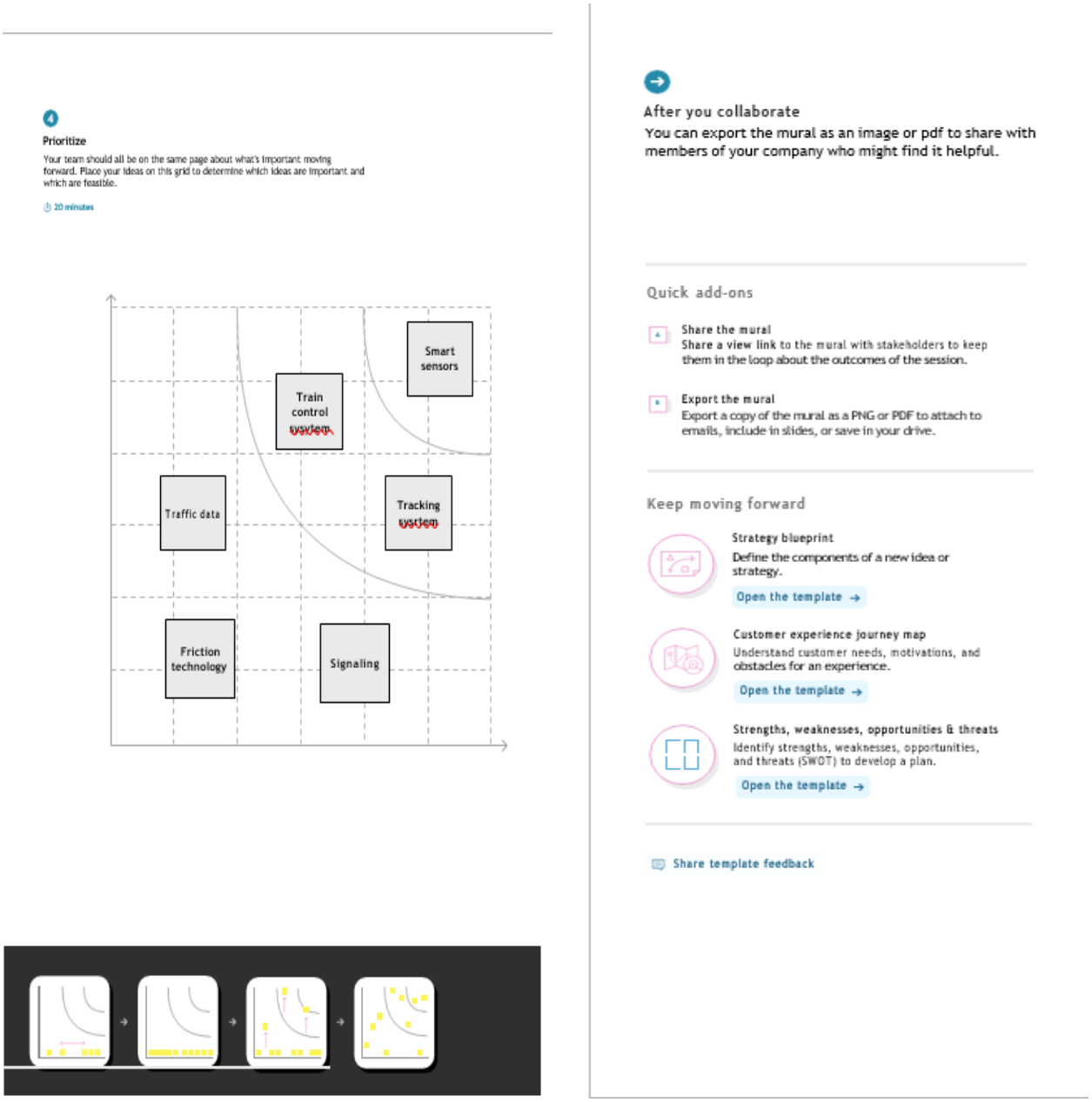

Fig 3.2.2 PRIORITIZE & COLLABORATION

3.3 PROPOSED SOLUTION

S.NO	PARAMETER	DESCRIPTION
1	Problem Statement (Problem to be solved)	In order to satisfy the passengers, the Railways provides various services to its passengers But, the passengers can face some problems
2	Idea / Solution description	The idea is to minimize the ticket booking problems among the passengers by providing Onlinemode of booking rather than papers. . In queues in front of the ticket counters in railway stations have been drastically increased overthe time.
3	Novelty / Uniqueness	Online mode of booking is mostcommon and so ease of access to everyone that makes more efficient uniqueness of utilizing the technique. People can book their ticket through online and they get a QR code through SMS
4	Social Impact / Customer Satisfaction	Customers for sure they get satisfied as they are in the fast-roaming world this technique makes more easier for travelling passengers. A web page is designed in which the user can book tickets and will be provided with the QR code, which will be shown to the ticket collector and by scanning the QR code the ticket collector will get the passenger details
5	Business Model (Revenue Model)	A web page is designed in which the user can book tickets and will be provided with the QR code, which will be shown to the ticket collector and by scanning the QR code the ticket collector will get the passenger details. The booking details of the user will be stored in the database, which can be retrieved any time

6	Scalability of the Solution	The scalability of this solution is most feasible among the passengers who are willing to travel. No need of taking printout Counter ticket has to be handled with care, but SMS on mobile is enough. No need to taking out wallet and showing your ticket to TTR just tell your name to TTR that you are a passenger with valid proof

Table 3.3.1 Proposed Solution

3.4.1 PROBLEM SOLUTION FIT

Fig 3.4.1 PROBLEM SOLUTION FIT

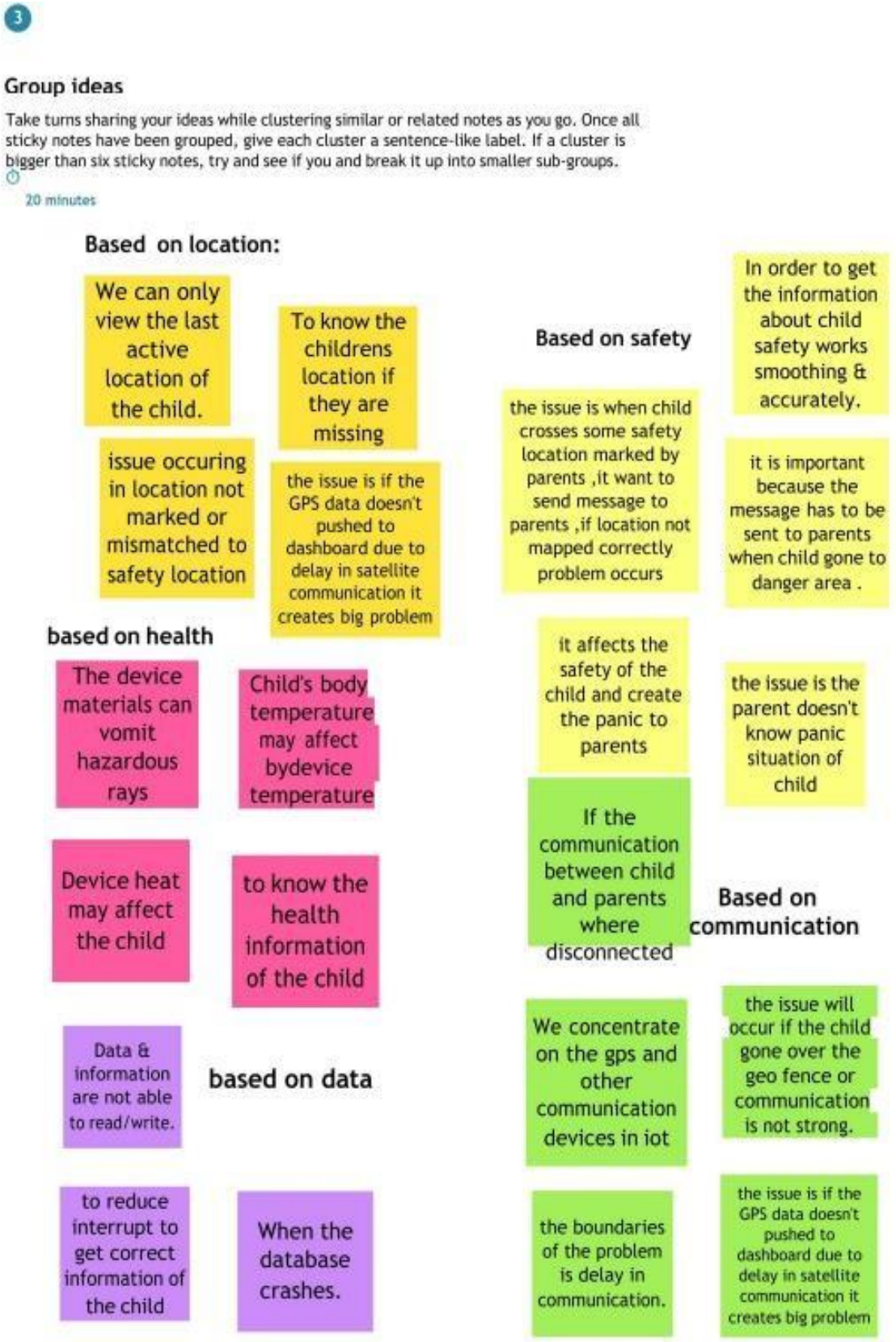

Fig 3.4.2 Group Ideas

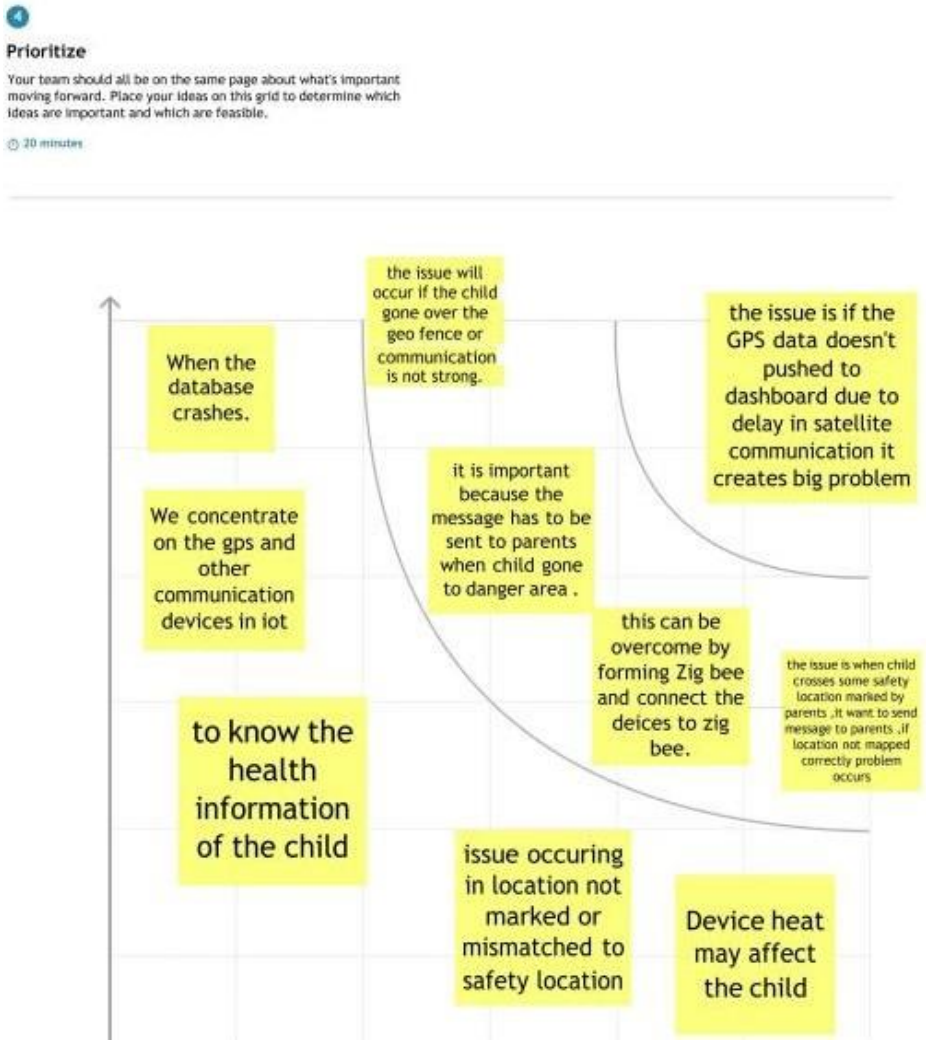

Fig 3.4.3 Prioritize

CHAPTER 4

REQUIREMENT ANALYSIS

4.1. FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Unique accounts	Every online booking needs to be associated with an account One account cannot beassociated with multiple users
FR-2	Booking options	Search results should enable users to find the most recent and relevant booking options
FR-3	Mandatory fields	System should only allow users to move to payment only when mandatory fields such as date, time, location has been mentioned
FR-4	Synchronization	System should consider timezone synchronisation when accepting bookings from different timezones
FR-5	Authentication	Booking confirmation should be sent to user to the specified contact details

Table 4.1.1 Functional Requirements

4.2 NON-FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Search results should populate within acceptable time limits
NFR-2	Security	System should visually confirm as well as send booking confirmation to the user's contact
NFR-3	Reliability	System should accept payments via different payment methods, like PayPal, wallets, cards, vouchers, etc
NFR-4	Performance	Search results should populate within acceptable time limits
NFR-5	Availability	User should be helped appropriately to fill in the mandatory fields, incase of invalid input
NFR-6	Scalability	Use of captcha and encryptionto avoid bots from booking tickets

Table 4.2.1 Non-Functional Requirements

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

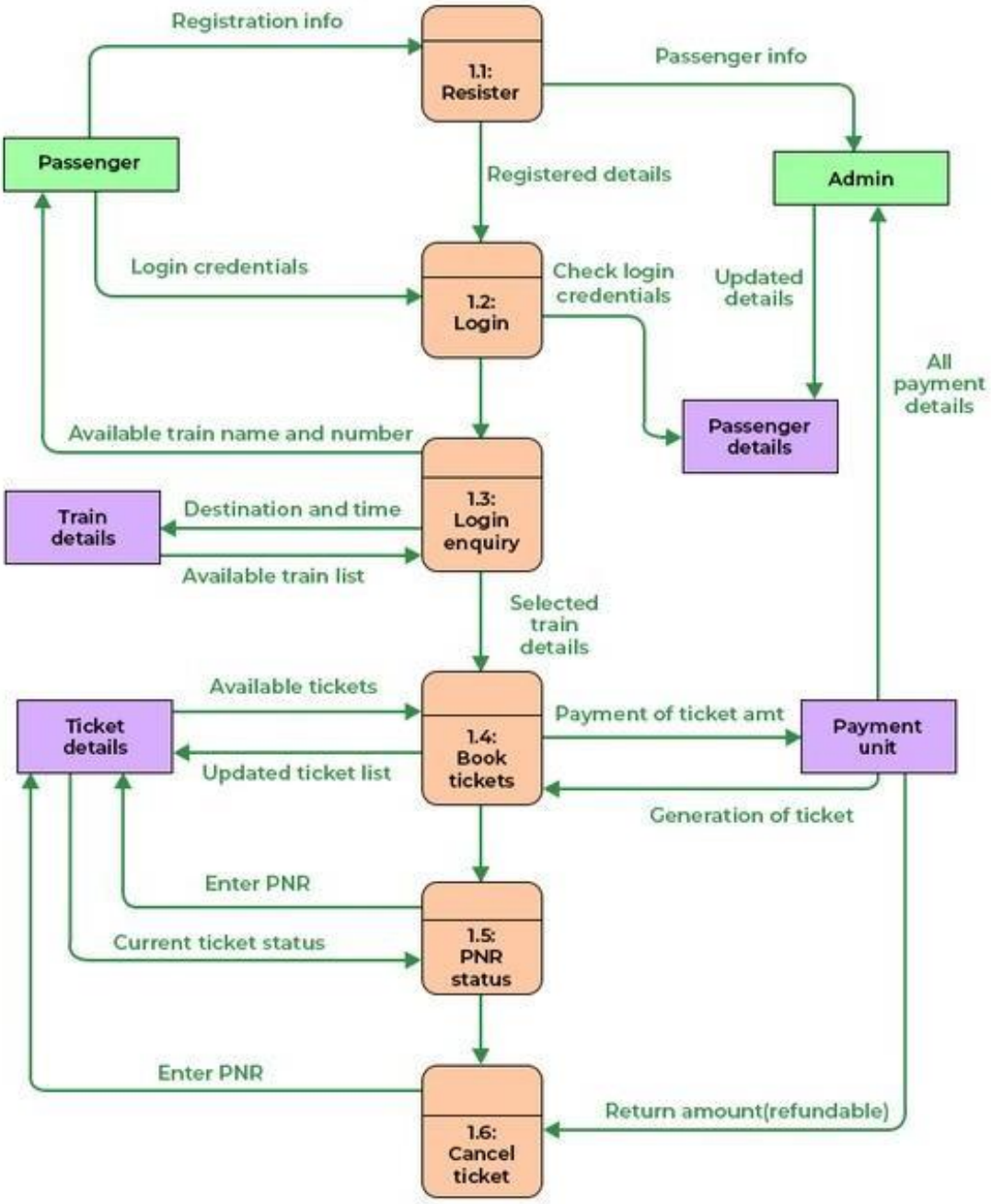

Fig 5.1.1 DATA FLOW DIAGRAM

5.2 SOLUTION & TECHNICAL ARCHITECTURE

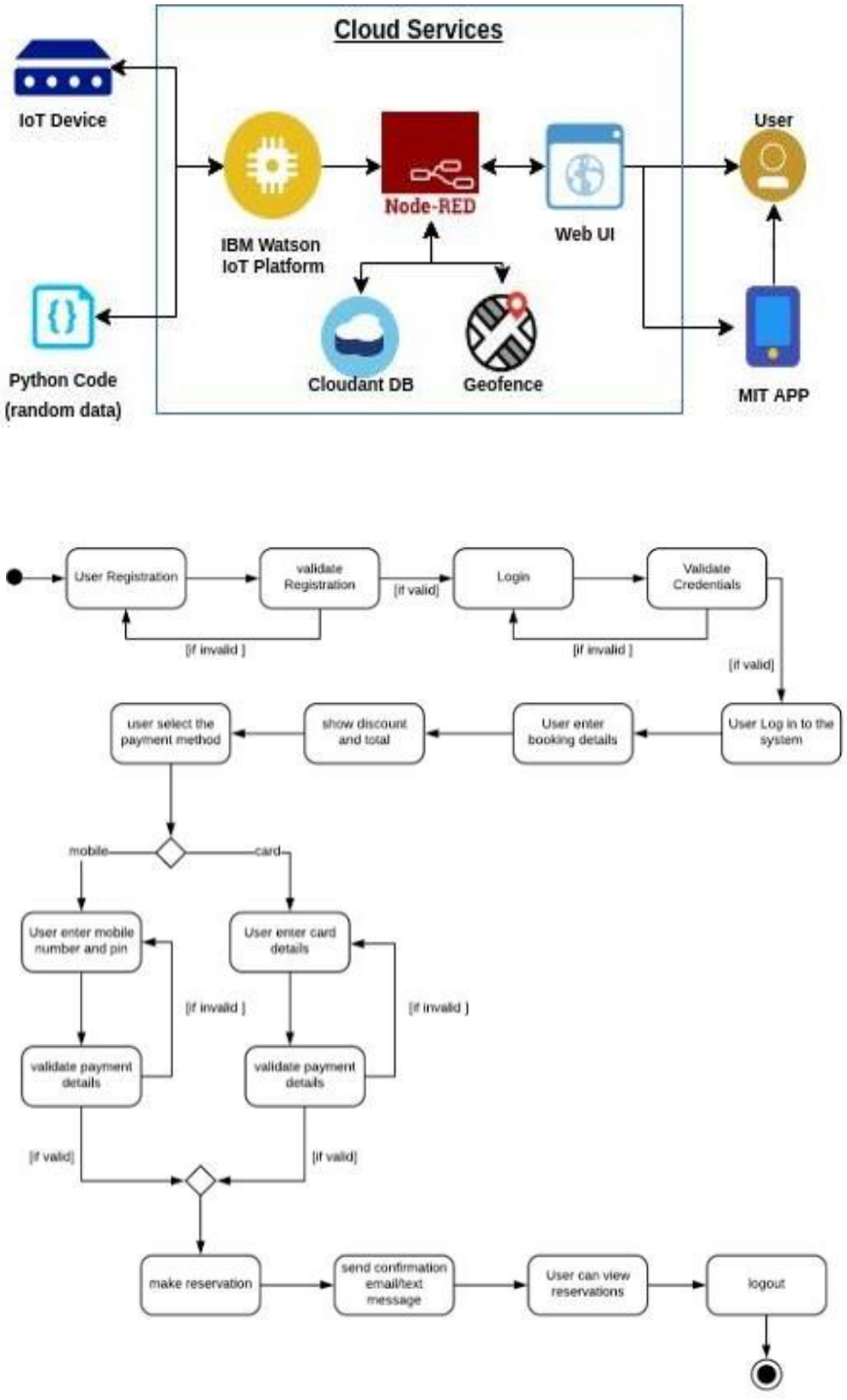

Fig 5.2.1 SOLUTION & TECHNICAL ARCHITECTURE

5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story/Task	Acceptance criteria	Priority	Release
Customer (Mobile user,Web user)	Registration	USN-1	As a user,I can register Through the form byFilling in my details	I can register and create my account/dashboard	High	Sprint-1
		USN-2	As a user,I can register through phone numbers,Gmail,Facebook or other social sites	I can register & create my dashboard with Facebook login or other social sites	High	Sprint-2
	Conformation	USN-3	As a user,I will receive confirmation through OTP once registrationis successful	I can login and access my account/dashboard	High	Sprint-1
	Authentication	USN-4	As a user,I can login via id and password or through OTP received on register phone number	I can login and access my account/dashboard	High	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	I can view the train details (name&number),corresponding routes it passes through based on the start and destination entered.	High	Sprint-1

	Booking	USN-6	As a use, I can provide the basic the details such as a name, age, gender etc.	I will view, modify or confirm the details enter.	High	Sprint-1
		USN-7	As a user, I can choose the class, seat/berth. If a preferred seat/berth is not available, I can be allocated based on the availability	I will view, modify or confirm the seat/class berth selected.	High	Sprint-1
	Payment	USN-8	As a user, I can choose to pay through credit card/debit card/UPI.	I can view the payment options available and select my desirable choice to proceed with the payment	High	Sprint-1
		USN-9	As a user, I will be redirected to the selected payment gateway and upon successful completion of payment, I will be redirected to the booking website	I can pay through the payment portal and confirm the booking if any changes need to be done, can move back the initial payment wage		

User type	Functional requirement (epic)	User story number	User story /task	Acceptance criteria	Priority	Release
	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	I can show the generate QR code so that authenticati on can be done quickly	high	Sprint-1
	Ticket status	USN-11	As a user,I can see the status of my ticket whether it's confirmed/waitin g/RAC	I can confidential ly get the information and arrange alternate transport if the ticket isn't confirmed	High	Sprint-1
	Remainders notification	USN-12	As a user ,I get remainders about my journey A day before my actual journey	I can make sure that I don't miss the journey because of the constant notifications	Medium	Sprint-2
		USN-13	As a user, I can track the train using GPS and can get information such as ETA, Current stop and delay	I can track the train and go to know about the delays plan accordingly	Medium	Sprint-2
	Ticket cancellation	USN-14	As a user I can cancel my ticket if there's any change in plan	I can cancel the ticket and get are refund based on how close the date is to the journey	High	Sprint-1
	Raise queries	USN-15	As a user I can raise queries through the query box or via mail	I can view my previous queries	Low	Sprint-2

Customer Care executive	Answer the queries	USN-16	AS a user I will answer he question raised by the customer	I can view the queries and make once resolved	Medium	Sprint-2
Administrator	Feed details	USN-17	As a user I will feed the information about the train delays and add extra seat if new added	I can view and ensure the information that is feed	High	Sprint-1

Table 5.3.1 User Stories

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1. SPRINT PLANNING & ESTIMATION

Fig 6.1.1 SPRINT PLANNING & ESTIMATION

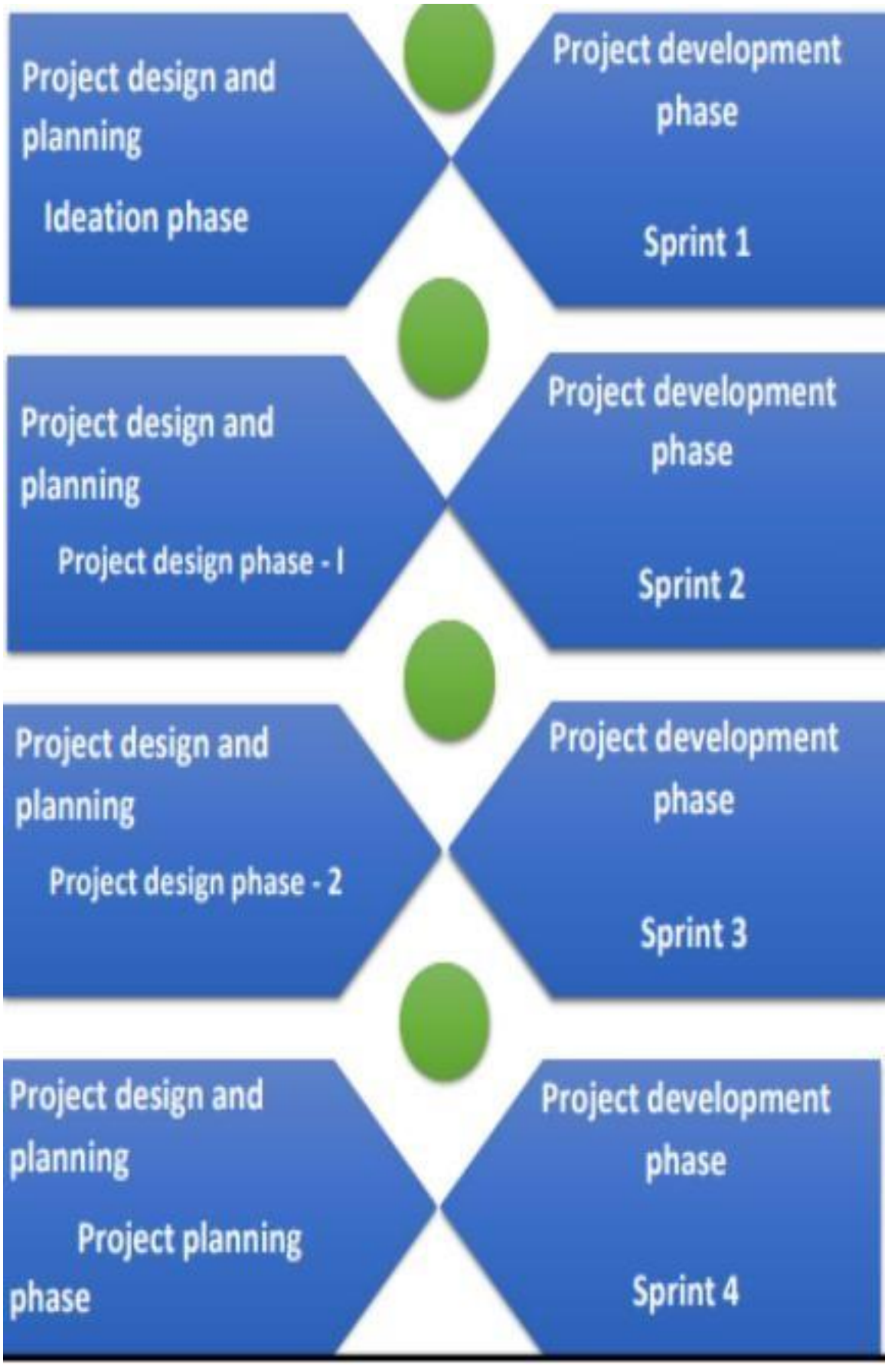

Fig 6.1.2 SPRINT PLANNING & ESTIMATION

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 Nov2022

Table 6.2.1 Sprint Delivery Schedule

CHAPTER 7

CODING AND SOLUTIONING

7.1. FEATURE 1

7.1.1 User Module

As member of IoT ecosystem, user notifies about their needs and desires, and provides feedback within the networked intelligence to manually progress their individual ability to rule the actuators of the system at their services. User device means handheld devices

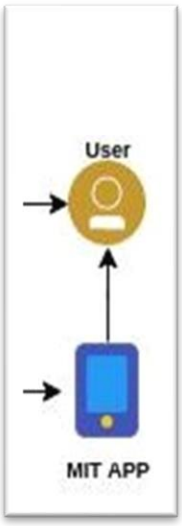

Fig 7.1.1 User Module

PROGRAM:

```
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) 30

Radiobutton(base, text="others", padx=15, variable=var,

value=3).place(x=310,y=240)

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

```
cv =

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: ")32

s.sendmail('&&&&&&&&&&',emailid,msg)

a = input("Enter Your OTP >>:

")if a == OTP:

print("Verifie

d")else:

print("Please Check your OTP again")
```

Explanation

In user module, user can use a blueprint to assess the smart solution to scan and book their tickets of the concerned area. User also check their status by this module. Payment can also be done by this module

7.2 FEATURE 2

7.2.1 CLOUD SERVICE MODULE

There are three major cloud service models software as a service (SaaS), infrastructure as a service (IaaS), platform as a service (PaaS),IBM Watson IoT platform, Node-Red etc.

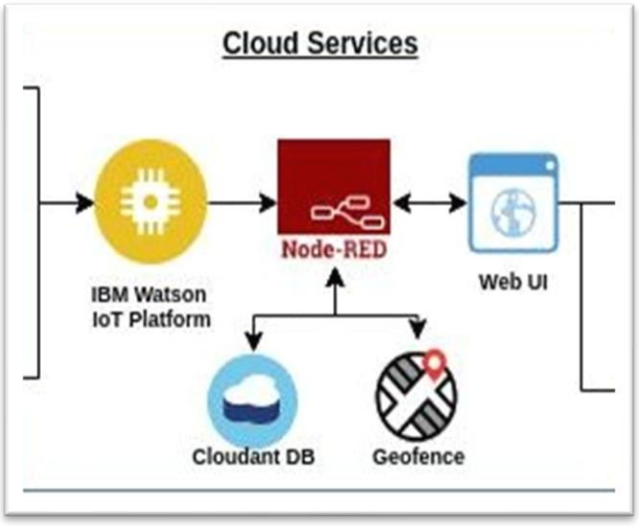

Fig 7.2.2 Cloud Service Module

Program

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

authenticator = BasicAuthenticator('apikey-v2-16u3crmdpkghhxefdi
kvpssoh5fwezrmuup5fv5g3ubz', 'b0ab119f45d3e6255eabb978')
service = CloudantV1(authenticator=authenticator)

service.set_service_url('https://apikey-v2-
16u3ermdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119145d3e625
5eabb978e7e2f0')

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

while 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 Ticket")
                time.sleep(5)

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

import wiotp.sdk.device
import time
import random
myConfig = {
"identity": {
        "orgId": "gagtey",
        "typeId": "GPS",
        "deviceId":"12345"
},
"auth": {
        "token": "12345678"
}
}
```

Explanation

As a user can register through IBM Watson IOT platform and the Watson will transfer the input to Node Red services which fetches the data from cloudant DB and Geofence. Then it will be passed on to the web user interface.

CHAPTER 8

TESTING

8.1. TEST CASES

The purpose of testing is to discover errors. Testing is to process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of the components, sub-assemblies and finish the product. It is the process to indent of ensuring that the software system meets the requirements and user expectation. There are various types of test.

8.2 USER ACCEPTANCE TESTING

User Acceptance testing (UAT) is a type of testing performed by clients to understand the software system before moving the software application to invention environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

Test Result: All the test cases mentioned above are passed approximately.

SPRINT - 1

Date	16-Nov-22
Team ID	PNT2022MD44153
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	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
1	Functional	Registration	Registration through the form by Filling in my details		1.Click on register 2.Fill the registration form 3.click Register		Registration form to be filled is to be displayed	Working as expected	Pass				MUSTHAKEEN
2	UI	Generating OTP	Generating the otp for further process		1.Generating of OTP number		user can register through phone numbers, Gmail, Facebook or other social sites and to get oto number	Working as expected	pass				FAIZAL
3	Functional	OTP verificatio	Verify user otp using mail		1.Enter gmail id and enter password	Username: abc@gmail.com password: Testing123	OTP verified is to be displayed	Working as expected	pass				MASOOD
4	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter into log in page 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: abc@gmail password: Testing123	Application should show 'Incorrect email or password ' validation message.	Working as expected	pass				SANHAR
5	Functional	Display Train details	The user can view about the available train details		1.As a user, I can enter the start and destination to get the list of trains available connecting the above	Username: abc@gmail.com password: Testing1236786867868768 76	A user can view about the available trains to enter start and destination details	Working as expected	fail				SULPIKAR M

Table 8.1.1 Test Sprint-1

SPRINT - 2

Date	16-Nov-22
Team ID	PNT2022MD44153
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	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
1	Functional	Booking	user can provide the basic details such as a name, age, gender etc		1.Enter method of reservation 2.Enter name,age,gender 3.Enter how many tickets wants to be booked 4.Also enter the number member's details like name,age,gender		Tickets booked to be displayed	Working as expected	Pass				Musthakeem
2	UI	Booking seats	User can choose the class, seat/berth. If a preferred seat/berth isn't available I can be allocated based on the		1.,known to which the seats are available		known to which the seats are available	Working as expected	pass				Faizal
3	Functional	Payment	user, I can choose to pay through credit Card/debit card/UPI.		1.user can choose payment method 2.pay using tht method		payment for the booked tickets to be done using payment method through either the following methods credit Card/debit	Working as expected	pass				Masood
4	Functional	Redirection	user can be redirected to the selected		1.After payment the usre will be redirected to the previous page		After payment the usre will be redirected to the previous page	Working as expected	pass				Sulpikar

Table 8.1.2 Test Sprint-2

SPRINT - 3

Date	16-Nov-22
Team ID	PNT2022MID44153
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	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
1	Functional	Ticket generation	a user can download the generated e ticket for my journey along with the QR code which is used for authentication during my journey.		1.Enter method of reservation 2.Enter name,age,gender 3.Enter how many tickets wants to be booked 4.Also enter the number member's details like name,age,gender		Tickets booked to be displayed	Working as expected	Pass				Sanhar
2	UI	Ticket status	a usercan see the status of my ticket Whether it's confirmed/waiting/RAC		1.known to the status of the tivkets booked		known to the status of the tivkets booked	Working as expected	pass				Musthakeem
3	Functional	Remainder notificatio n	a user, I get remainders about my journey A day before my actual journey		1.user can get reminder nofication		user can get reminder nofication	Working as expected	pass				Faizal
4	Functional	GPS tracking	user can track the train using GPS and can get information such as ETA, Current stop and		1.tracking train for getting information		tracking process through GPS	Working as expected	pass				Sulpikar

Table 8.1.3 Test Sprint-3

SPRINT – 4

Date	16-Nov-22
Team ID	PNT2022MID44153
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	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
1	Functional	Ticket cancellatio	user can cancel my tickets there's any Change of plan		1.tickets to be cancelled		Tickets booked to be cancelled	Working as expected	Pass				Sanhar
2	UI	Raise queries	user can raise queries through the query box or via mail.		1,raise the queries		raise the queries	Working as expected	pass				Sanhar
3	Functional	Answer the queries	user will answer the questions/doubts Raised by the customers.		1.answer the queries		answer the queries	Working as expected	pass				Faizal
4	Functional	Feed details	a user will feed information about the trains delays and add extra seats if a new compartment is added.		1.information feeding on trains		information feeding on trains	Working as expected	pass				musthakeem

Table 8.1.4 Test Sprint-4

CHAPTER 8

RESULTS

9.1. PERFORMANCE METRICS

Fig 9.1.1 Performance Metrics

CHAPTER 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 fullvisibility 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, usingemerging
- communication technologies;
- Integrated, interoperable, and scalable solutions for railway systemspreventive 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

13.1 SOURCE

PROGRAM

```
from ibmcloudant import CouchDbSessionAuthenticator
from ibm_cloud_sdk_core.authenticators import BasicAuthenticator
authenticator = BasicAuthenticator('apikey-v2-16u3crmdpkghhxefdi
kvpssoh5fwezrmuup5fv5g3ubz', 'b0ab119f45d3e6255eabb978')
service = CloudantV1(authenticator=authenticator)
service.set_service_url('https://apikey-v2-
16u3ermdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119145d3e6255eabb978e7
e2f0')
cap= cv2.VideoCapture(0)
font = cv2.FONT_HERSHEY_PLAIN
while 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 Ticket")
                time.sleep(5)

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

import wiotp.sdk.device
import time
import random
```

```
myConfig = {
"identity": {
        "orgId": "gagtey",
        "typeId": "GPS",
        "deviceId":"12345"
},
"auth": {
        "token": "12345678"
}
}

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 = myCommandCallback
client.disconnect ()
```

13.2 GITHUB LINK

https://github.com/IBM-EPBL/IBM-Project-41208-1660640175