IoT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING & NOTIFICATION

A PROJECT REPORT

Submitted by

AASTHIKKA G	722819106001
DHIVYA ARCHANA K P	722819106018
KRUBHA HARANE T	722819106044
MALAVIKA V	722819106050

TEAM ID: PNT2022TMID19359

SRI ESHWAR COLLEGE OF ENGINEERING

(Autonomous Institution)

Coimbatore.

TABLE OF CONTENTS:

1. INTRODUCTION

1.1 Project Overview

- A Web page is designed for the public where they can book tickets by seeing the available seats.
- After booking the train, the person will get a QR code which has to be shown to the Ticket Collector while boarding the train.
- The ticket collectors can scan the QR code to identify the personal details.
- A GPS module is present in the train to track it. The live status of the journey is updated in the Web app continuously
- All the booking details of the customers will be stored in the database with a unique ID and they can be retrieved back when the Ticket Collector scans the QR Code.

1.2 Purpose

The Purpose of our Project is

- ✓ To reduce the work load of the parents.
- ✓ To monitoring the children via. Online notification
- ✓ To track the live location of children.
- ✓ To ensure the safety of the children
- ✓ To maintain proper pampering of children when parent is not present.

2. LITERATURE SURVEY

2.1 Existing Problem :

- Real-Time Child Abuse and Reporting System

In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted peoples. GPS is used to track the live location and it is used when needed. The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians.

2.2 References :

☆ Asmita Pawar. Pratiksha Sagare, Tejal Sasane, Kiran Shinde (March–2017) 'Smart security solution for women and children safety based on GPS using IoT', International Journal of Recent Innovation in Engineering and Research, vol. 2, Issue 3, pp. 85-9.

☆Anwaar Al-Lawati, Shaikha Al-Jahdhami, 'RFID-based System for School Children Transportation Safety Enhancement', Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015.

☆Starner, T Schiele, B and Pentland, A. (1998) 'Visual contextual awareness in wearable computing', Second International Symposium on Wearable Computers, Pittsburgh, PA, IEEE Computer Society, pp. 50-57.

☆AkashMoodbidri, Hamid Shahnasser (Jan 2017) 'Child safety wearable device', International Journal for Research in Applied Science & Engineering Technology, Vol. 6 Issue II, IEEE, pp. 438-444.

☆Nitishree, (May-June, 2016) 'A Review on IOT Based Smart GPS Device for Child and Women Safety', International Journal of Engineering Research and General Science, Vol.4, Issue. 3, pp. 159-164.

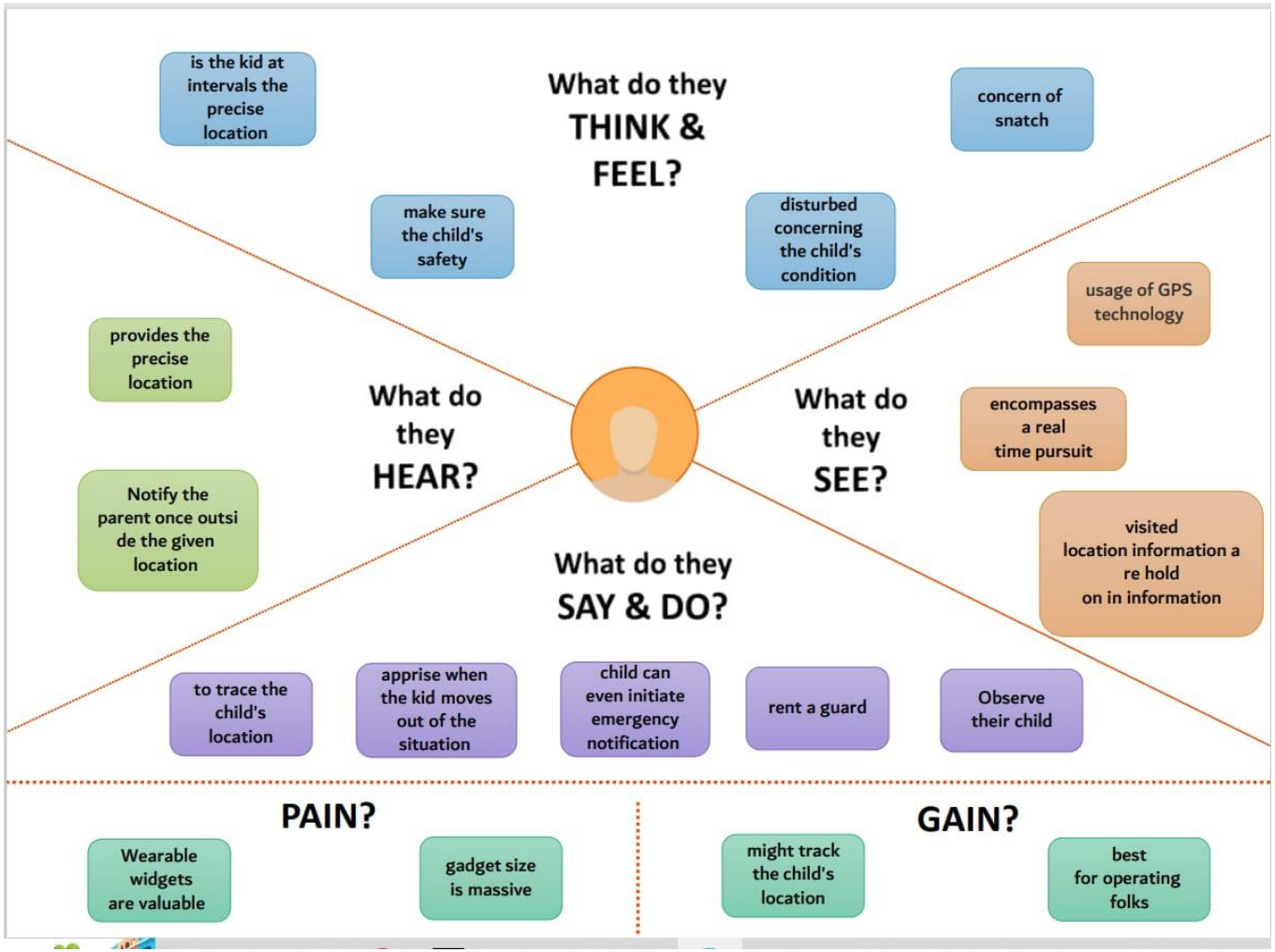
2.3 Problem Statement definition :

Enable tracking of the child's location and capturing of data remotely such as temperature, pulse, respiratory rate, quality of sleep and many more.

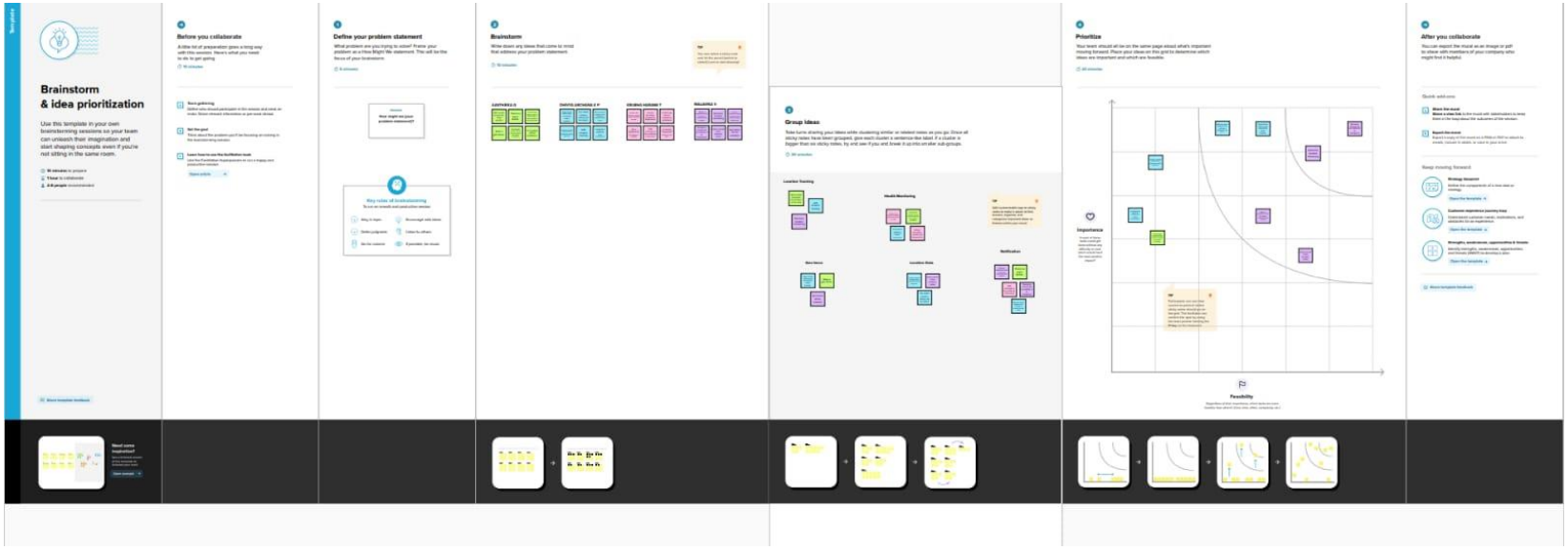
- To show the child's actual data with reference values.
- Enable sending of notification if the child is out of location or when the device realizes abnormal conditions/situations.
- To trigger the alarm and enable automatic video recording whenever the emergency button is pressed. Then, emergency notification along with real-time video will be sent to and display in the parents' mobile apps.
- Develop a prototype of IoT wearable smart band connected to parents' mobile apps so that they can monitor the actual condition of children at anytime and anyplace.

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 Ideation phase

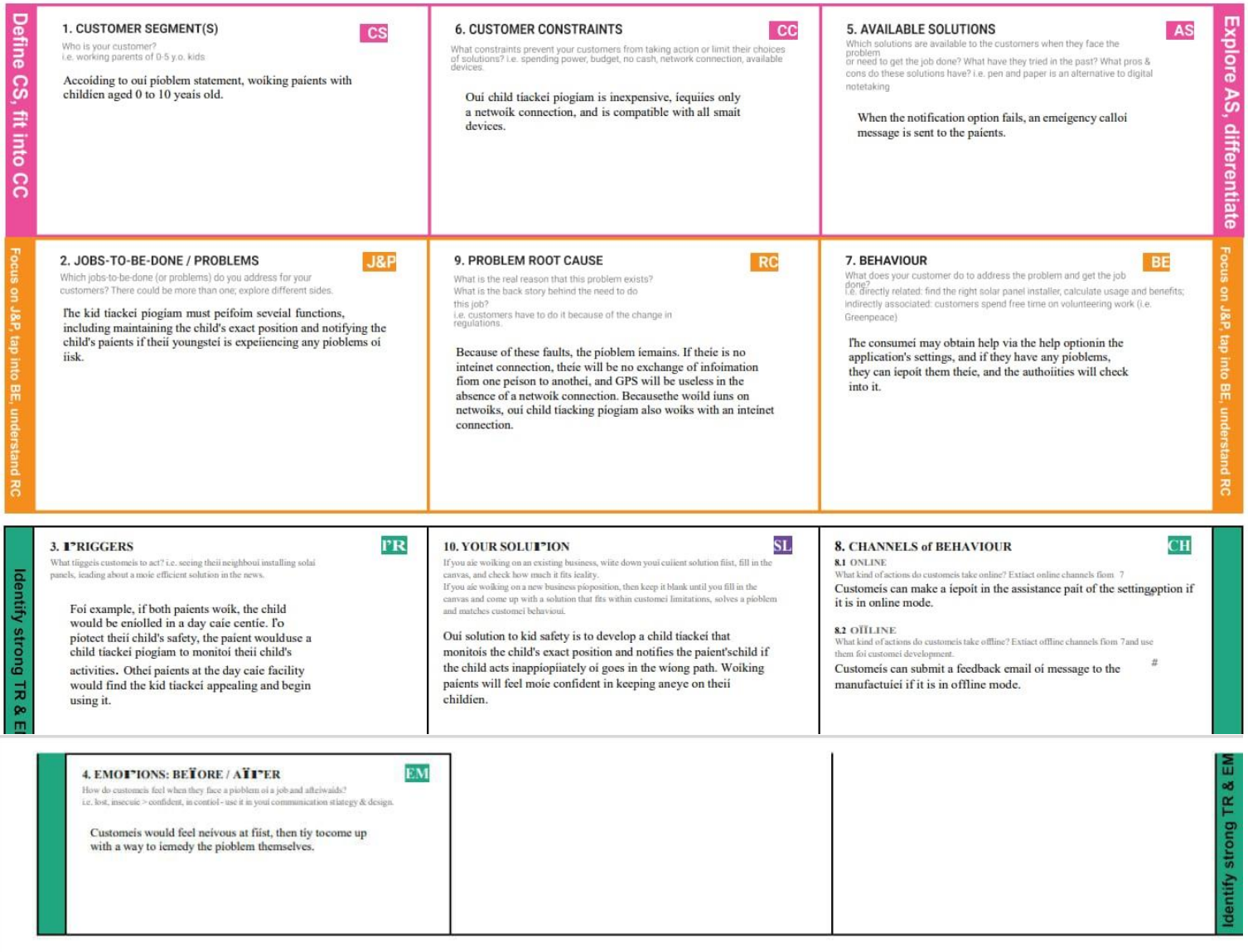


3.3 Proposed Solution

Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	As we all know, kids are the heartbeat of every parent, and when it comes to a child with special needs, parents have to be extra careful. Parents can't monitor the child by 24/7, if they have work.
2.	Idea / Solution description	• Our solution is achieved through monitoring the child by developing a wearable device to track the location. • Parameters include temperature, emotions and wet detection using appropriate sensors. • Based on the Sensor values an alert message with location and phone call is initialized and notified to neighbors and end user.
3.	Novelty / Uniqueness	• Our System offers an GPS tracking and wearable device to get information about the location and also an immediate notification.
4.	Social Impact / Customer Satisfaction	• Improved safety, provides freedom for the children with their needs.
5.	Business Model (Revenue Model)	Our system provides a futuristic framework in such a way that new technologies in the market that align with our system can be readily adopted, adding more profit from a revenue standpoint and also offering multiple benefits at a viable cost from a user standpoint.
6.	Scalability of the Solution	• It is a portable system. • It is more efficient and costs less. • It requires little maintenance.

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirements	A Smart device will be given to the parents/guardian in order to ensure the safety of the children.
FR-2	User Registration	Manual registration through a website or Gmail
FR-3	User Confirmation	Phone Confirmation Email Confirmation OTP authentication
FR-4	Payments options	No payment required
FR-5	Product Delivery and installation	The installation fee will be determined with respect to circumstances of the children and the parent.
FR-6	Product Feedback	Through a website via Gmail

Non-functional Requirements:

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

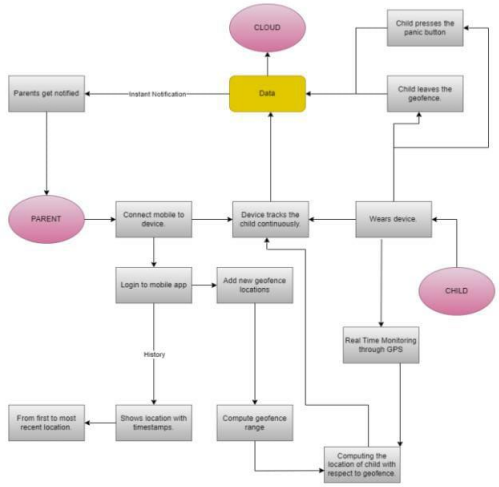
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Have clear product instructions and a self-explanatory product that is simple to use.
NFR-2	**Security**	Cloud data must be obtained within the network, collapsing to be avoided, real-time avoidance should be avoided, and the device will be constantly monitored.
NFR-3	**Reliability**	Hardware is frequently tested.
NFR-4	**Performance**	The smart device will provide a better user experience and deliver accuracy output.
NFR-5	**Availability**	All of the functions that the user demands will be provided, depending on the needs of the consumer.
NFR-6	**Scalability**	The product is based on child safety so it must ensures all types of child safety parameters are true.

5. PROJECT DESIGN

5.1 Data Flow Diagram

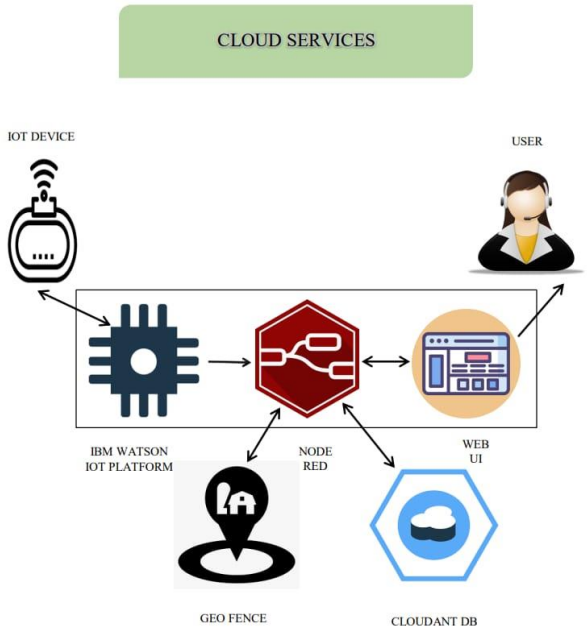
Data Flow Diagrams:

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

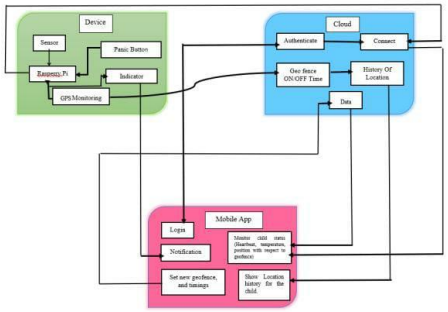


5.2 Solution and Technical Architecture

Solution Architecture:



Technical Architecture:



5.3 User Stories

User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can access my account / dashboard.	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the application	I can receive confirmation email & click confirm,	High	Sprint-1
		USN-3	As a user, I can register for the application through my Google Account	I can register & access the dashboard with Google Account.	High	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering my email & password.		High	Sprint-1
	Dashboard		As a user, I can monitor the child 's location 24/7.		High	Sprint-1
Customer Care Executive	Login		I can view the working of the application and scan for any glitches and monitor the operation and check if all the users are authorized and provide help to the user is needed.	I can login with my provided credentials.	Medium	Sprint-3

6. PROJECT PLANNING & SCHEDULING

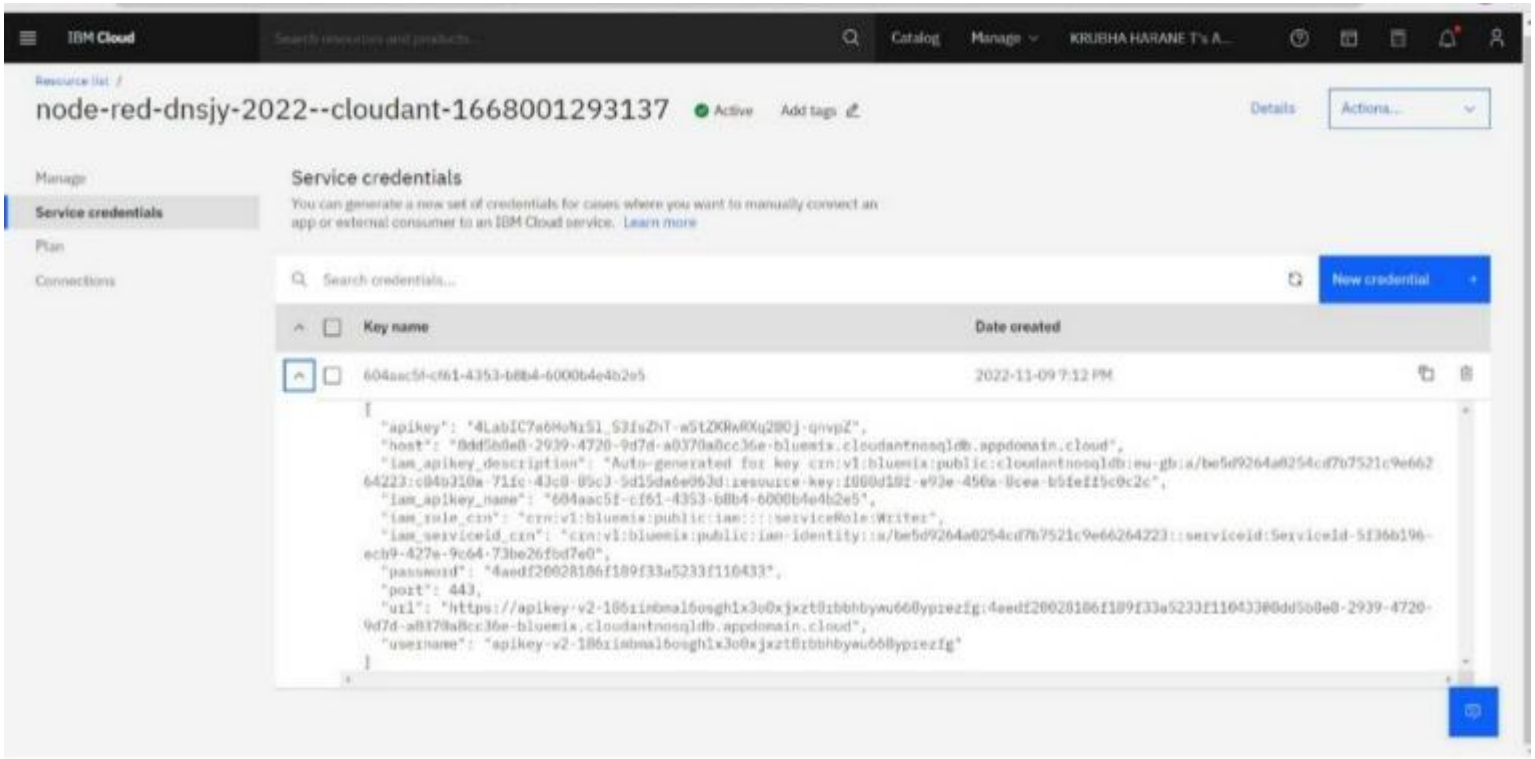
Sprint Planning , Estimation & Sprint Delivery Schedule

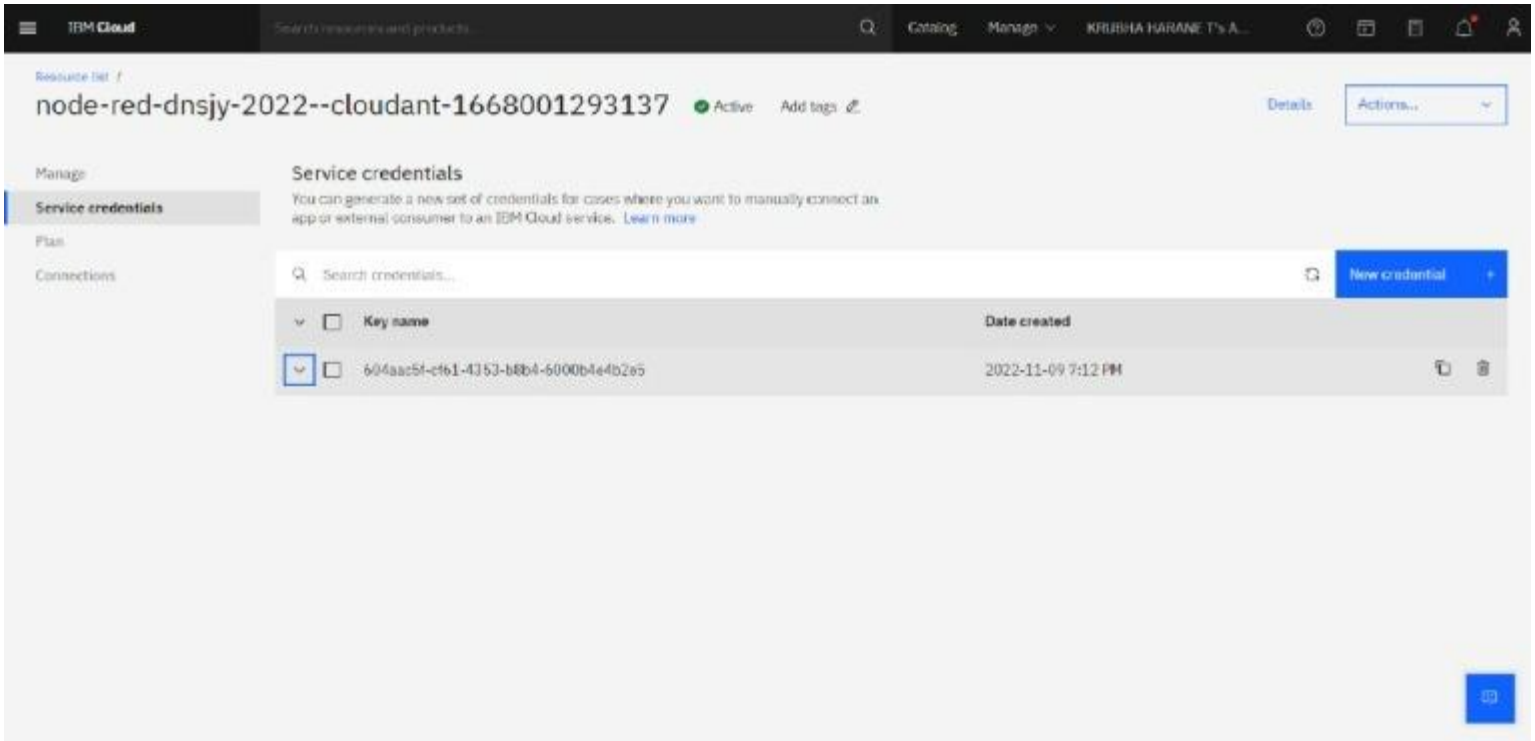
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

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 for the application by entering my email, password and confirming my password.	4	High	Krubha Harane T
Sprint-1	Confirmation	USN-2	As a user, I will receive a confirmation email once I have registered for the application	4	High	Aasthikka G
Sprint-2		USN-3	As a user, I can register for the application through Facebook	10	Low	Malavika V
Sprint-1		USN-4	As a user, I can register for the application through Gmail	4	Medium	Dhivya Archana K P

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-5	As a user, I can log into the application by entering my email & password	4	High	Krubha Harane T
Sprint-2	Dashboard	USN-6	As a User, I can Navigate to the Dashboard after successfully Login to the Application.	10	High	Aasthikka G
Sprint-1	Notification	USN-7	As a user when there is an anomalous situation with the child, a notification will be received through the fencing application.	4	High	Malavika V
Sprint - 3	Support	USN-8	As a User, I can connect with experts to clear Queries, they assist to overcome challenges by scanning for any glitches and monitoring the operation and by checking if all the users are authorized.	10	Medium	Krubha Harane T
Sprint - 3	Login	USN-9	As an Administrator, I can set the Geofence Location Limit and make sure the database encompassing the locations is secure, factual and updated constantly.	10	High	Dhivya Archana K P

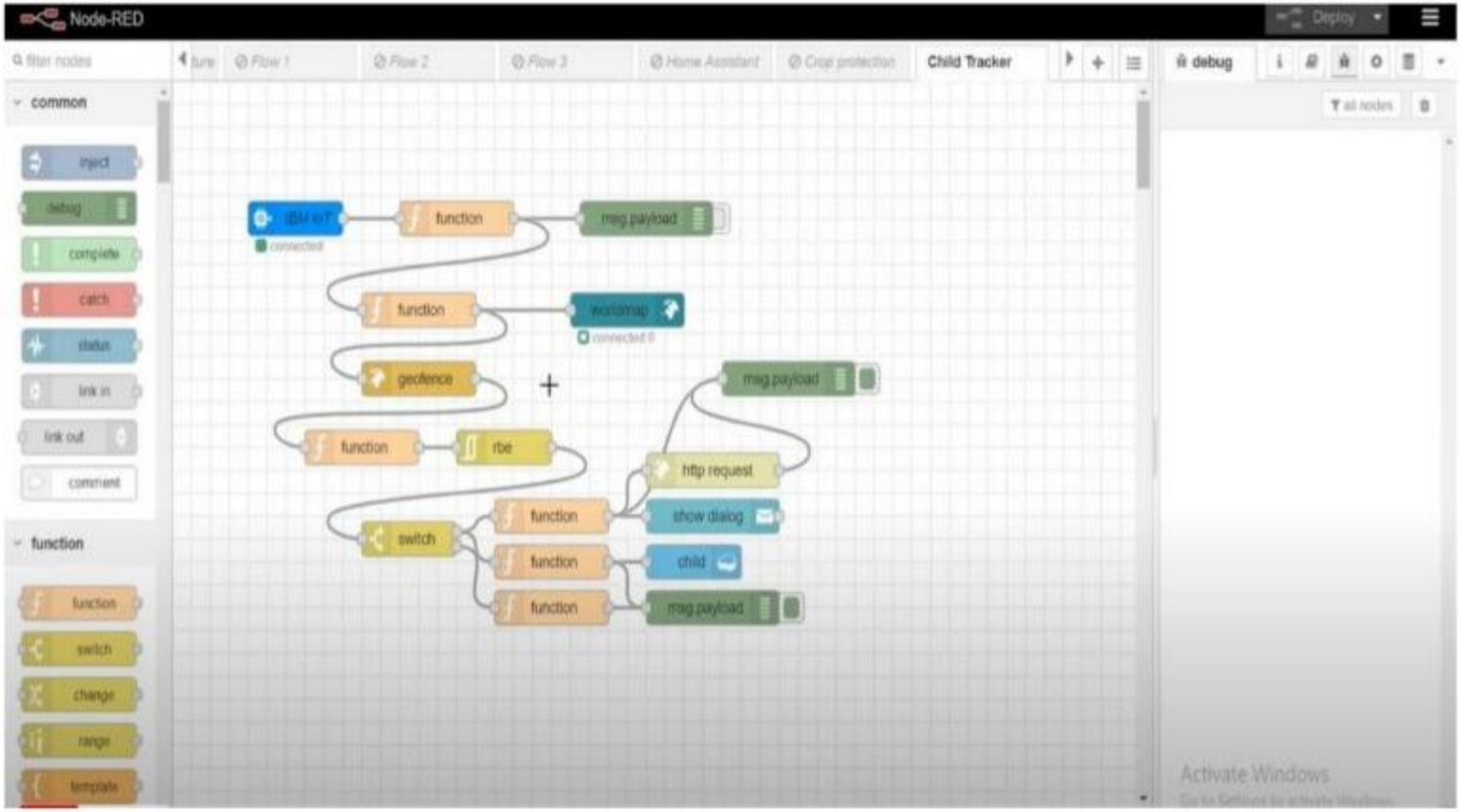
6.1 Database and Cloudant:




IBM Cloud
Catalog
Manage
KRUSHA HARANE T's A...
node-red-dnsjy-2022--cloudant-1668001293137
Active
Add tags
Details
Actions...
Manage
Service credentials
Plan
Connections
Service credentials
You can generate a new set of credentials for cases where you want to manually connect an app or external consumer to an IBM Cloud service. Learn more
Search credentials...
New credential
Key name
Date created
604aac5f-cfb1-4153-b8b4-6000b4e4b2a5
2022-11-09 7:12 PM

6.2 DEVELOP WEB APPLICATION USING NODE RED:

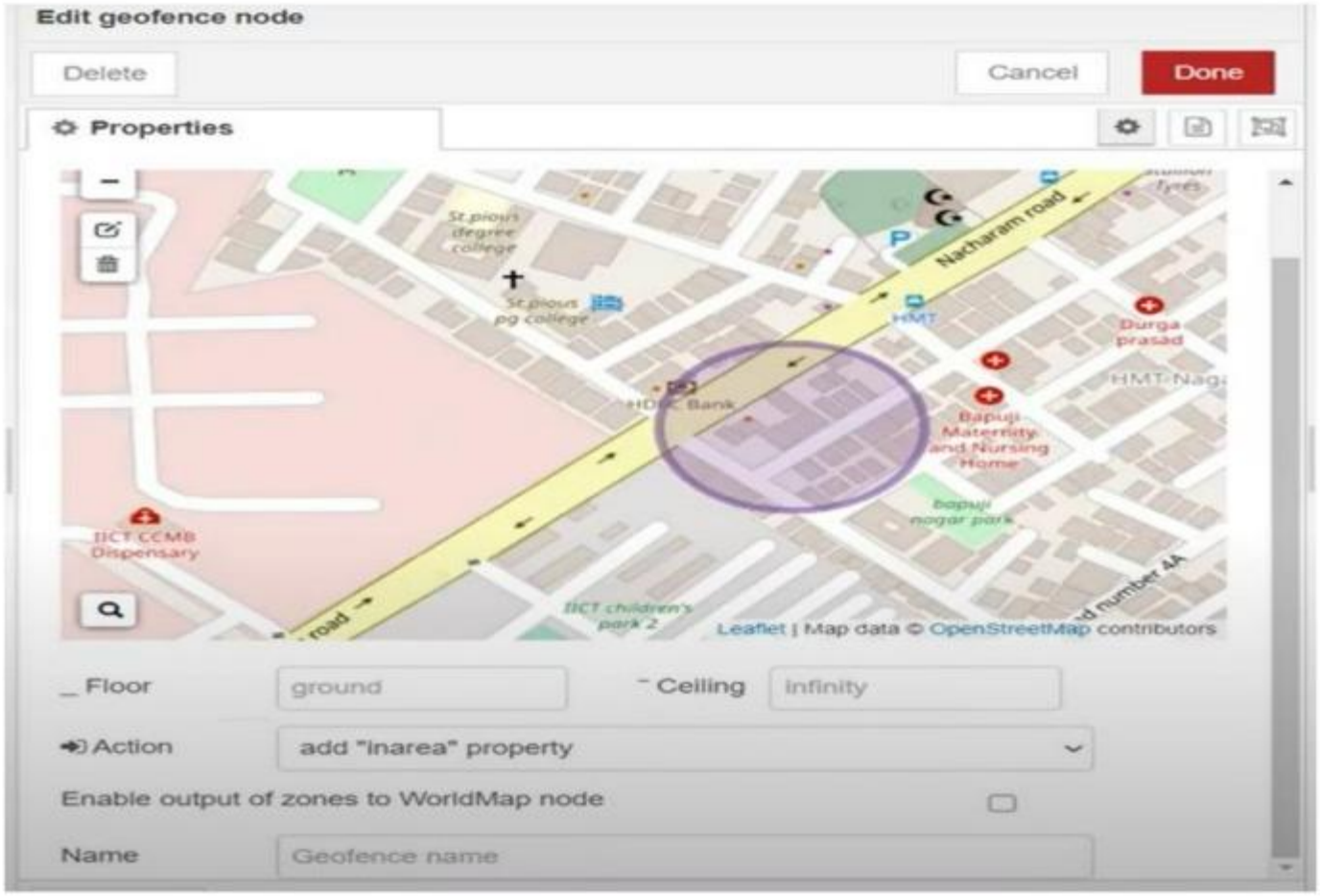
1. Open a Node-Red Project:



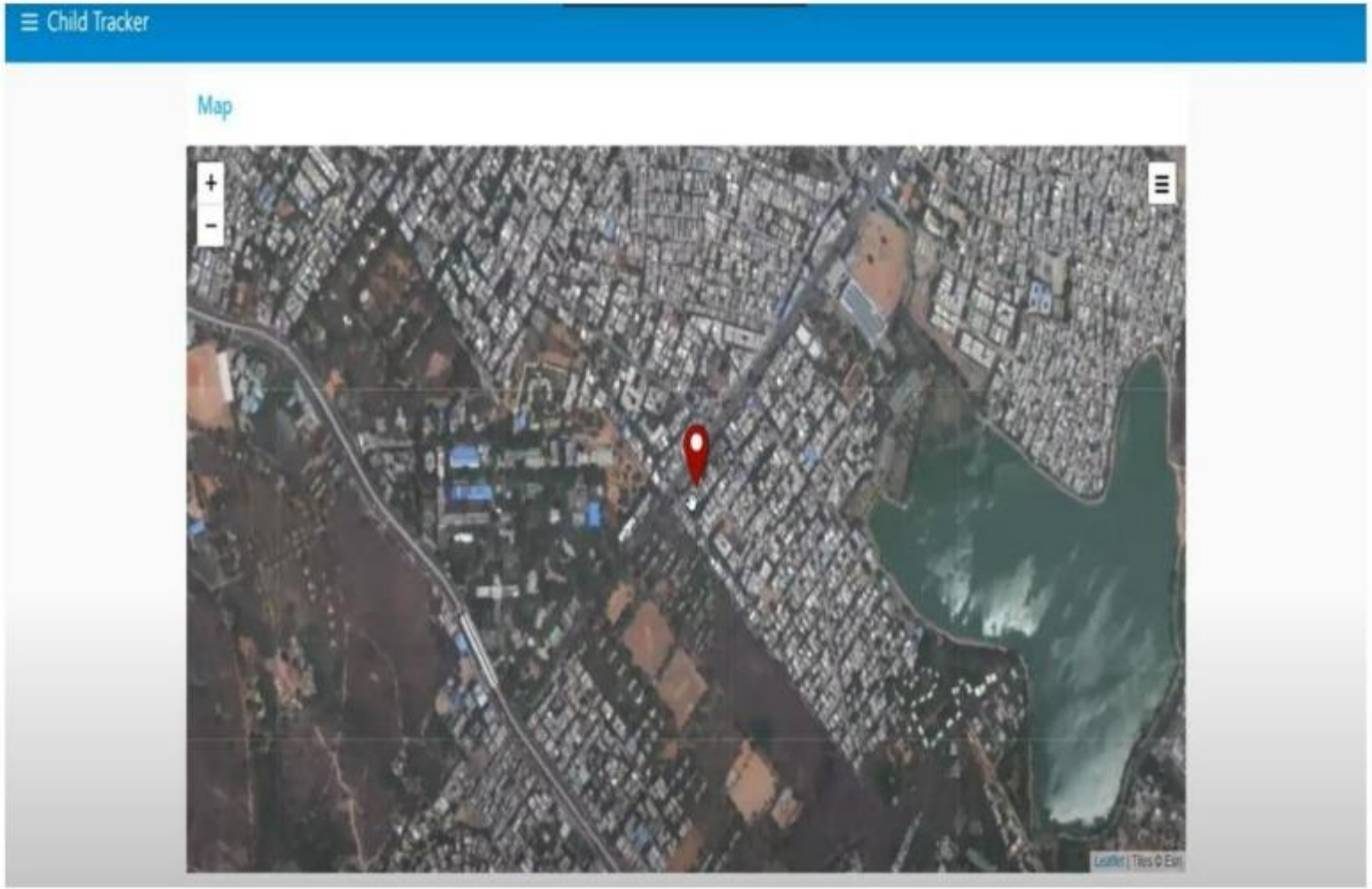
2.Add code to get location in Python:

```
import json
import wiotp.sdk.device
import time

myConfig = {
    "identify": {
        "orgId": "fy2vxg",
        "typeId": "NodeMCU",
        "deviceId": "12345"
    },
    "auth": {
        "token": "12345678"
    }
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
        name = "Sri Eshwar College of Engineering"
        #in area location

        #latitude= 17.4225176
        #longitude= 78.5458842

        #out area location

        latitude= 17.4219272
        longitude= 78.5488783
        myData={'name':name,'lat':latitude,'lon':longitude}
        client,publishEvent(eventId="Status",msgformat="json",data=myData,,qos=0,onPublish=None)
        print("Data published to IM IoT platform:",myData)
        time.sleep(5)

    client.disconnect
```

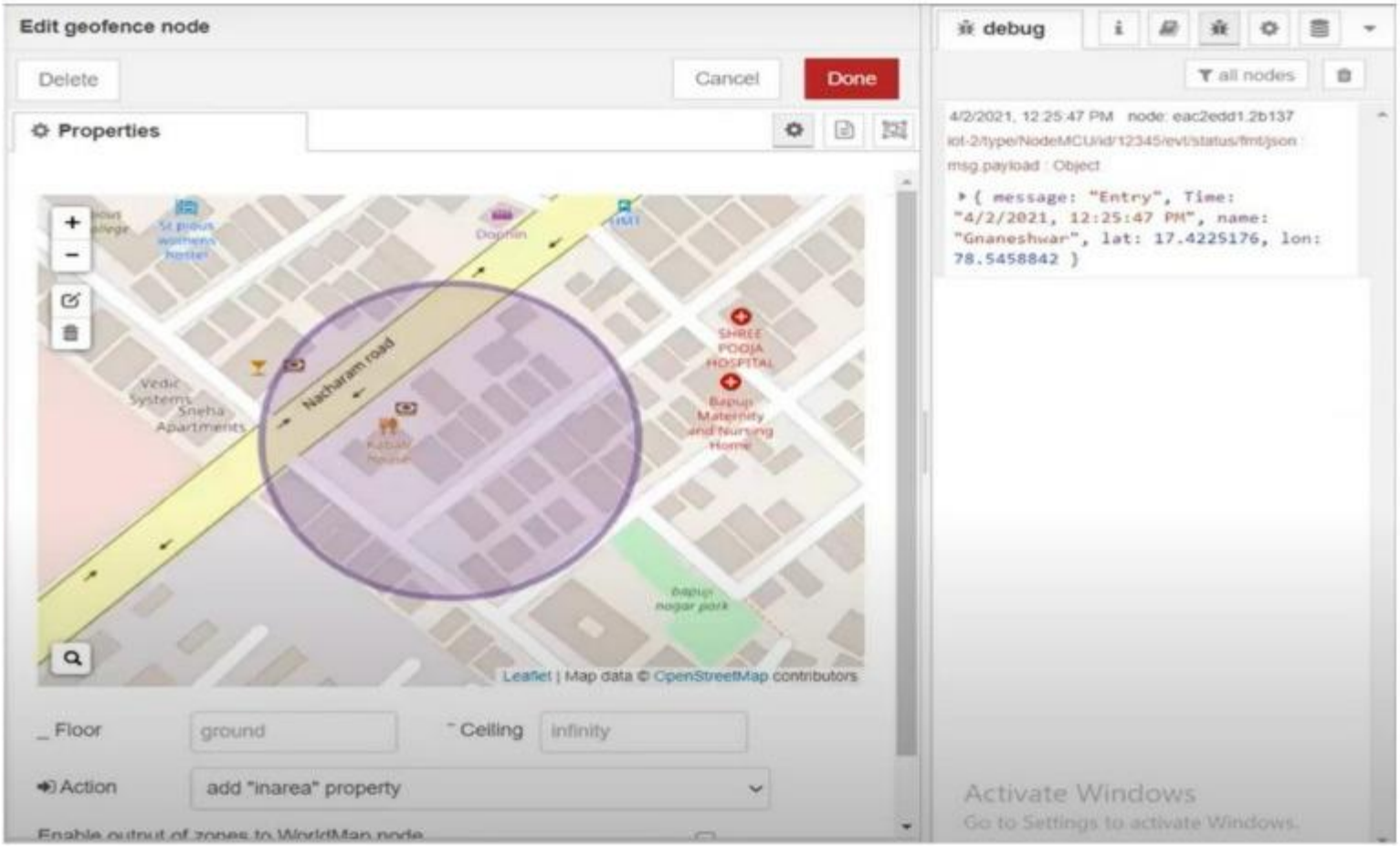
3.Create the Geofence:



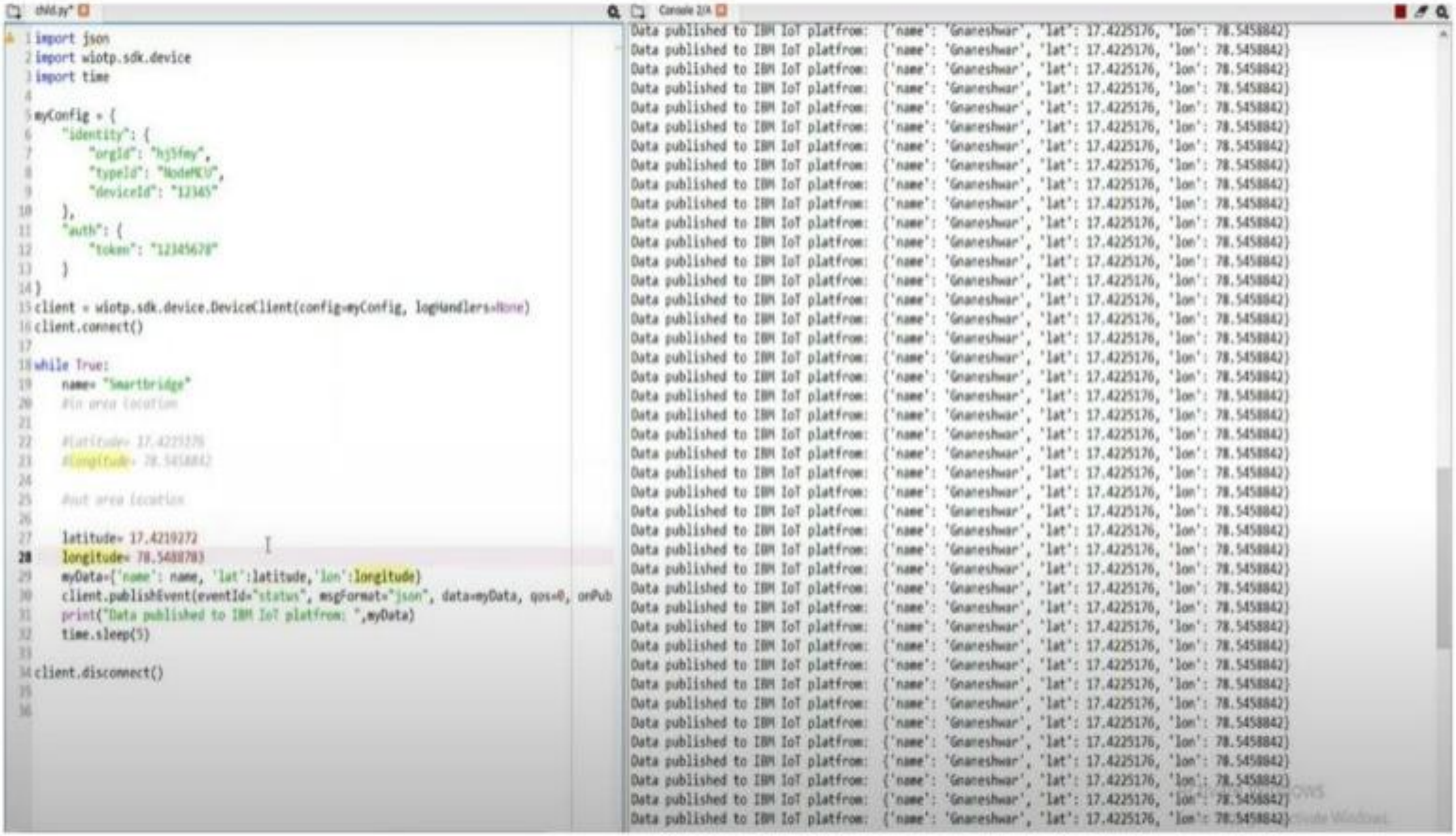
4.Locate the place:



5.Create the Geofence:



6.Python scripts sent requests to IBM cloud:

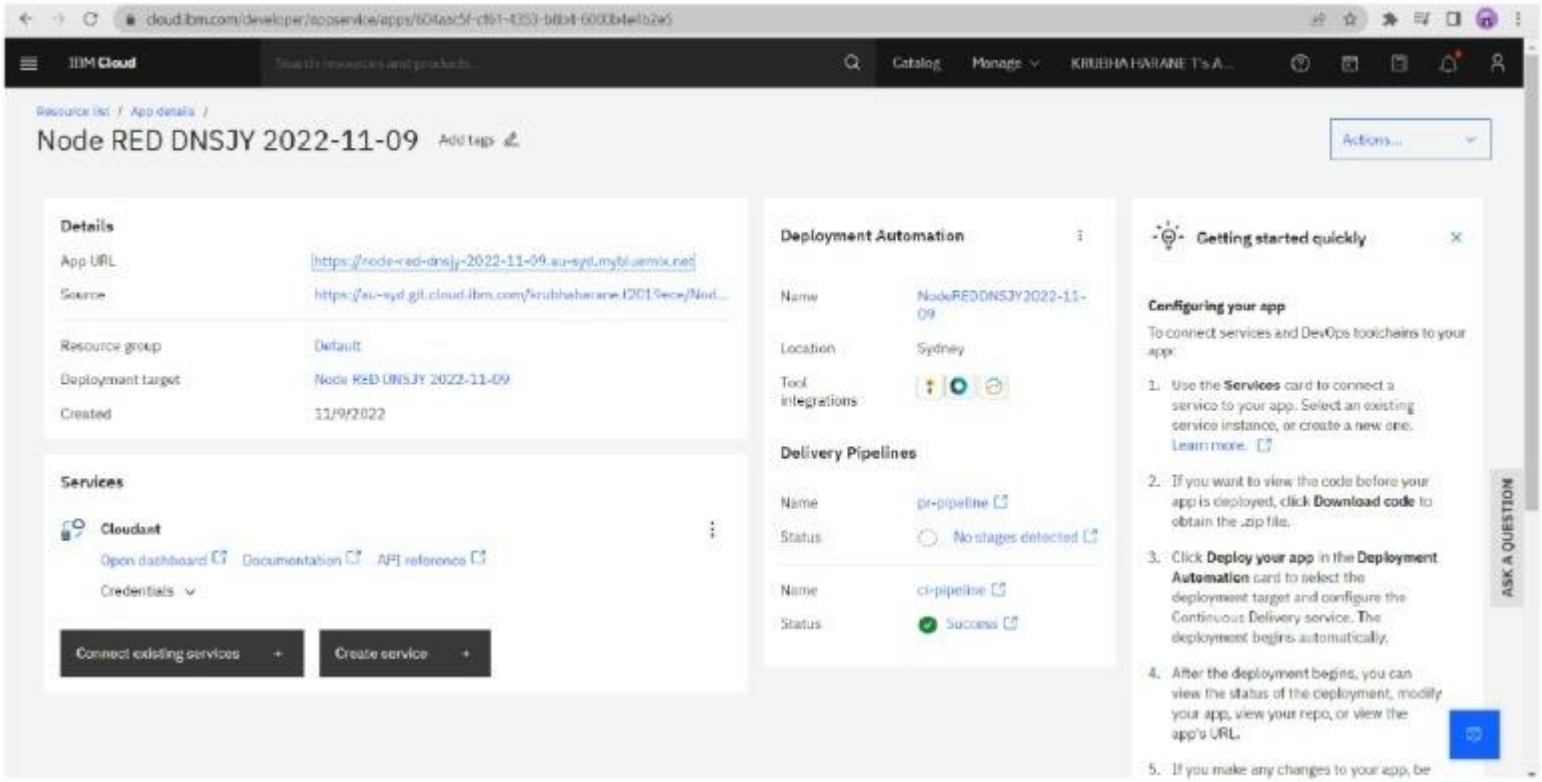


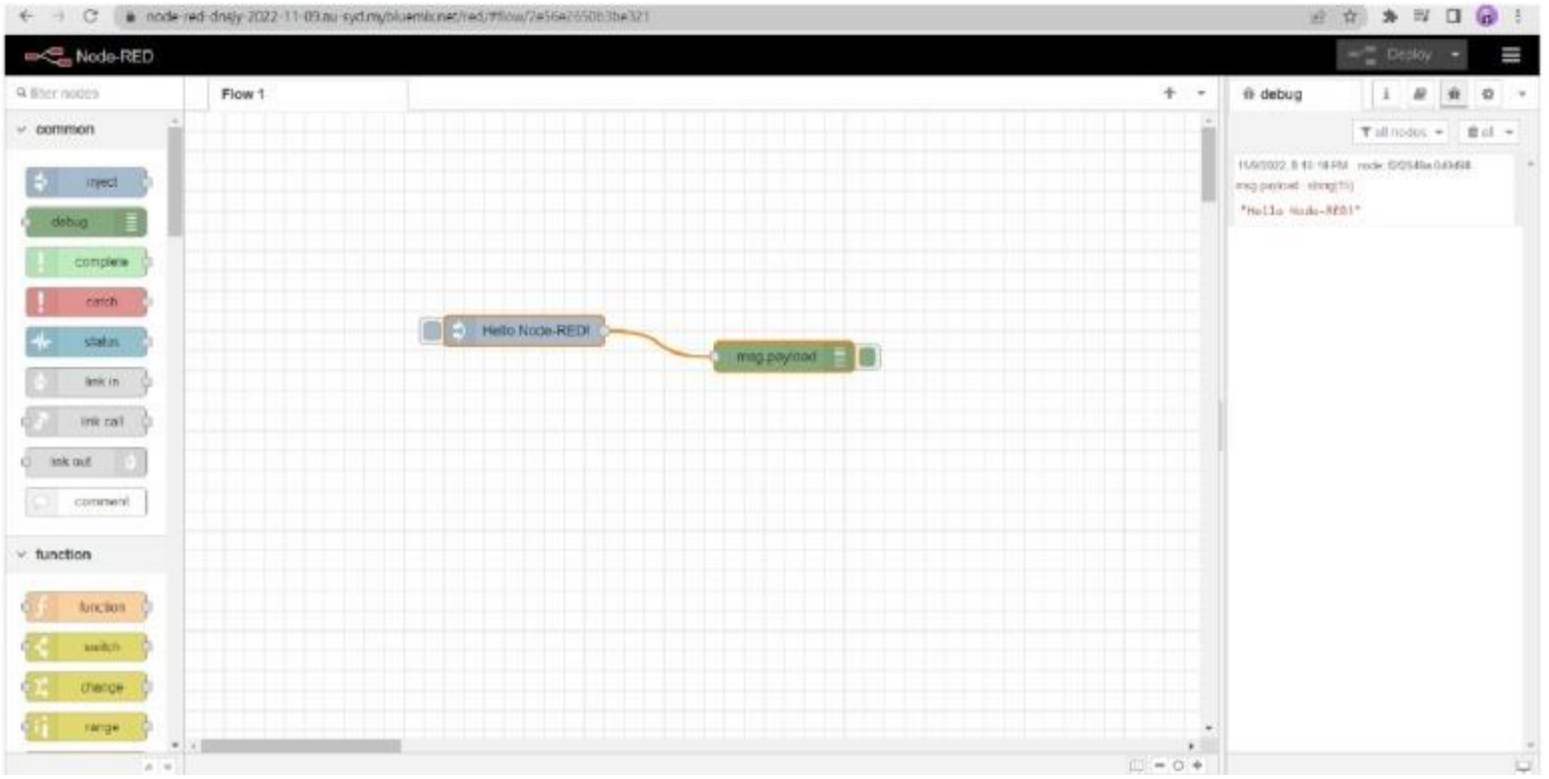
7. After running the script, the web UI shows "Person is not in the particular area":

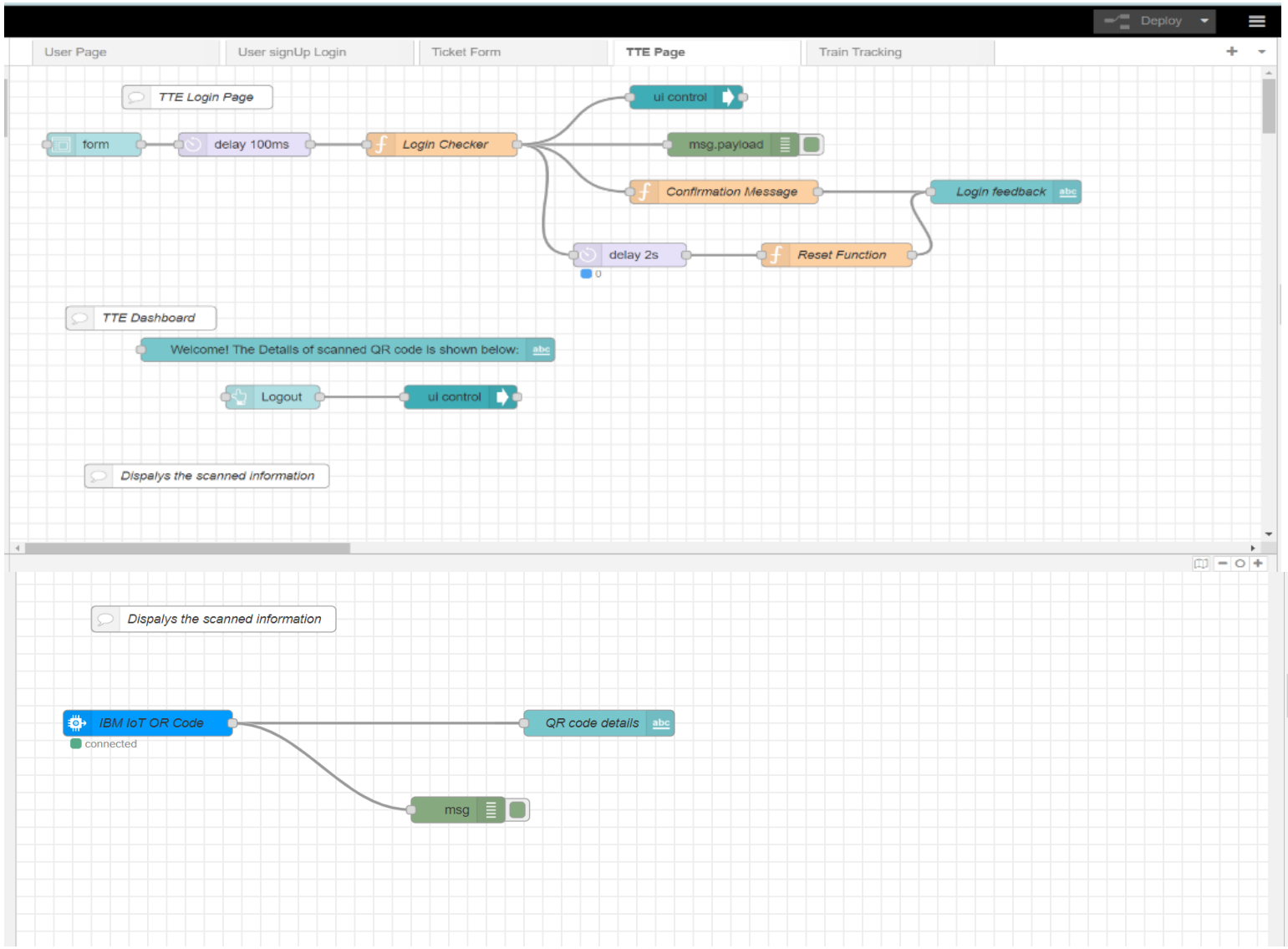
8.Conclusion:

Developed the web application using Node-Red Successfully.

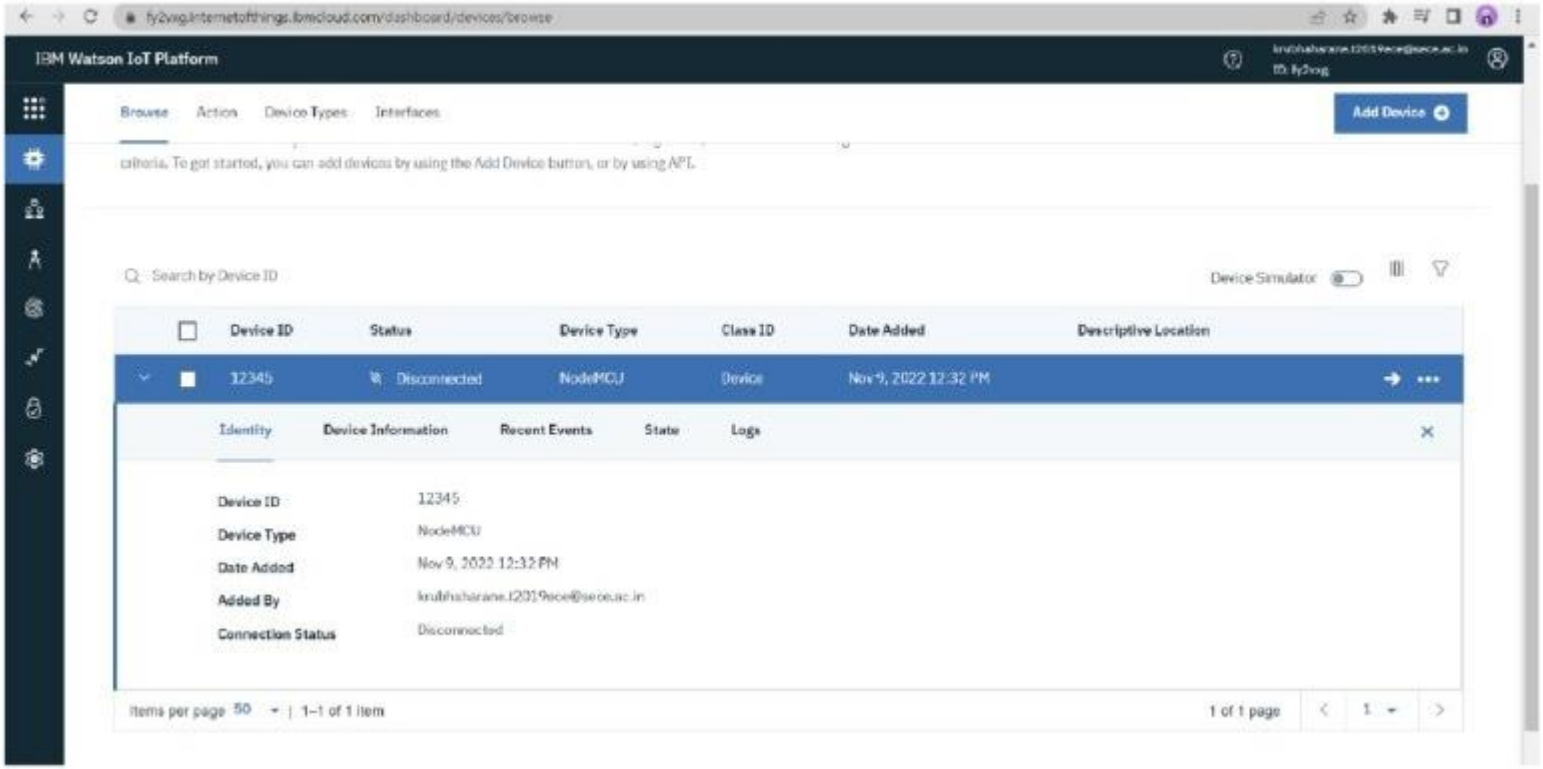
7.1 Node-RED Service:




Node-RED
Deploy
Flow 1
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
switch
change
range
Hello Node-RED!
msg.payload
debug
all nodes
"Hello Node-RED!"


Deploy
User Page
User signUp Login
Ticket Form
TTE Page
Train Tracking
TTE Login Page
form
delay 100ms
Login Checker
ui control
msg.payload
Confirmation Message
Login feedback
delay 2s
Reset Function
0
TTE Dashboard
Welcome! The Details of scanned QR code is shown below:
Logout
ui control
Dispalys the scanned information
Dispalys the scanned information
IBM IoT OR Code
connected
QR code details
msg

7.2 IBM Watson IOT device



CODE AND SOLUTION:

HTML

```
<!DOCTYPE html>
<html lang="en" style="height: 100%; margin: 0;">
 <head>
 <meta charset="UTF-8" />
 <meta name="description" content="The Home Page after Logged In" />
 <meta name="viewport" content="width=device-width, initial-scale=1.0" />
 <title>IOT Based Safety Gadget for Child Safety Monitoring and Notification</title>
 <script src="./LOCALFORAGE.js"></script>
 <script>
 if (window.location.hostname !== "localhost") {
 if (location.protocol !== "https:") {
 location.replace(
 `https:${location.href.substring(
 location.protocol.length
 )}`
 )
 }
 }
 async function check() {
 let data = localforage.getItem("userData")
 if (data == null) {
 window.location.href = "/login"
 }
 }
```

```
check()
</script>
</head>
<body
style="
height: 100%;
margin: 0;
font-weight: 300;
font-family: -apple-system, BlinkMacSystemFont, 'Segoe UI', Roboto,
Oxygen, Ubuntu, Cantarell, 'Open Sans', 'Helvetica Neue',
sans-serif;
"
>
<div
class="wrapper"
style="
height: 90%;
display: flex;
flex-direction: column;
align-items: center;
justify-content: center;
text-align: center;
"
>
<div
class="details"
style="
```

```
 display: flex;
 flex-direction: column;
 align-items: center;
 gap: 20px;
 padding: 1rem;
 border-radius: 5px;
 box-shadow: 0 0 8px 0px #44444444;
 max-width: 80%;
 "
 >
 <h1 class="name" style="margin: 0"></h1>
 <div
 class="imageContainer"
 style="padding: 10px; height: 10rem; width: 10rem"
 >
 <img class="image" alt="profile picture" />
 </div>
 <h2 class="email" style="margin: 0"></h2>
 <a style="text-decoration: none;text-align: center;font-size: 1.2rem;color: #0070f3;fontweight: 400;"
href="./dashboard">Go to Dashboard ↗</a>
 </div>
 </div>
 <script>
 async function main() {
 let name = document.querySelector(".name")
 let image = document.querySelector(".image")
 let email = document.querySelector(".email")
```

```
 let userData = await localforage.getItem("userData")
 if(userData == null) {
 window.location.href = "/login"
 }
 name.innerHTML = `Welcome ${userData.firstName} ${userData.lastName}!`
 image.src = userData.profilePic
 email.innerHTML = `Your email is: <a style="text-decoration: none;color: #0072B5;"
href="mailto:${userData.email}">${userData.email}</a>`
 }
 main()
 </script>
 </body>
</html>
```

CSS

```
html,
body {
 height: 100%;
 margin: 0;
 font-weight: 300;
 font-family: -apple-system, BlinkMacSystemFont, "Segoe UI", Roboto,
Oxygen,
 Ubuntu, Cantarell, "Open Sans", "Helvetica Neue", sans-serif;
}
.wrapper {
 height: 100%;
 display: flex;
```

```
 align-items: center;
 justify-content: center;
}
.loginContainer {
 display: flex;
 flex-direction: column;
 gap: 1rem;
 min-width: 25rem;
 padding: 1rem 3rem;
 border: 1px solid #44444444;
 box-shadow: 0px 3px 2px 1px #44444444;
 border-radius: 8px;
}
.loginContainer span {
 text-align: center;
 font-size: 3rem;
 font-weight:  500;
 margin: 1rem 1rem 3rem;
}
.traditionalLoginContainer form {
 display: flex;
 flex-direction: column;
 align-items: center;
 justify-content: center;
}
.traditionalLoginContainer :is(input[type="text"], input[type="password"],
input[type="email"]) {
```

```
 margin: 0.3rem;
 padding: 0.3em 0.5em;
 border: 1px solid #44444444;
 border-radius: 5px;
 outline: none;
 min-width: 200px;
 font-size: 1.3rem;
}
.traditionalLoginContainer .loginButton {
 background-color: #0070f3;
 font-size: 1.6rem;
 padding: 0.2em 0.8em;
 color: white;
 margin: 0.4rem;
 border: none;
 border-radius: 5px;
 cursor: pointer;
 margin-top: 2rem;
}
.traditionalLoginContainer .loginButton:hover {
 background-color: #0071f3d6;
}
.loginWithFireContainer {
 display: grid;
 display: -ms-grid;
 place-items: center;
}
```

```
.fire {
 background-color: #f8f9fa;
 border: 1px solid #3c404321;
 border-radius: 4px;
 color: #3c4043;
 font-family: arial, sans-serif;
 margin: 11px 4px;
 padding: 0.4em 0.8em;
 line-height: 27px;
 min-width: 54px;
 text-align: center;
 cursor: pointer;
 user-select: none;
 font-size: 1.3rem;
 font-weight: 500;
}
.hyperLink {
 text-decoration: none;
 text-align: center;
 font-size: 1.2rem;
 color: #0070f3;
 font-weight: 400;
}
@media screen and (max-width: 480px) {
 .loginContainer {
 border: none;
 box-shadow: none;
```

```
 min-width: fit-content;
 min-width: -moz-fit-content;
 min-width: -webkit-fill-available;
 padding: 1rem;
 }
}
```

9) RESULT

1) Live Location Tracking:

GPS is installed on gadget to track its current location can be tracked on android app and via SMS request sent from parent phone to safety gadget.

2) Panic Alert Systems:

Panic alert system on gadget is triggered during panic situation, automatic call and SMS are triggered to parental phone. The alert is also updated to the cloud for purpose of app monitoring.

3)Stay Connected Feature:

Stay connected feature is used to trigger call and pre-defined SMS anytime from gadget to parental phone by just pressing a button and also parent can make SMS and call to the gadget anytime.

4)Health Monitoring System:

Health monitoring system is implemented using heart beat sensor, temperature sensor which is updated to the cloud and also can be monitored via app. The current value of sensors can be obtained using SMS request sent to gadget from parent phone. Fig. 5. Outputs of health monitoring system.

5) Gadget Plugged or Unplugged Monitoring:

Gadget plug or unplugged is monitored using contact switch installed on smart gadget, as soon as the device is unplugged, an alert is provided to parent phone via SMS and it is also updated to cloud for app monitoring.

6) Boundary monitoring system:

This is used to track the safety gadget using the binding gadget by implementing signal strength concept as soon as the safety gadget moves far away from the BLE listener gadget then an alert is provided to itself.

10) ADVANTAGES :

1. It assists parents to monitor their children remotely.
2. Parents will get all the details like their kid boarding and deboarding school bus.
3. By using this gadget child kidnaping is reduced.
4. Both the parents and school authorities can receive alerts, notification about the child's whereabouts through IoT.

DISADVANTAGES:

1) The system is dependent on communication signal/network signal for the smart gadget to trigger automatic phone call/SMS during panic situation.
2) It can be difficult to detect when network signal is not reachable/weak/when the smart gadget moves outside the boundary range. Hence, it can be improved by increasing the range.
3) Young children may refuse to cooperate unless allowed to play with their gadgets.
1. 4) Electronic gadgets use can lead to poor health.

11. Conclusion:

This research demonstrates Smart IoT device for child safety and tracking, to help the parents to locate and monitor their children. If any abnormal readings are detected by the sensor, then an SMS and phone call is triggered to the parents mobile. Also, updated to the parental app through the cloud. The system is equipped with GSM and GPS modules for sending and receiving call, SMS between safety gadget and parental phone. The system also consists of Wi-Fi module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring on parental phone. Panic alert system is used during panic situations alerts are sent to the parental phone, seeking for help also the alert parameters are updated to the cloud. Boundary monitoring system is implemented on safety gadget with the help of BEACON technology, as soon as the safety gadget moves far away from the BLE listener gadget an alert is provided to itself.

12. Future Scope:

This system can be further enhanced by installation of minicamera inside smart gadget for better security so that live footage can be seen on parental phone during panic situations. The system can be modified by installation of small solar panels for charging the battery of smart gadget to gain maximum battery backup.

13) APPENDIX :

GITHUB LINK :

https://github.com/IBM-EPBL/IBM-Project-4434-1658732308

PROJECT DEMO LINK:

https://drive.google.com/file/d/1uwBukYMPPQxmf7d3Ijjb3m6kQuHuYdY3/view?usp=share_link