TEAM ID : PNT2022TMID07818

PROJECT NAME : IOT Based Safety Gadget for Child Safety Monitoring and Notification

1. INTRODUCTION

1.1 Project Overview

The term "internet of things" (IoT) describes a collection of hardware and software that connects to the internet and real-world sensors. The safety of children is in danger today more than ever, so it's critical to offer them a technology-based solution that will support them in emergency circumstances and allow for smart device monitoring. The proposed system uses IoT and sends all the monitoring metrics to the cloud for android app monitoring on the parental phone. It is equipped with GSM and GPS modules for alarm sending and receiving between safety device and parental phone. Using the GPS coordinates on the parental phone's android app, an Android application can be used to track the current location of a safety device. It emphasizes on the crucial idea that a missing child can be helped by those who are close to them and can play a significant part in ensuring their safety until they are reunited with their parents. Additionally, it updates the parental app via the cloud.

1.2 Purpose

These days, kids lack a sense of security and face numerous security-related challenges. Many family members spend more time working and fulfilling their societal obligations, which include caring for their children. The situation in our nation right now is unsuitable for keeping an eye on kids. It is challenging to keep an eye on the kids constantly in the absence of a child surveillance system. Where Young children may act impulsively and choose impulsive locations. Most of the human behaviour is formed during the formative years, necessitating the need of a child monitoring system. Accidents and events frequently involve children. Due to their inability to defend themselves, children's safety is essential. Kids are the lifeblood of any parent, as we all know, and parents need to take particular care with children who have special needs. They must give their youngster special attention.

- Parents may always follow their children's whereabouts with the aid of a child tracker.
- They may easily set up a geofence around the site and leave their kids in play areas or schools.
- If the child crosses the geofence, alerts will be generated by continuously monitoring the child's position. Parents or caregivers will receive notifications based on the child's location.
- The database will contain all the location information.
- Enable the tracking of the child's location and the remote collection of data, including the child's position and other factors to display actual data from the child together with reference values.
- Enable notification transmission if the youngster is missing or if the device detects an unusual circumstance or condition.

2. LITERATURE SURVEY

2.1 Existing problem

Kids are the lifeblood of any parent, as we all know, and parents need to take particular care with children who have special needs. They must give their youngster special attention. Parents may always follow their children's whereabouts with the aid of a child tracker. They only need to set up a geo-fence around the site and leave their kids in play areas or schools. If the child crosses the geo-fence, notifications will be generated by continuously monitoring the child's position. Parents or caregivers will receive notifications based on the child's location. The database will contain all the location information. If there is a danger, the child can also alert the parents in an emergency.

This study shows how smart IoT devices can be used to track and protect children while also assisting parents in finding and keeping an eye on them. Alerts sent to mobile phones if the sensor detects any unusual readings. updated the parental app over the cloud as well. For communication between the safety device and the parent's phone, the system has GSM and GPS modules. The IoT system also includes a Wi-Fi module that transmits all the tracked parameters to the cloud for parental phone android app monitoring.

2.2 References

1. Mahajabeen Budebhai, "IOT based child and women protection", *International Journal of computer science and mobile Computing*, no. 7, pp. 141-146, August 2018.
2. Jonnadulal, Bhanu Prasad Davu, Hari Kishore Kandula, Vinod Donepudi, Sivaiah Etukuri and Gopinadh, "Child security wearable gadget", *VVIT Guntur Andhra Pradesh India Global Journal for Research in Applied Science and Engineering Technolgy(IJRASET)*, vol. 6, no. 2, February 2018.
3. Cassandra Dsouza, Dhanashree Rane, Anjanette Raj, Supriya Murkar and Namita Agarwal, "Design of Child Security Method", *International conference for convergence in tehnology*, 2018.
4. Moodbidri, A., Shahnasser, H.: Child safety wearable device. In: 2017 International Conference on Information Networking (ICOIN), pp. 438–444. IEEE (2017)
5. Niti shree, "A review on IOT Based Smart GPS device for Child and Women Safety applications", *International journal of engineering research and general science*, no. 4, May-June 2016.
6. Jatti Anand, Kannan Madhvi, M Alisha, R Vijayalakshmi and P Sinha, Structure and improvement of an IOT based wearable gadget for the wellbeing and security of ladies and young lady youngsters, 2016.
7. Huang, Z., Gao, Z., Lu, H., Zhang, J., Feng, Z., Xia, H.: An mobile safety monitoring system for children. In: 10th International Conference on Mobile Ad-hoc and Sensor Networks, pp. 323–328. IEEE (2014)

2.3 Problem Statement Definition

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

Customer Problem Statement Template:

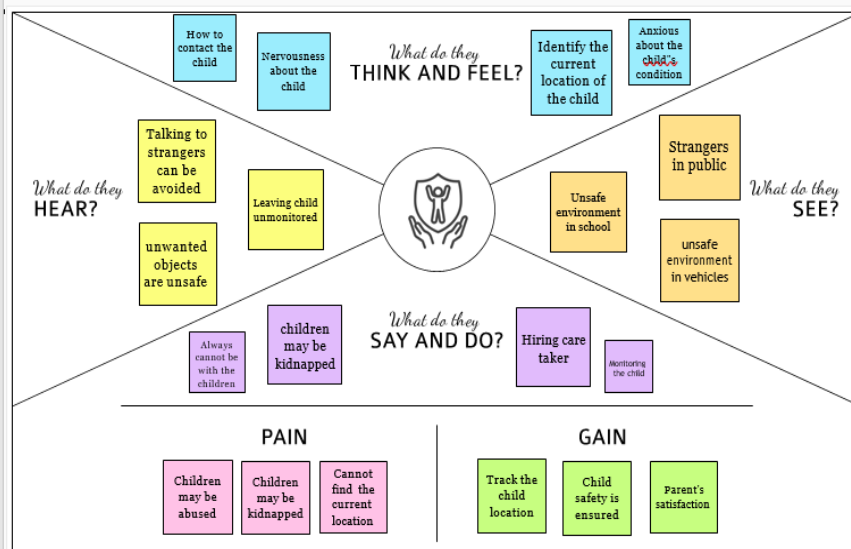| Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Parent	To detect child location	lack of information about child location	Because the location of the child is not exactly known by the parent	Frightening, scary , fearful , uneasy , worry, terrifying , unpleasant , anxious

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming

3.2 Proposed Solution

Proposed Solution Template:

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Prepare a device which is used to track the child and to notify it to their parents
2.	Idea / Solution description	We are going to prepare a device which sends the current location of the children and also parents can mak a geofence to protect their child
3.	Novelty / Uniqueness	Geofence - Parent can create a geofence at specified time like scheduling activities so that they can accurately monitor their children
4.	Social Impact / Customer Satisfaction	It is very compact and with good quality. It can be easily affordable by all.
5.	Business Model (Revenue Model)	Collected data can be used to predict the flow of children.
6.	Scalability of the Solution	The model can be able to handle many number of input and provides the respective output.

3.3 Problem Solution fit

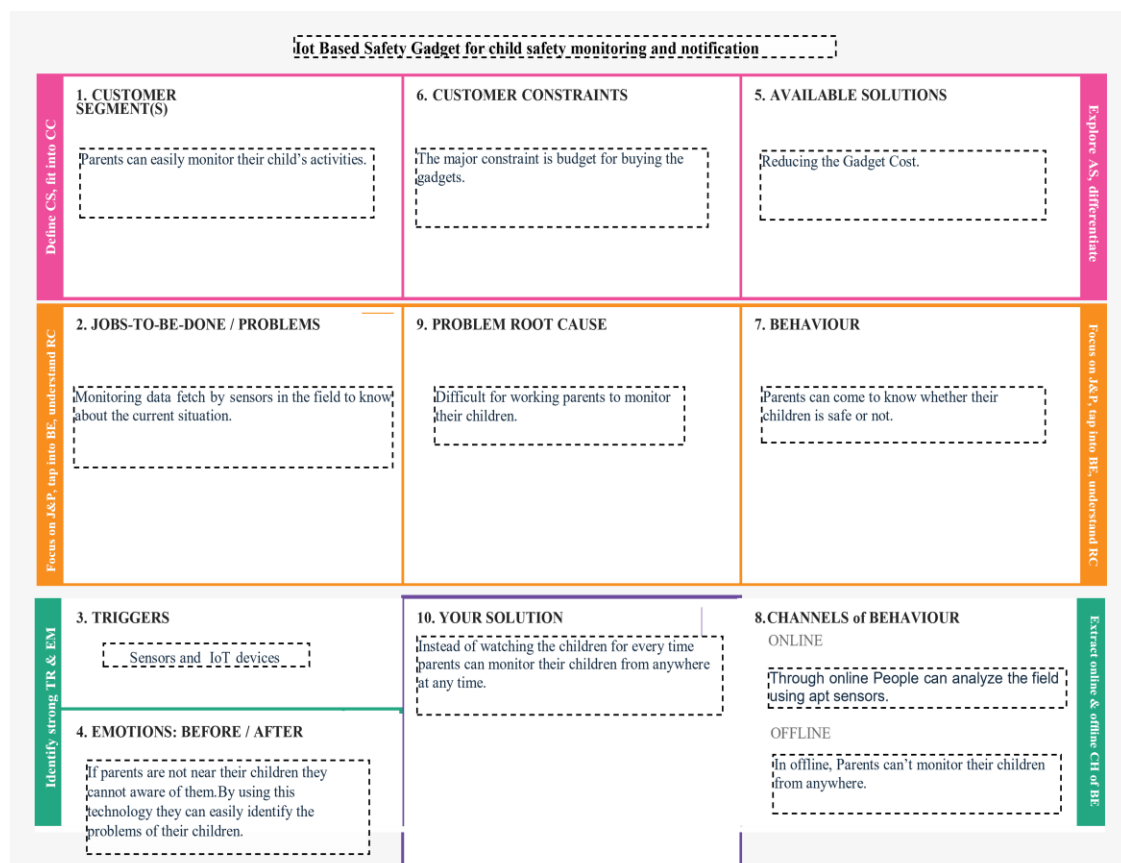# 4. REQUIREMENT ANALYSIS

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	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Notification	Notified via Mobile Web app
FR-4	User Interface	Mobile Web App user can create the geofence
FR-5	User Interface	Mobile Web App user able to see location of children when they are out of geofence

4.2 Non-functional Requirements:

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

| FR No.	Non-Functional Requirement	Description

IoT Based Safety Gadget for child safety monitoring and notification

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)

Parents can easily monitor their child's activities.

6. CUSTOMER CONSTRAINTS

The major constraint is budget for buying the gadgets.

5. AVAILABLE SOLUTIONS

Reducing the Gadget Cost.

Explore AS, differentiate

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

2. JOBS-TO-BE-DONE / PROBLEMS

Monitoring data fetch by sensors in the field to know about the current situation.

9. PROBLEM ROOT CAUSE

Difficult for working parents to monitor their children.

7. BEHAVIOUR

Parents can come to know whether their children is safe or not.

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

Identify strong TR & EM

3. TRIGGERS

Sensors and IoT devices

4. EMOTIONS: BEFORE / AFTER

If parents are not near their children they cannot aware of them. By using this technology they can easily identify the problems of their children.

10. YOUR SOLUTION

Instead of watching the children for every time parents can monitor their children from anywhere at any time.

8. CHANNELS of BEHAVIOUR

ONLINE

Through online People can analyze the field using apt sensors.

OFFLINE

In offline, Parents can't monitor their children from anywhere.

Extract online & offline CH of BE

NFR-1	**Usability**	Accessed through Mobile Web app Showing location of the child
NFR-2	**Security**	Database security must meet HIPAA requirements
NFR-3	**Reliability**	Once logged in, webpage is available until logging out of app
NFR-4	**Performance**	Each page must load with minimum time
NFR-5	**Availability**	Must be active throughout the day and remain active at least a week for a single charge.
NFR-6	**Scalability**	The process must finish within 3 hours so data is available in the morning after an overnight update

5. PROJECT DESIGN

5.1 Data Flow Diagrams
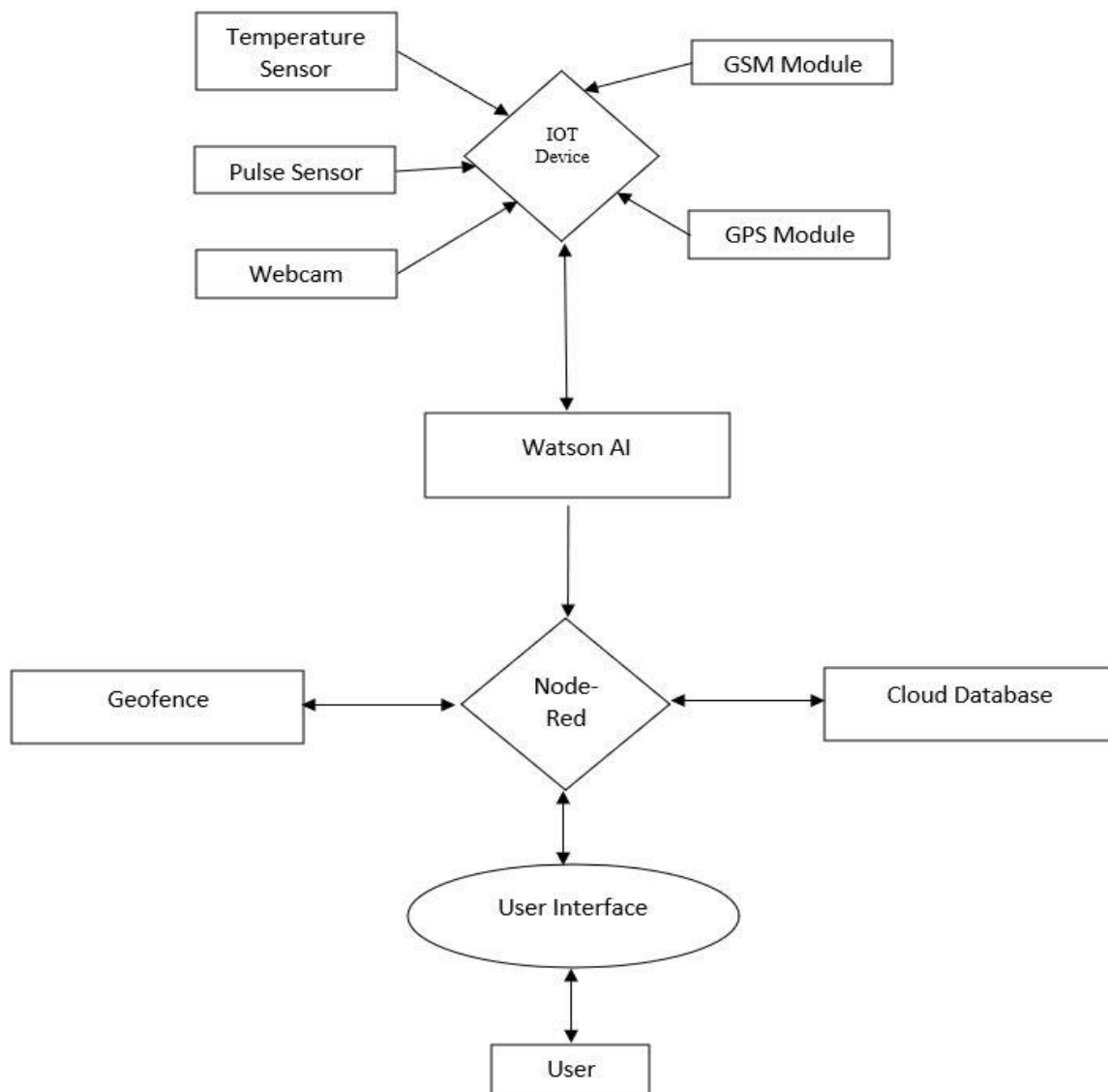
5.2 Solution & Technical Architecture

Technical Architecture:

Example - Solution Architecture Diagram:
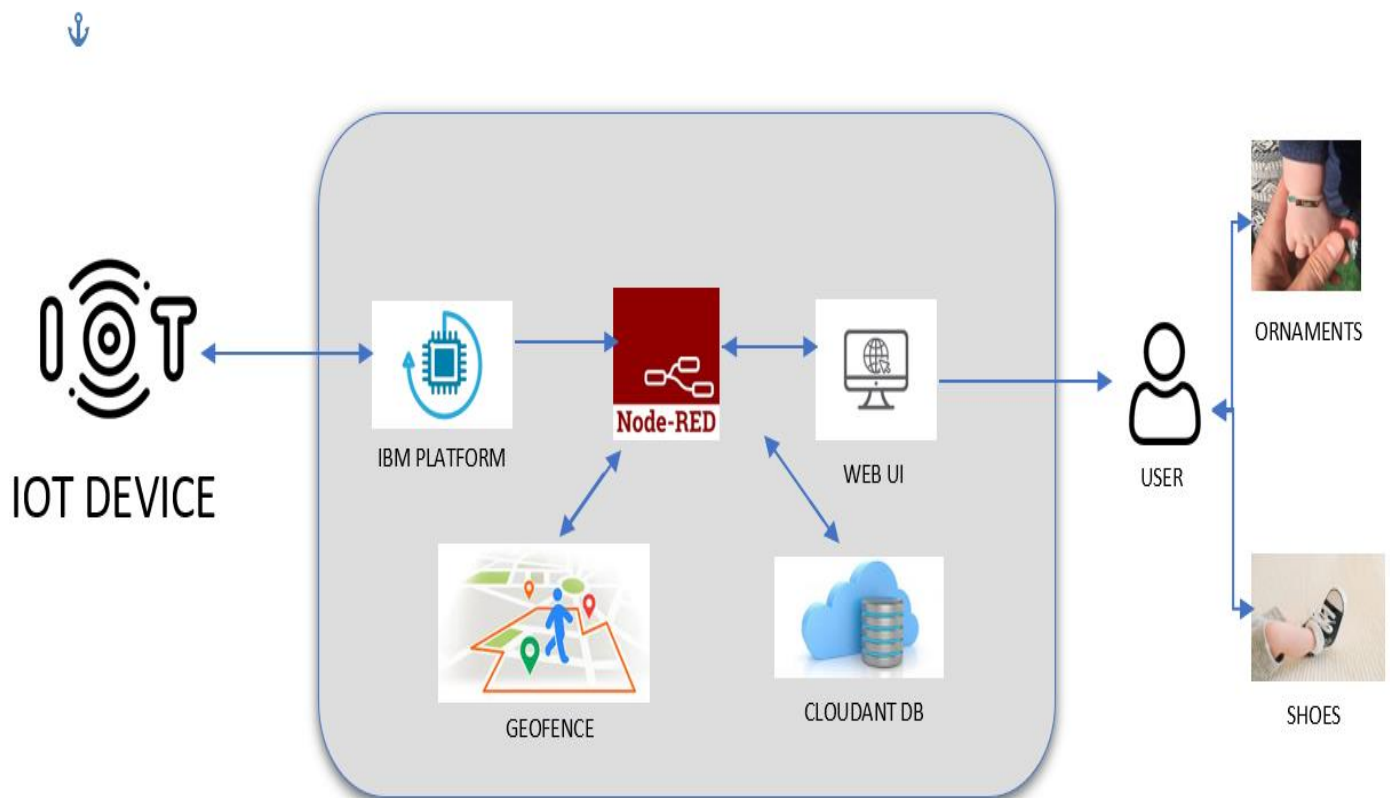
5.3 User Stories

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)	➤ The rate of child kidnapping was increasing ➤ Lack of tracking technology for child. ➤ Limited application for child monitoring.
2.	Idea / Solution description	1. Giving a toy to the child which contains GPS, mic, temperature sensor and pulse sensor to know the state of the child. 2. Create a Geofence around the Park, School and etc.,. to monitor the Child 3. Ornament which contains GPS to find the children's location.
3.	Novelty / Uniqueness	As the device looks like toy the children will keep it with them. So it is easy to track the child.
4.	Social Impact / Customer Satisfaction	➤ The customer will be satisfied by assuring the safety of the child using safety gadget. ➤ Prevent their child from abuse and critical issues.
5.	Business Model (Revenue Model)	➤ Service based product is developed to serve the parents to know the status of their children before they lost. ➤ This prevents child abuse and critical issues.
6.	Scalability of the Solution	1. We are developing the product for both web and mobile application. It is portable and data can be accessed from cloud at anytime. 2. It provides a real-time monitoring and a feasible solution for child safety and monitoring.

6. PROJECT PLANNING & 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 for the application by entering my email, password, and confirming my password.	2	High	Aravind, Sriragavi, Melsiya, Sneha
Sprint-1	User confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Aravind, Sriragavi, Melsiya, Sneha
Sprint-2	user login	USN-3	Create the IBM Watson, Node- Red, and Cloudant DB	1	high	Aravind, Sriragavi, Melsiya, Sneha
Sprint-1	App permission	USN-4	Grant the permission to access the app to check out the location of the children.	2	Medium	Aravind, Sriragavi, Melsiya, Sneha
Sprint-1	Interfacing	USN-5	Connecting the device with the registered Application.	1	High	Aravind, Sriragavi, Melsiya, Sneha
Sprint- 3	Setting Geofence	USN-6	Develop the web application using Node-RED	2	Medium	Aravind, Sriragavi, Melsiya, Sneha
Sprint 4	user notification	USN -7	To develop a module to notify the user in case of possible emergency	2	High	Aravind, Sriragavi, Melsiya, Sneha
Sprint 2	Tracking location	USN-8	Live location can be tracked using sensor	1	High	Aravind, Sriragavi, Melsiya, Sneha

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	01 Nov 2022	07 Nov2022	20	08 Nov 2022
Sprint-2	20	6 Days	09 Nov 2022	15 Nov 2022	20	15 Nov 2022
Sprint-3	20	6 Days	16 Nov 2022	22 Nov 2022	20	22 Nov 2022
Sprint-4	20	6 Days	23 Nov 2022	29 Nov 2022	20	25 Nov 2022

Velocity:

Average Velocity = 61/24 = 2.51

7. CODING & SOLUTIONING

7.1 Feature 1

Creating IBM Cloud Account
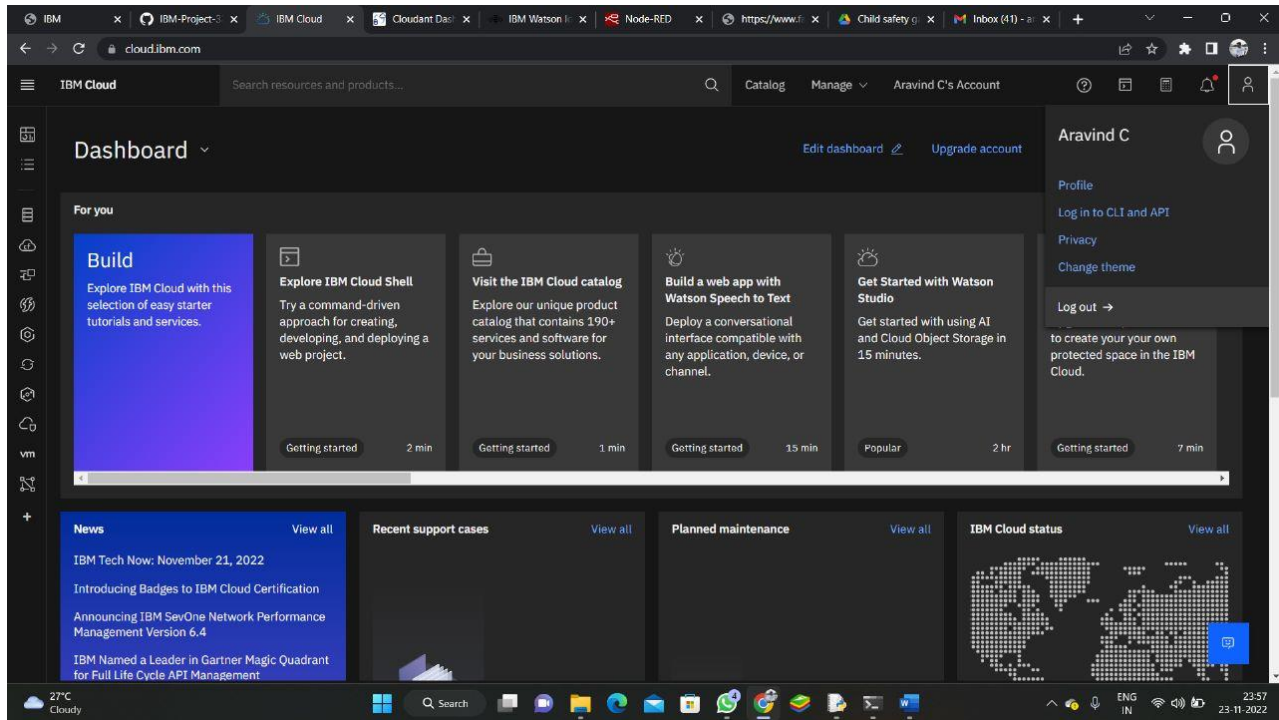
Connecting the Device in IOT Watson Platform

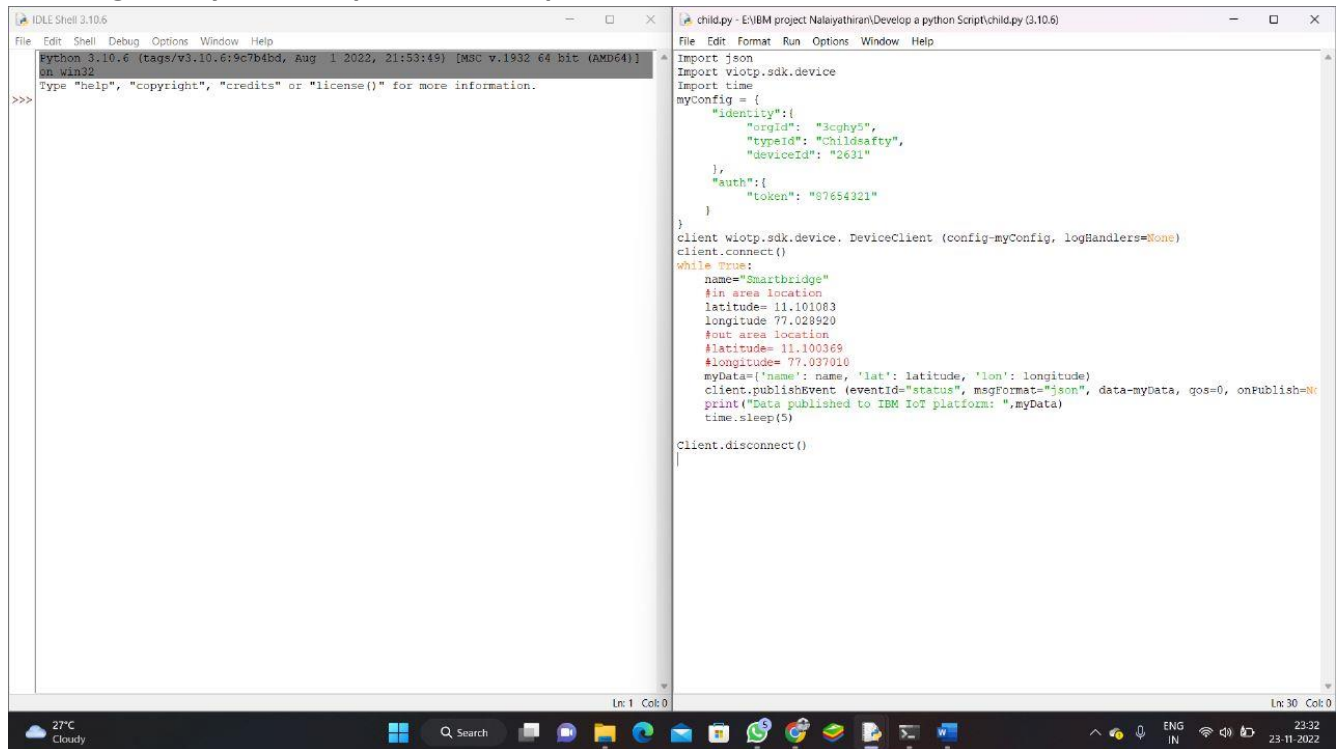## Developing Node Red flow and Connecting it to the IOT Device

Created the Geofence in Node Red
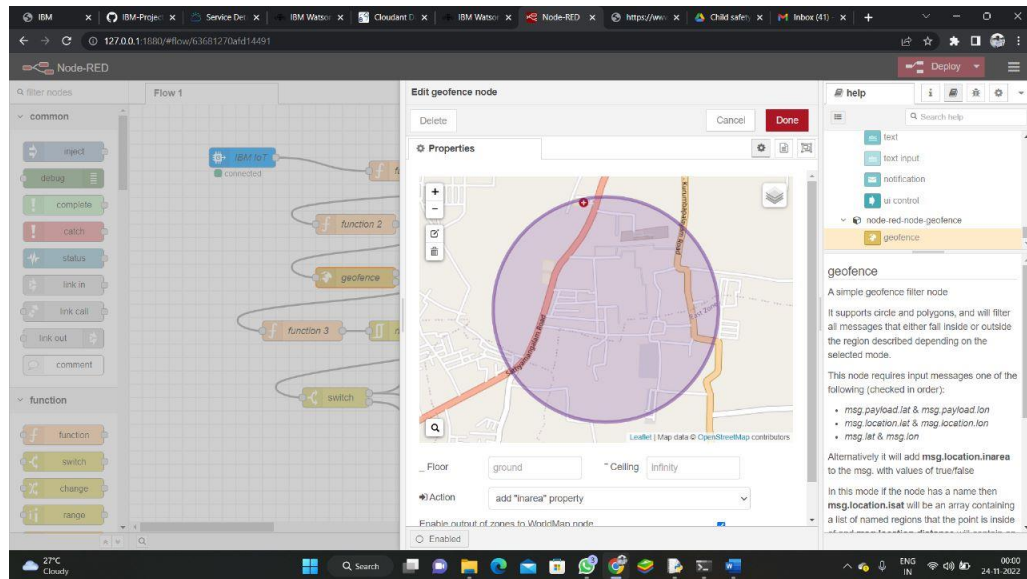
Code: Python, Node Red, JavaScript, IBM Cloudant

7.2 Feature 2

Added code to get child location in python using IDLE


```python
Import json
Import viotp.sdk.device
Import time
myConfig = {
    "identity":{
        "orgId":  "3cghy5",
        "typeId": "Childsafty",
        "deviceId": "2631"
    },
    "auth":{
        "token": "87654321"
    }
}
client wiotp.sdk.device. DeviceClient (config-myConfig, logHandlers=None)
client.connect()
while True:
    name="Smartbridge"
    #in area location
    latitude= 11.101083
    longitude 77.028920
    #out area location
    #latitude= 11.100369
    #longitude= 77.037010
    myData={'name': name, 'lat': latitude, 'lon': longitude)
    client.publishEvent (eventId="status", msgFormat="json", data-myData, qos=0, onPublish=None)
    print("Data published to IBM IoT platform: ",myData)
    time.sleep(5)

Client.disconnect()
```

Running the Python Script to send requests to IBM Watson

Information From Python Script is Received by IBM Watson(Recent Location)

Information Received by Node Red from Watson device

Located the Child in UI Dashboard
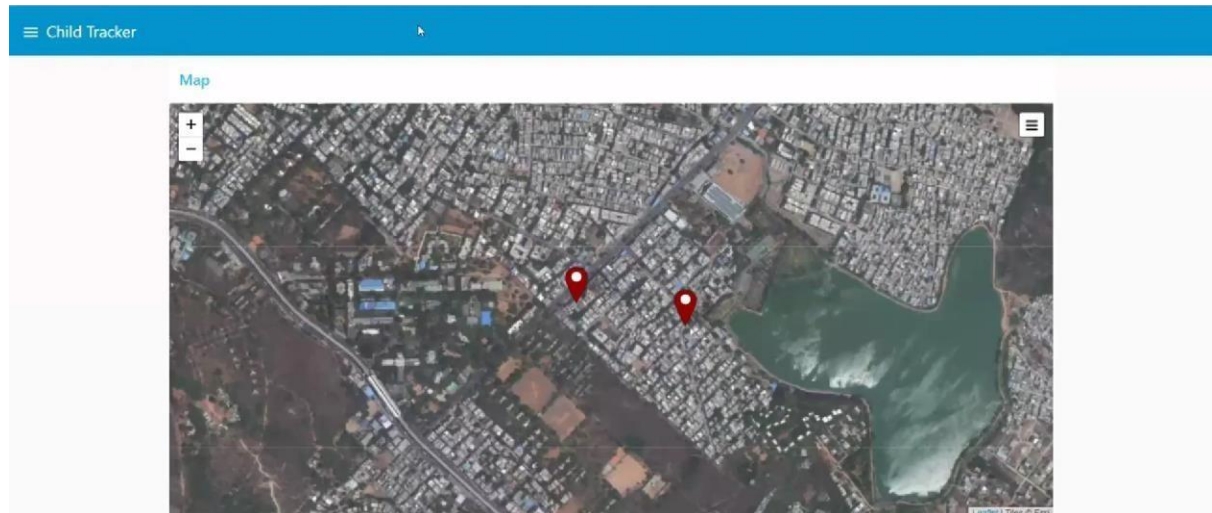
Code: Python

9. CONCLUSION

This Android Device has a superior mode for viewing and locating the children where about with correct latitude and longitude, which is especially useful when using Google maps. This could assist to reduce the number of attacks on children while also making them feel protected and secure. The major goal of this project is to create a device that protects youngsters from risky circumstances while also assisting them in combating them.

GitHub LINK:

https://github.com/IBM-EPBL/IBM-Project-32618-1660211041

Project Demo Link:

https://drive.google.com/file/d/1pv71tNbNmSi9zjpMXyuweBZziI3j-i-U/view?usp=share_link