Team ID	**PNT2022TMID07818**
Project Name	IOT Based Safety Gadget for Child Safety Monitoring and Notification
Team Lead	ARAVIND C
Team Member 1	SRIRAGAVI S
Team Member 2	MELSIYA S
Team Member 3	SNEHA R

1. INTRODUCTION

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.

a. 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.

1. Parents may always follow their children’s whereabouts with the aid of a child tracker.
2. They may easily set up a geo fence around the site and leave their kids in play areas or schools.
3. If the child crosses the geo-fence, alerts will be generated by continuously monitoring the child's position. Parents or caregivers will receive notifications based on the child's location.
4. The database will contain all the location information.
5. 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.
6. Enable notification transmission if the youngster is missing or if the device detects an unusual circumstance .

2. LITERATURE SURVEY

a. 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 WiFi module that transmits all the tracked parameters to the cloud for parental phone android app monitoring.

References

i. Mahajabeen Budebhai, "IOT based child and women protection", *International Journal of computer science and mobile Computing*, no. 7, pp. 141-146, August 2018.

ii. 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.

iii. Cassandra Dsouza, Dhanashree Rane, Anjanette Raj, Supriya Murkar and Namita Agarwal, "Design of Child Security Method", *International conference for convergence in technology*, 2018.

Moodbidri, A., Shahnasser, H.: Child safety wearable device.In: 2017 International Conference on Information Networking (ICOIN), pp. 438–444.IEEE (2017)

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-June2016.

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.

. Huang, Z., Gao, Z., Lu, H., Zhang, J., Feng, Z., Xia, H.: An mobile safety monitoring system for children. In: 10th International Conference on MobileAd-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.

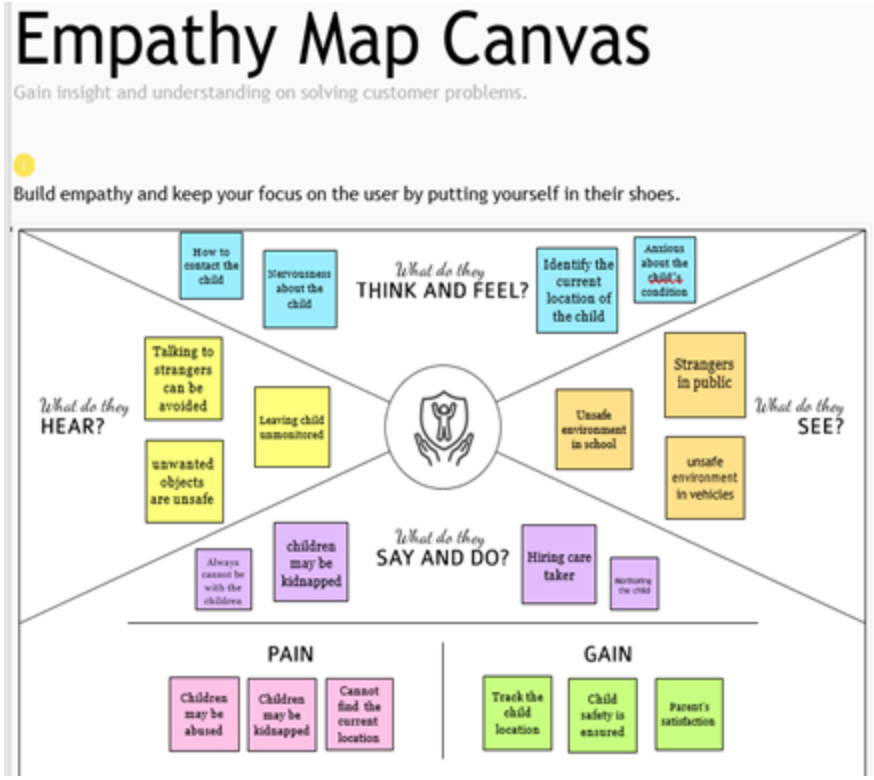
The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize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

Customer Problem Statement Template:

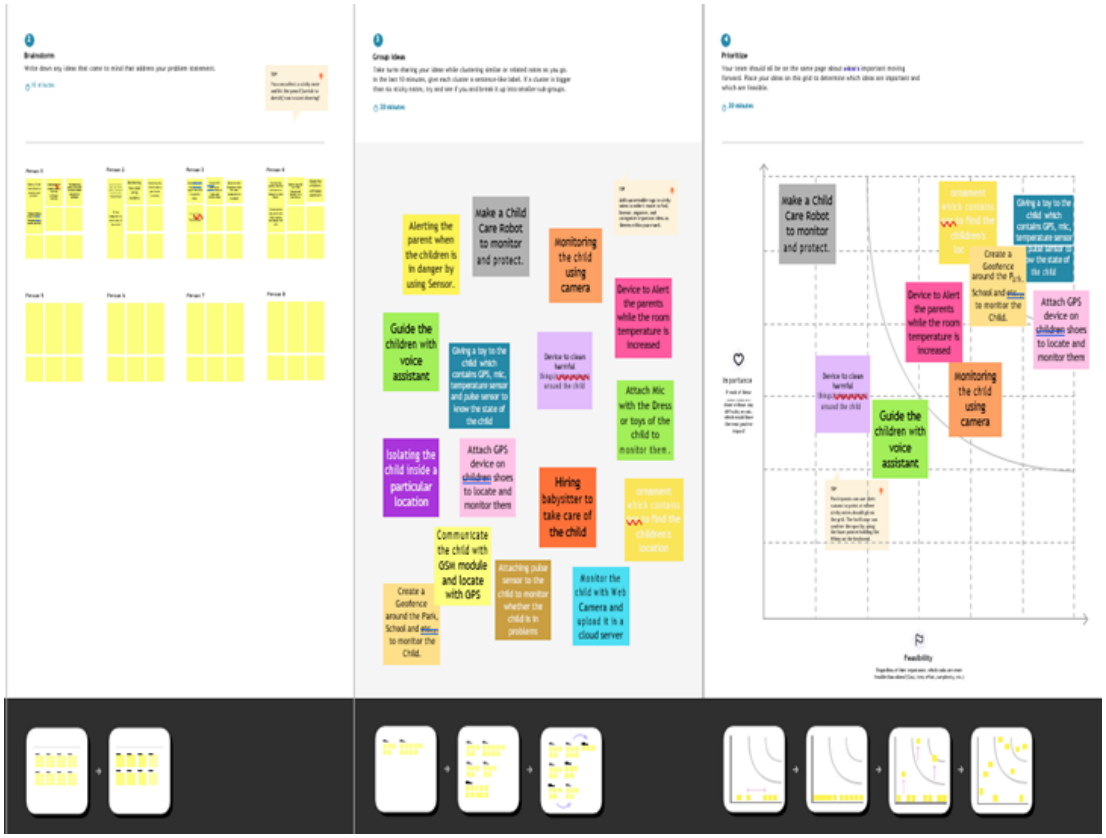
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Parent	To detect child location	lack of information n about child location	Because the location of the child is not exactly known by the parent	Frightening, scary, fearful, uneasy, worry, terrifying, unpleasant,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

3 IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

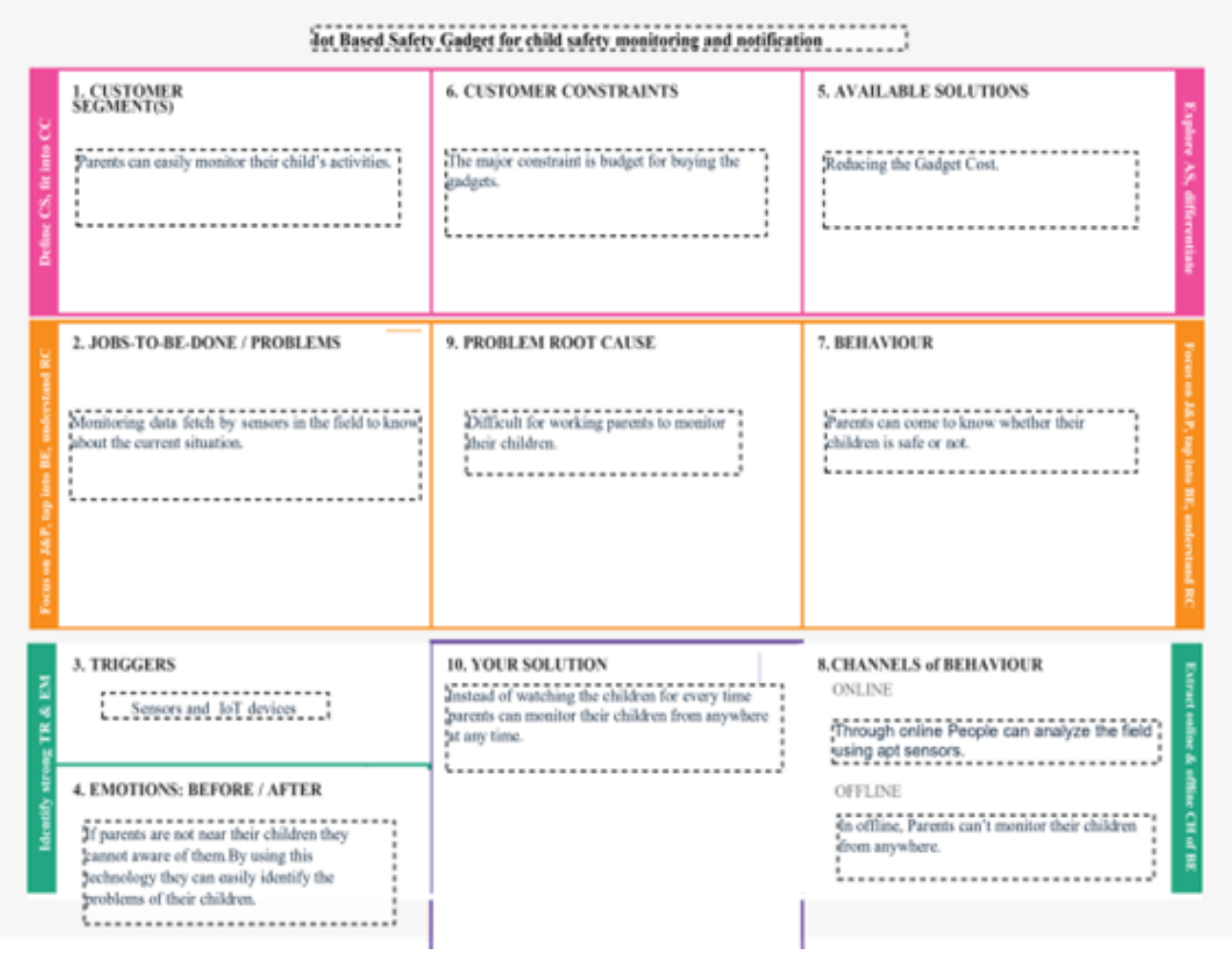


3.2 Proposed Solution

Proposed Solution Template:

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

3.2 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

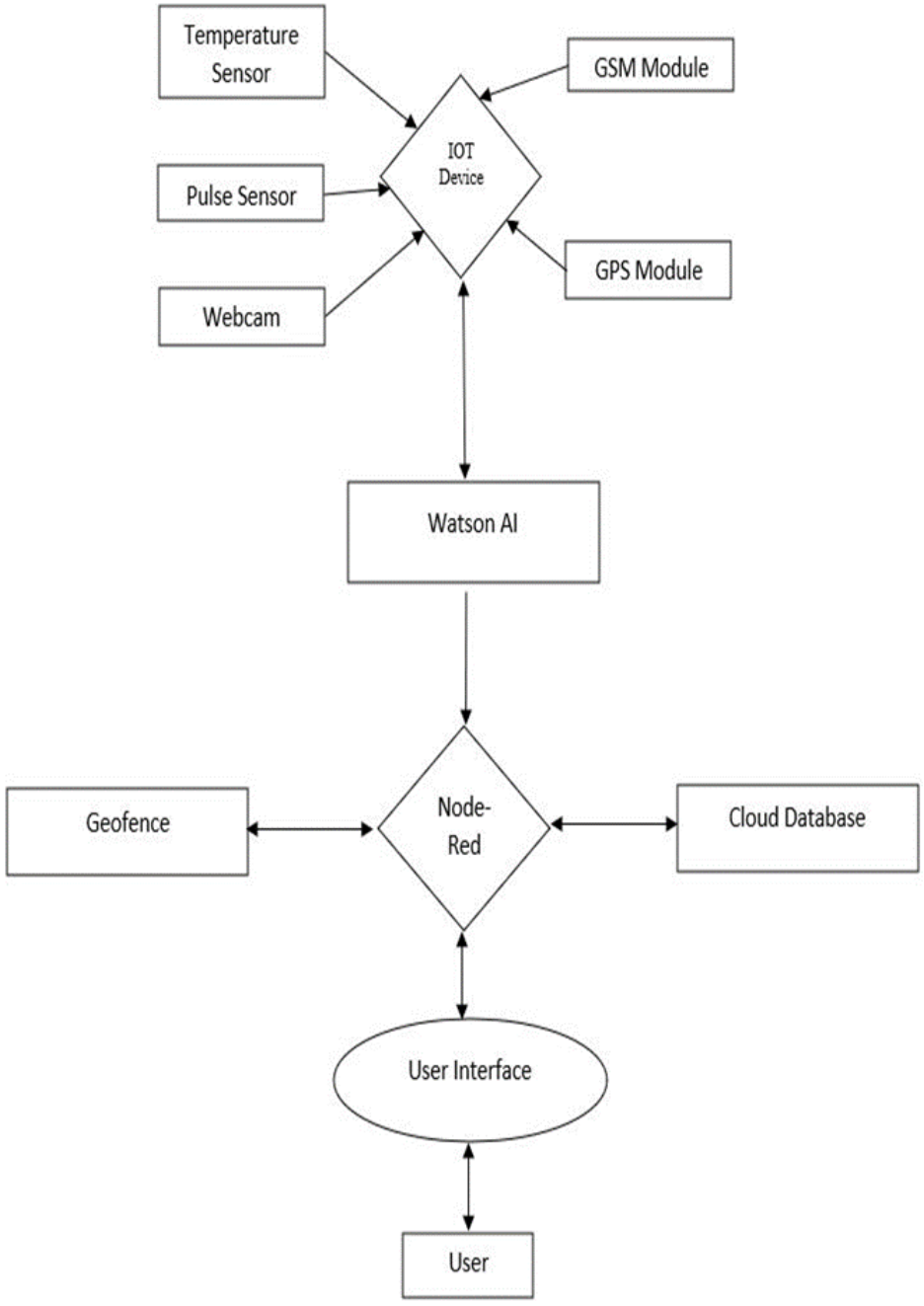
4.2 Non-functional Requirements:

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

FR NO.	NON-FUNCTIONAL REQUIREMENT	DESCRIPTION
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

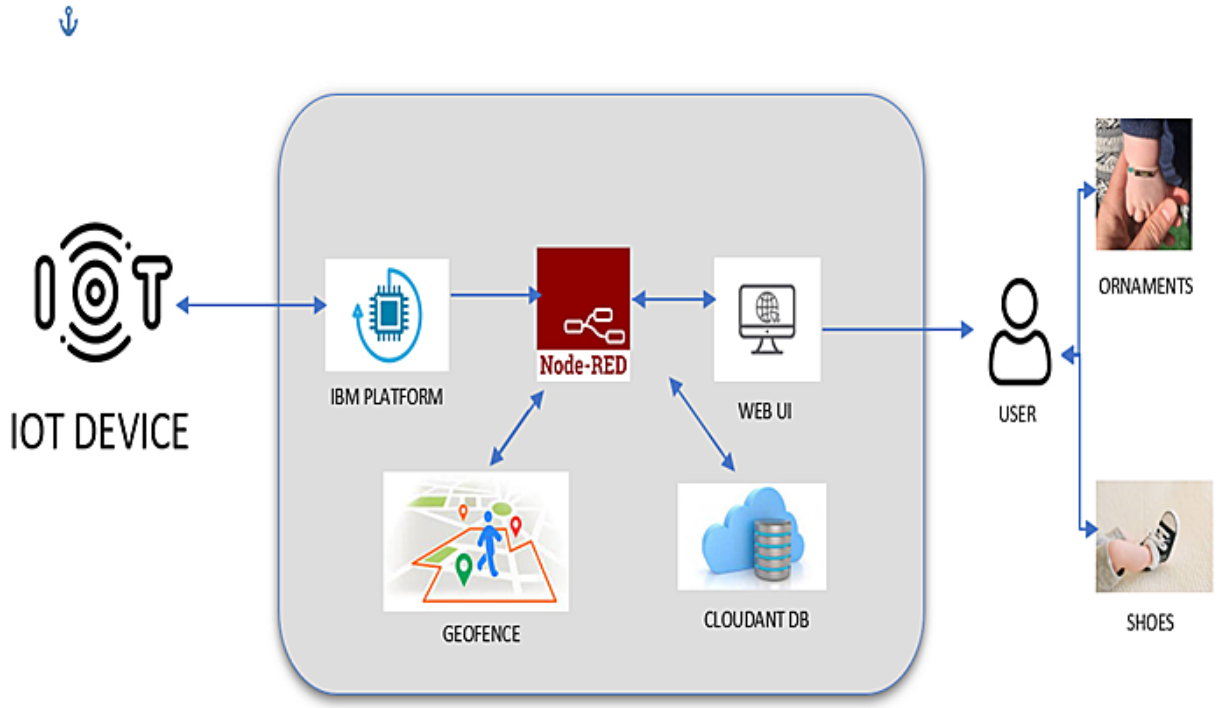
5.1 Data Flow Diagrams



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.

Proposed Solution Template:

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

S.No.	Parameter	Description
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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.
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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- 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

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Sprint 2	Tracking location	USN-8	Live location can be tracked using sensor	1	High	Aravind, Sriragavi, Melsiya, Sneha

6.2 Sprint Delivery Schedule

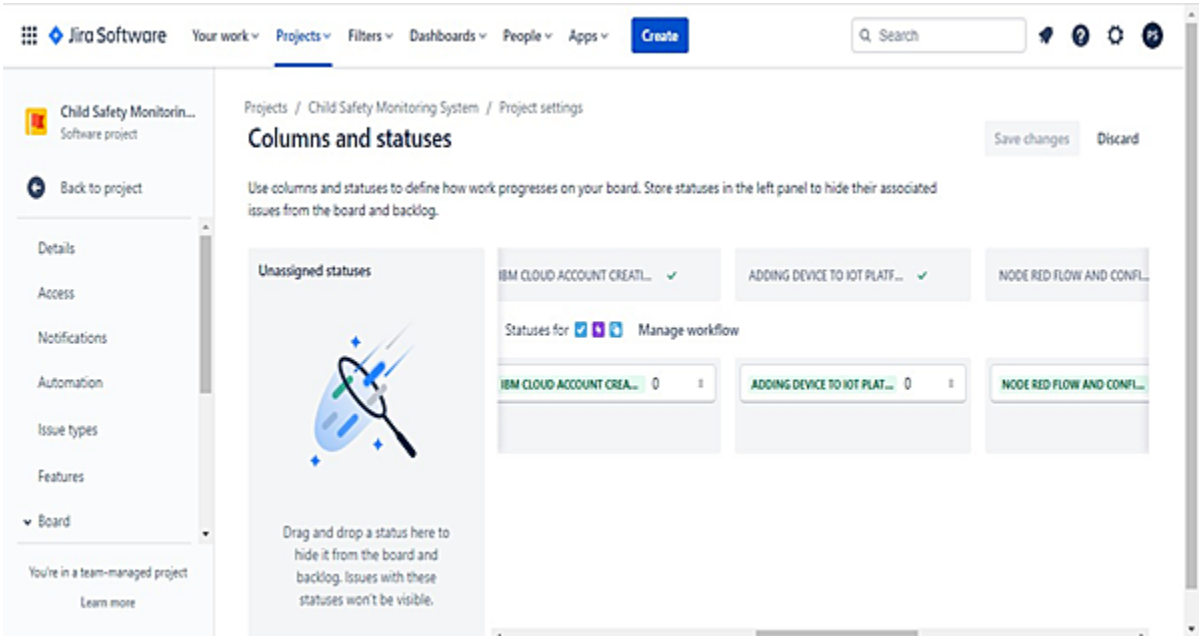
Project Tracker, Velocity & Burndown Chart: (4 Marks)

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

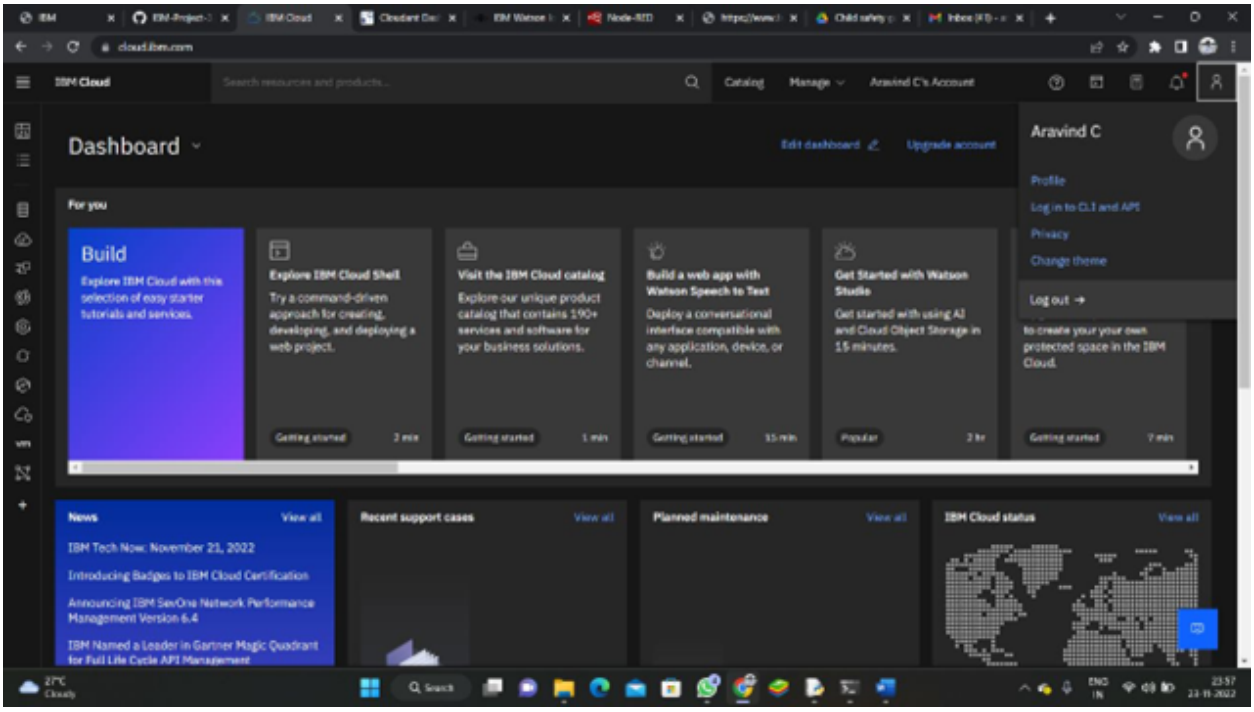
6.3 Reports from Jira



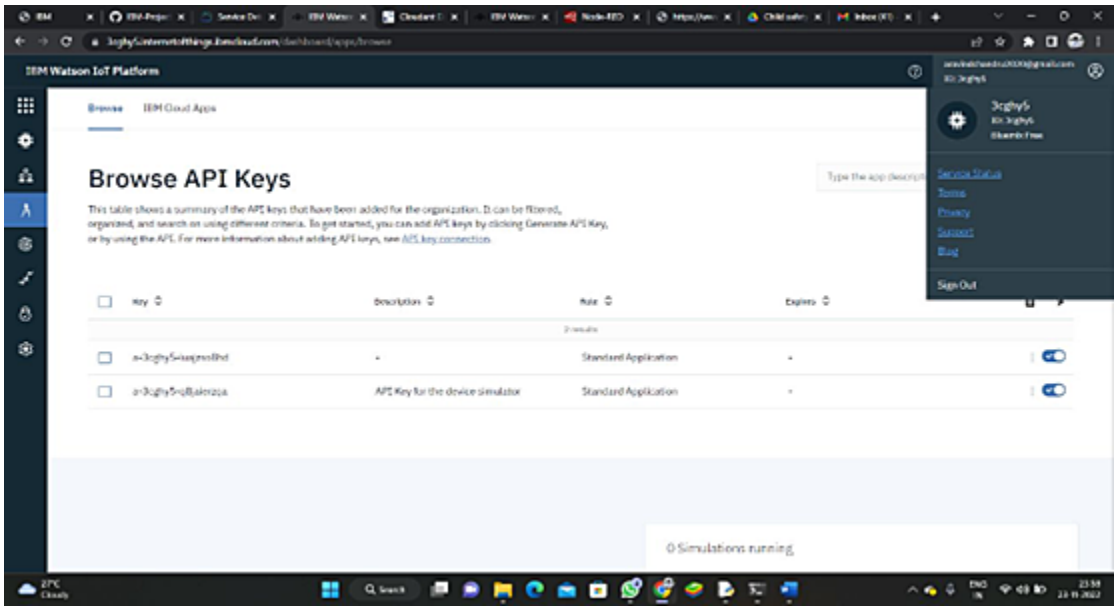
7. CODING & SOLUTIONING

7.1 Feature 1

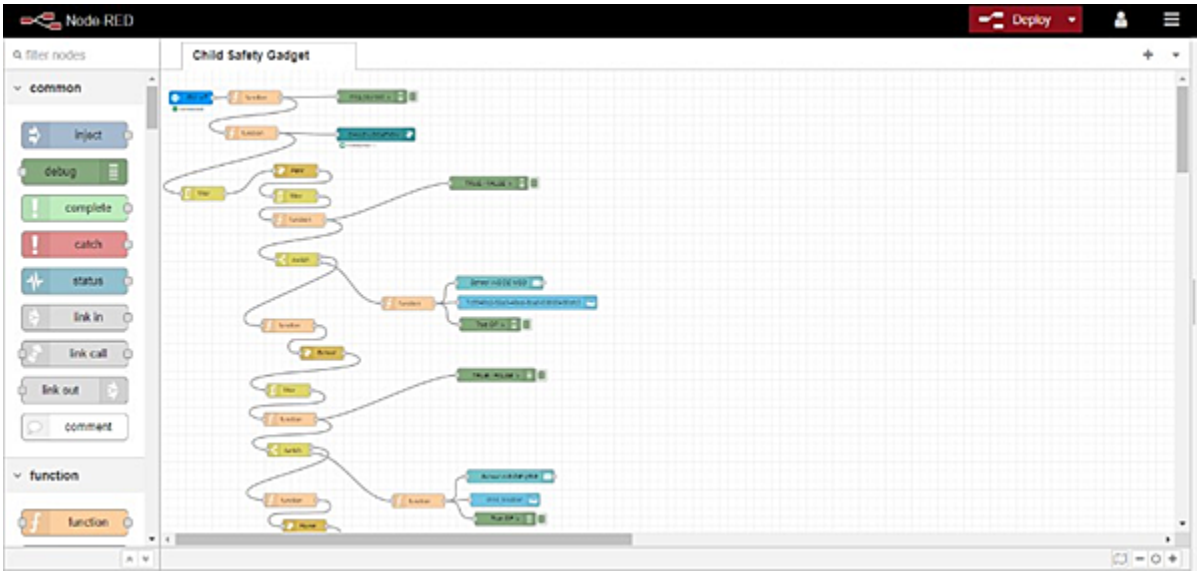
Creating IBM Cloud Account

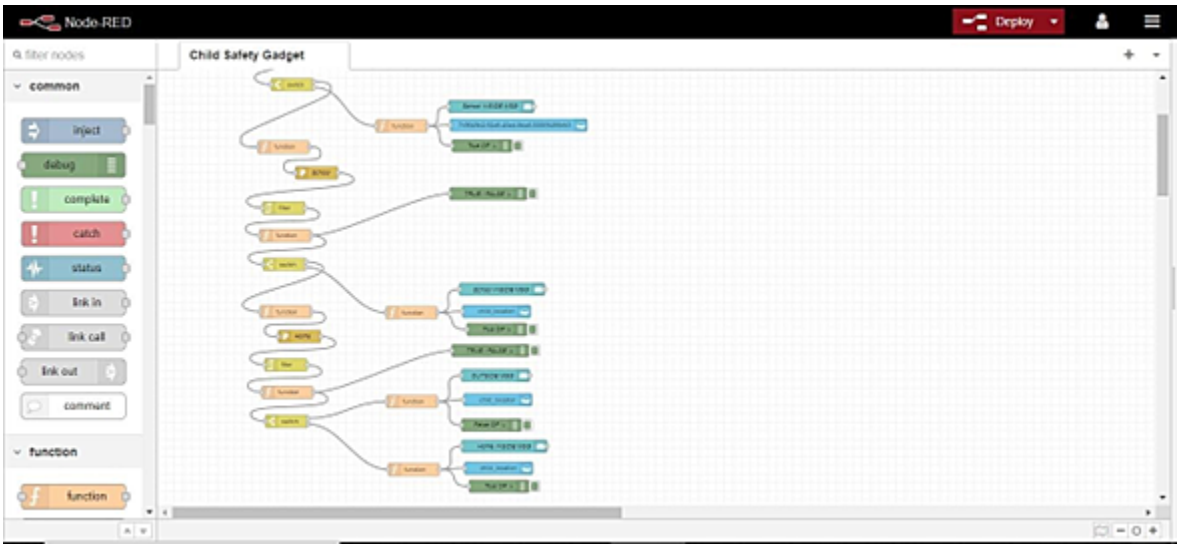


Connecting the Device in IOT Watson Platform

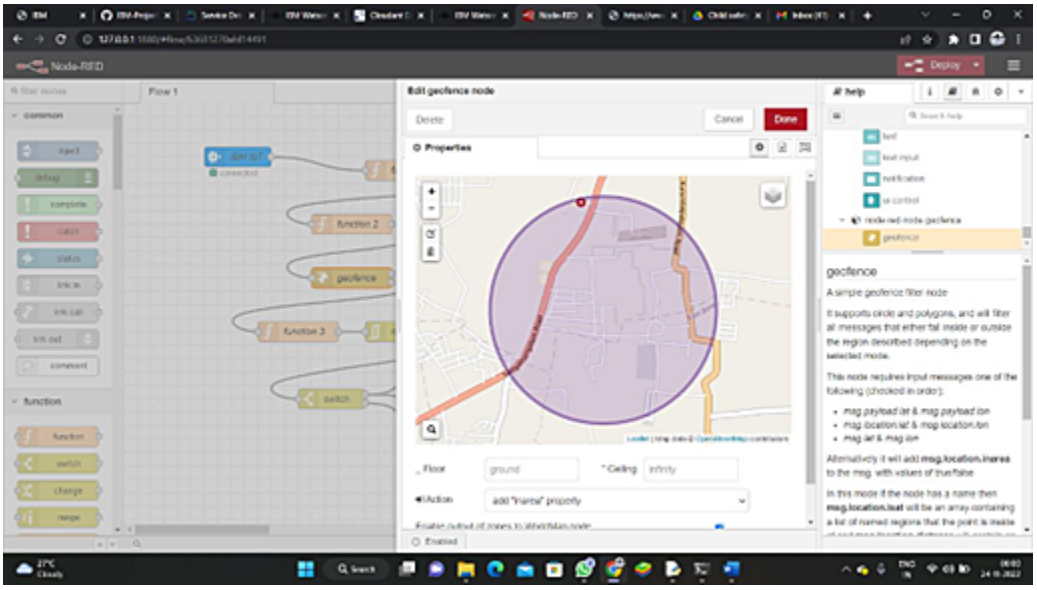


Developing Node Red flow and Connecting it to the IOT Device





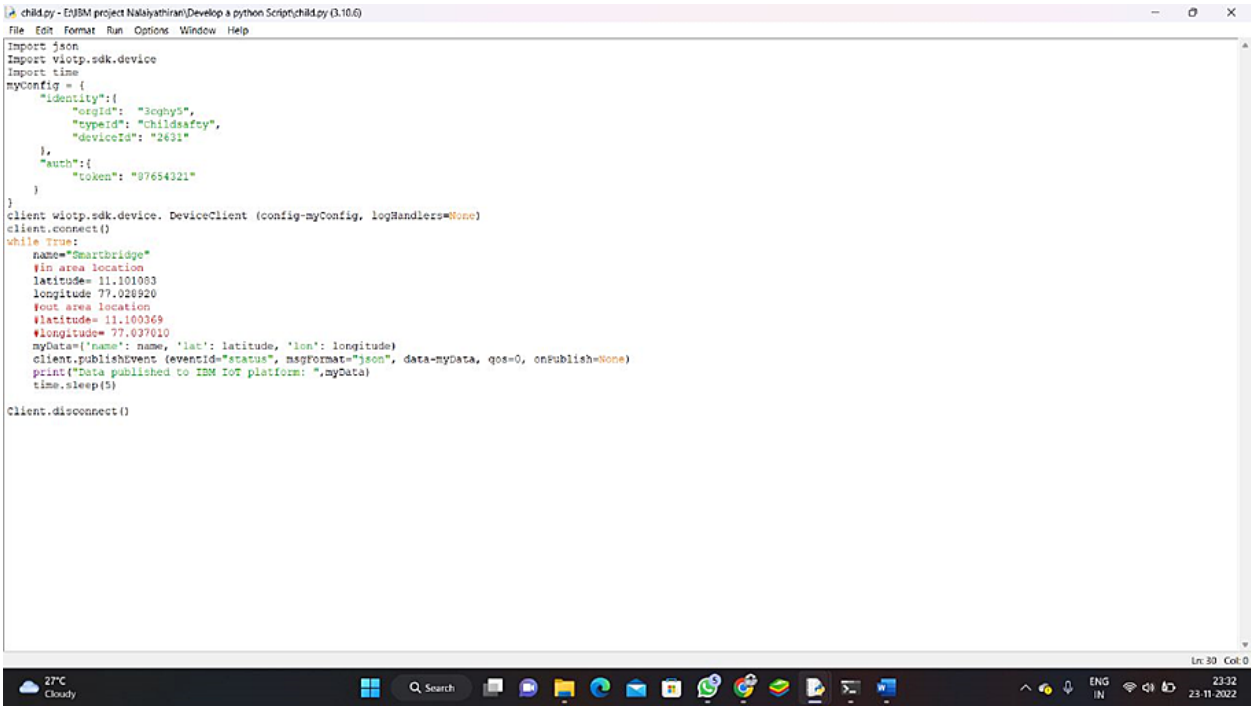
Created the Geofence in Node Red



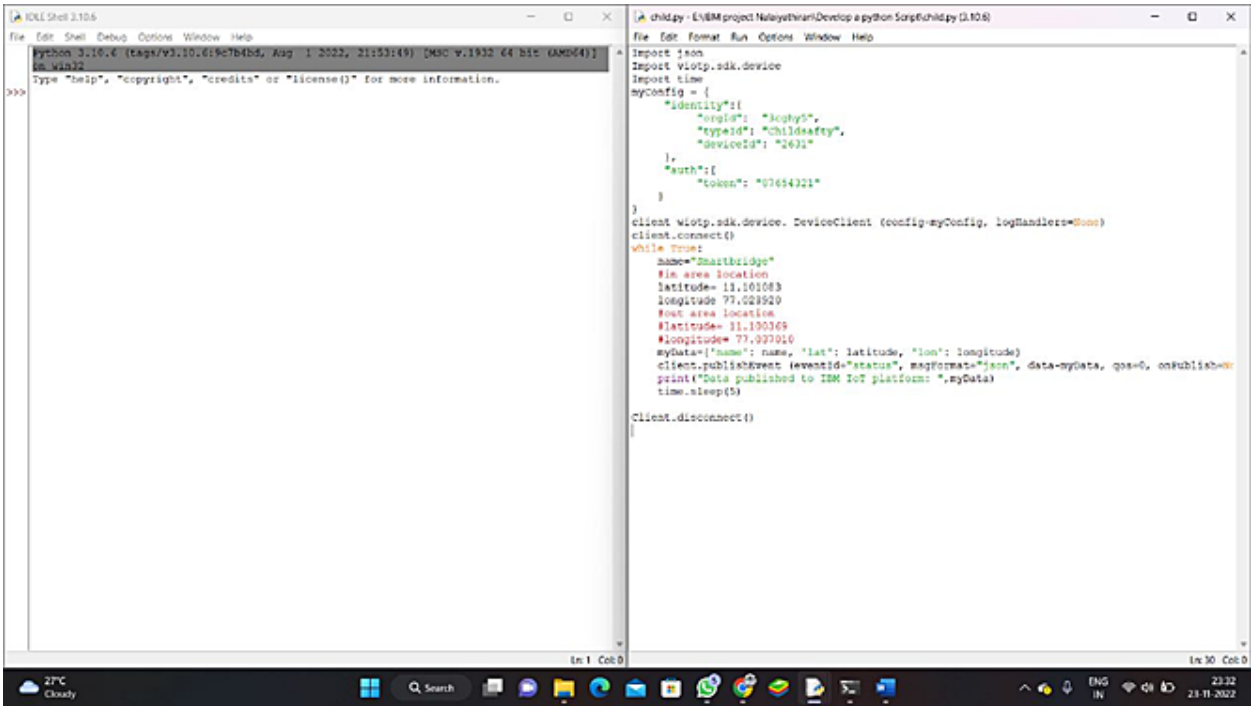
Code: [Python, Node Red, JavaScript, IBM Cloudant]

7.2 Feature 2

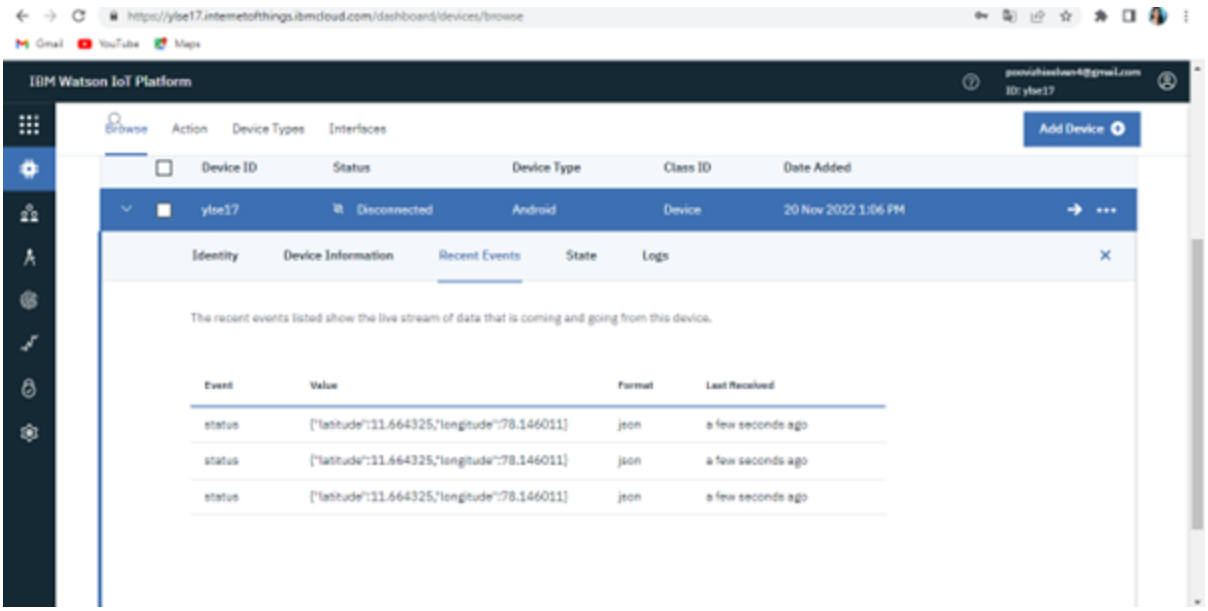
Added code to get child location in python using IDLE



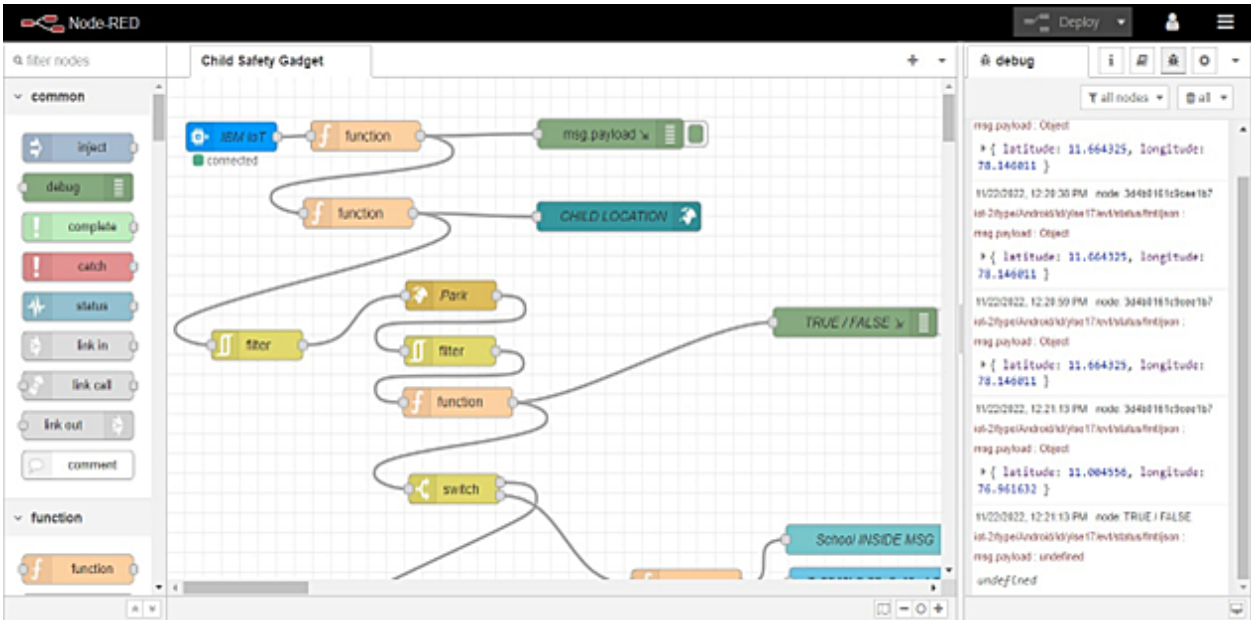
Running the Python Script to send requests to IBM Watson



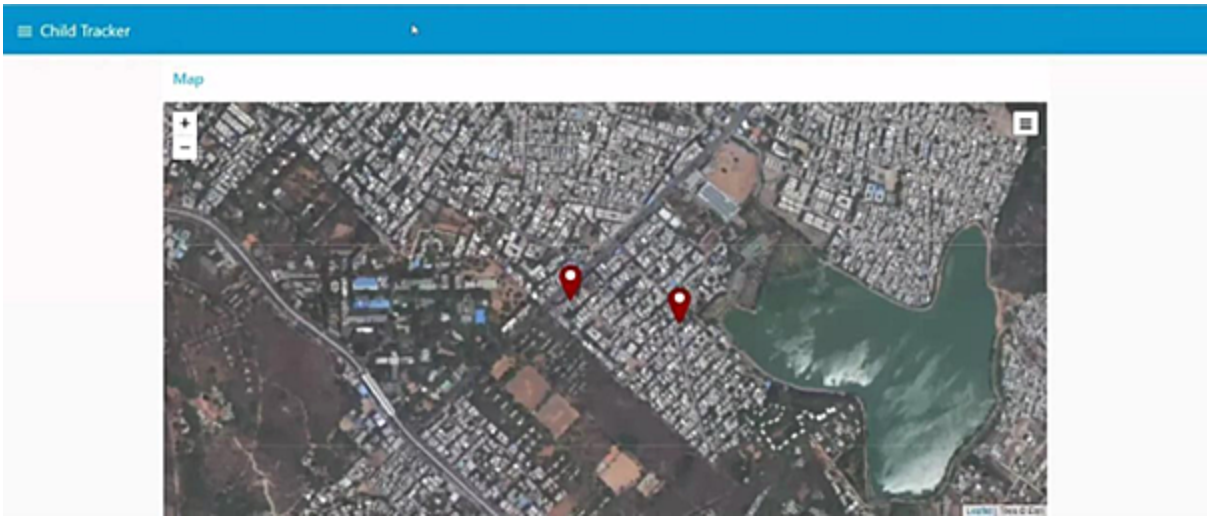
Information From Python Script is Received by IBM Watson(Recent Location)



Information Received by Node Red from Watson device



Located the Child in UI Dashboard



Code: HTML, CSS, Python, JavaScript

8 . ADVANTAGES & DISADVANTAGES

Advantages:

1. A Child's GPS Tracker reports any potential dangers and protects them in the process.
2. It acts as a communication tool for parentsand can be helpfuleven when traveling.
3. Usually, children tend to wander a lot. With the help of GPS Tracking devices, you can easily and quickly know where your children are.
4. Parents will get all the details like their kid boarding/de- boarding school bus. Also, they can get emergency alerts when the childfails to board or de-boardat the other stop.
5. Prevent abductionand let your children play and walk around safely. Our Personal GPS trackers for kids are great options for parentsfor monitoring theirchildren 24/7.

Disadvantages:

1. Young children may refuse to cooperate unless allowed toplay with their gadgets.

2. Excess use of electronic gadgets can lead to childrenspending less time outdoors and limiting their social interaction.

3. It may lead to poor concentration in studies and lack of interest in day to-dayactivities.

4. Excessive gadgets use can lead to poor health, a sedentary lifestyle, and bad eating habits.

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 usingGoogle maps. This could assistto reduce the number of attacks on children while also making them feel protected and secure. The major goal of this projectis to create a devicethat protects youngsters from risky circumstances while also assisting them in combatingthem.

10.FUTURE SCOPE

A camera module for surveillance of the child's surrounds can be added to improve the system's performance. It's also possible to do it with a Raspberry Pi and Lily pad. It is possible to develop a more energy-efficient type that can keepthe battery for a longer period.

This system can be further enhanced by installation of mini camera inside smart gadget for better security so that live footage can be seen on parental phone during panic situations. The system can be modifiedby installation of small solarpanels for chargingthe battery of smart gadget to gain maximum battery backup.

For surveillance of the child's surroundings, to get a clearer picture of the location, this wearable can also contain a camera module incorporated in it. The camera will be collecting information in the same manner as the GPS module. It will be on standby conserving power waiting for the particular keyword "SNAPSHOT" to be sent from the user'ssmart phone to the GSM shield will activate the camera to start clickinga snapshot of the surrounding and save the file temporarily on the external micro-SD card. After which Arduino UNO will access the saved image from the micro SD storage and transfer it to the GSM modulewhich send it to the user via SMS/MMS text.

11. APPENDIX

Source Code:

Python Script

```
import json
import collections
im;ort wiotp,sdk,device
import time
myConfig={
"identity":
        {
            "orgId" :"ylse17",
            "typeId"
            :
            "Androi
            d",
            "deviceI
            d"          :
            "ylse17"
        },
        "auth":{
            "token":"WORLDSpretty@1811"
            }
        }

        client      =      wiotp.sdk.device.DeviceClient(config=myConfig      ,logHandlers=None)
        client.connect()
        while True:
            name = "salem"
            #child  is
            in
            safe(Sale
            m)
            #latitude
            =
            11.6643
            25
            #ongitude = 78.146011

            #child   is   in   playing
            area(Coimbatore)  latitude
            = 11.004556
            longitude = 76.961632

            #child     in
```

```
    school(Che
    nnai)
    #latitude   =
    13.067439
    #ongitude = 80.237617



    myData = {'latitude' :latitude, 'longitude':longitude}

client.publishEvent(eventId="status",msgFormat="json",data=myData,qos=0,onPublish=N
on e)
    print("Data  published  to  IBM  IoT  platform  :  ",myData)
    time.sleep(20)
client.disconnect()
```

GitHub LINK:

https://github.com/IBM-EPBL/IBM-Project-24506-1659943952

Project Demo Link:

https://drive.google.com/file/d/1Cu_1vEFex7RDiLir-bbErjD1Tw6sPSKt/view?usp=share_link