

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 Technology(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-June 2016.
- 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 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.

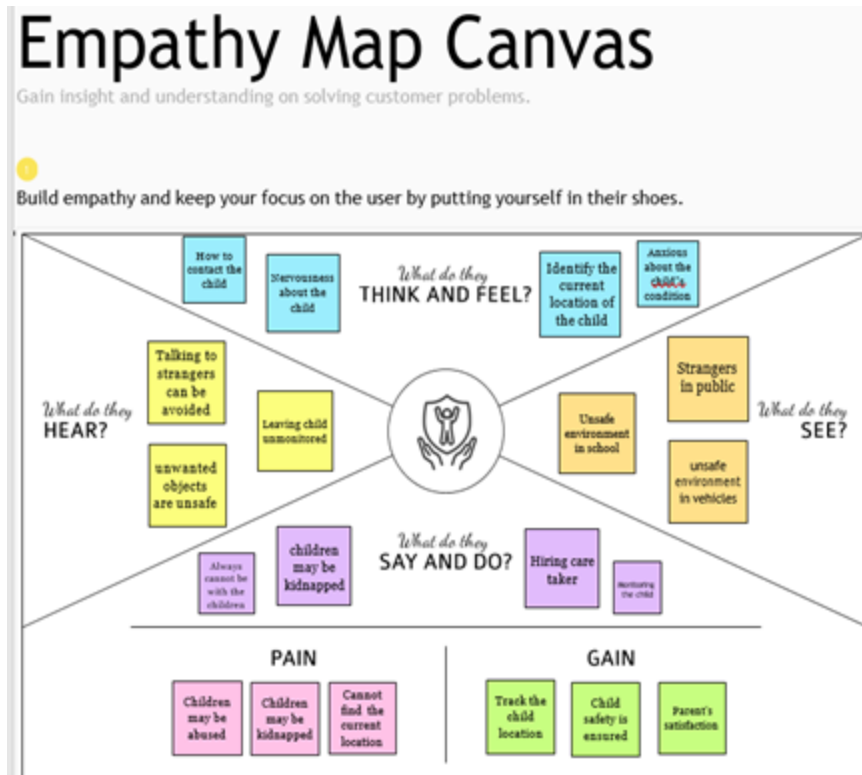
The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize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

1 Brainstorm

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

15 minutes

SP: The problem is to create a system to monitor a child's location and safety. The system should be able to track the child's location and provide alerts if the child is in danger.

2 Group Ideas

Take turns sharing your ideas while clustering similar or related ideas as you go. In the last 10 minutes, give each cluster a name and label. It's okay to have more than one idea, try and see if you can break it up into smaller sub-groups.

10 minutes

3 Prioritize

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

15 minutes

Phase 1: Initial Ideas

Phase 2: Grouping Ideas

Phase 3: Naming Clusters

Phase 4: Refining Ideas

Phase 5: Final Selection

Phase 6: Presentation Prep

Phase 7: Presentation

Phase 8: Feedback

Phase 9: Reflection

Phase 10: Conclusion

Alerting the parent when the children is in danger by using Sensor.

Make a Child Care Robot to monitor and protect.

Monitoring the child using camera.

Device to Alert the parents while the room temperature is increased.

Guide the children with voice assistant.

Giving a toy to the child which contains GPS, etc. temperature sensor and pulse sensor to know the state of the child.

Device to clean harmful things around the child.

Attach AIC with the Dress or toys of the child to monitor them.

Isolating the child inside a particular location.

Attach GPS device on children shoes to locate and monitor them.

Hiring babysitter to take care of the child.

Ornament which's location is to find the children's location.

Communicate the child with GSM module and locate with GPS.

Attaching pulse sensor to the child to monitor whether the child is in problems.

Monitor the child with Web Camera and upload it to a cloud server.

Create a Geofence around the Park, School and other to monitor the child.

Importance

Feasibility

Make a Child Care Robot to monitor and protect.

Monitoring the child using camera.

Device to Alert the parents while the room temperature is increased.

Guide the children with voice assistant.

Attach GPS device on children shoes to locate and monitor them.

Attach AIC with the Dress or toys of the child to monitor them.

Give a toy to the child which contains GPS, etc. temperature sensor and pulse sensor to know the state of the child.

Device to clean harmful things around the child.

Ornament which's location is to find the children's location.

Communicate the child with GSM module and locate with GPS.

Attaching pulse sensor to the child to monitor whether the child is in problems.

Monitor the child with Web Camera and upload it to a cloud server.

Create a Geofence around the Park, School and other to monitor the child.

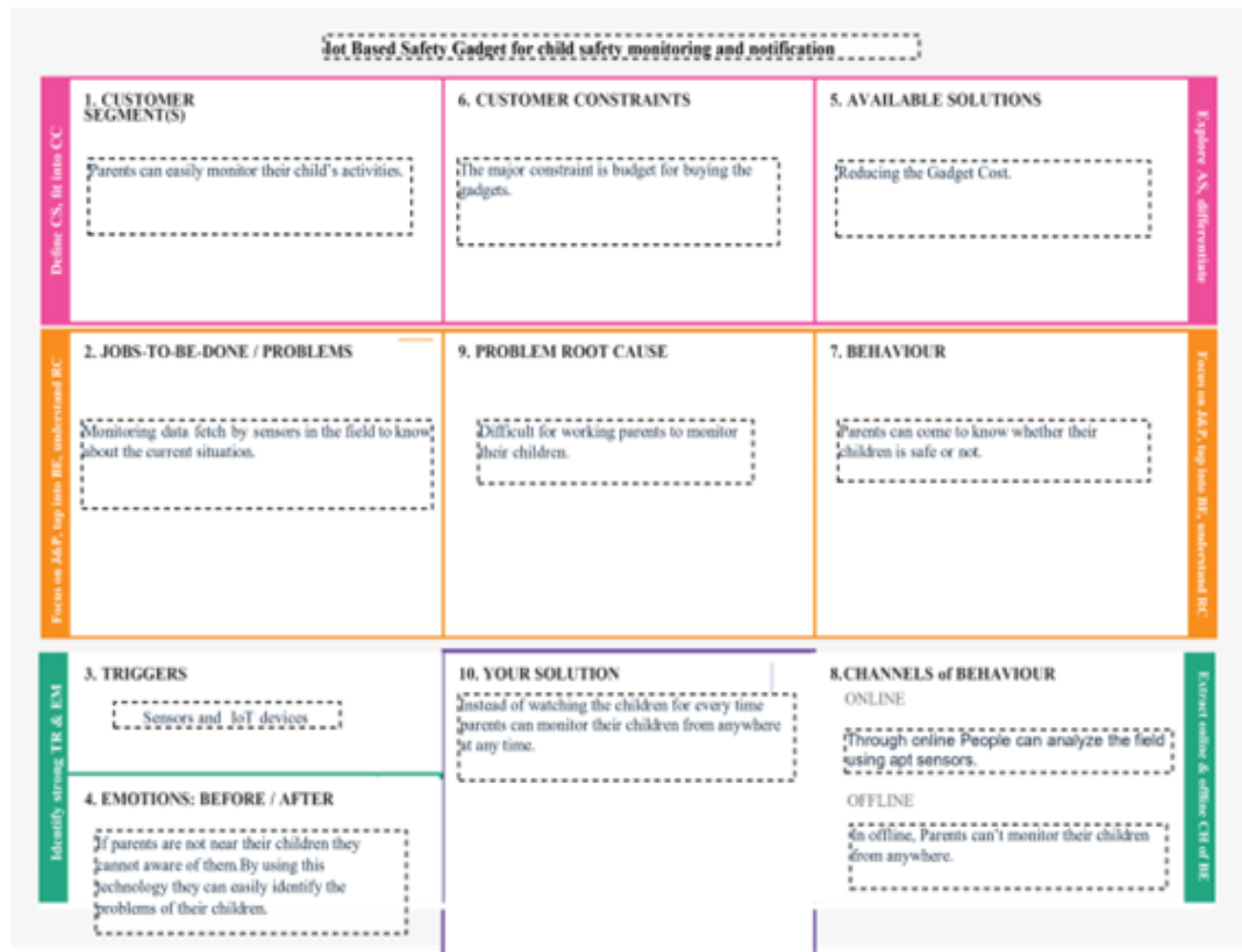


3.2 Proposed Solution

Proposed Solution Template:

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Prepare a device which is used to track 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 child and also parents can make a geofence to protect their child
3.	Novelty / Uniqueness	Geofence - Parent can create a geofence specified time like scheduling activities that they can accurately monitor their children
4.	Social Impact / Customer Satisfaction	It is very compact and with good quality 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.

3.2 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

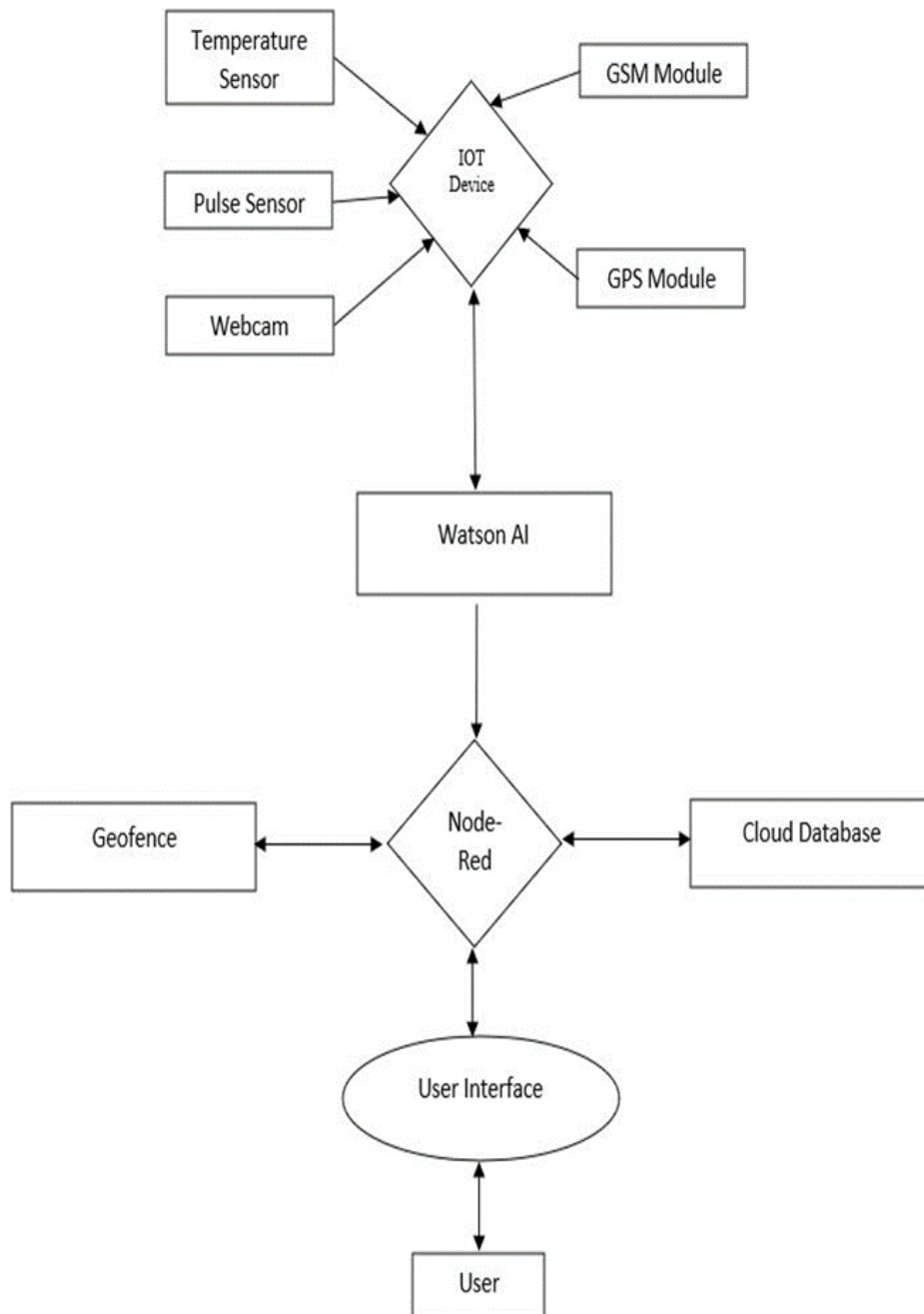
4.2 Non-functional Requirements:

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

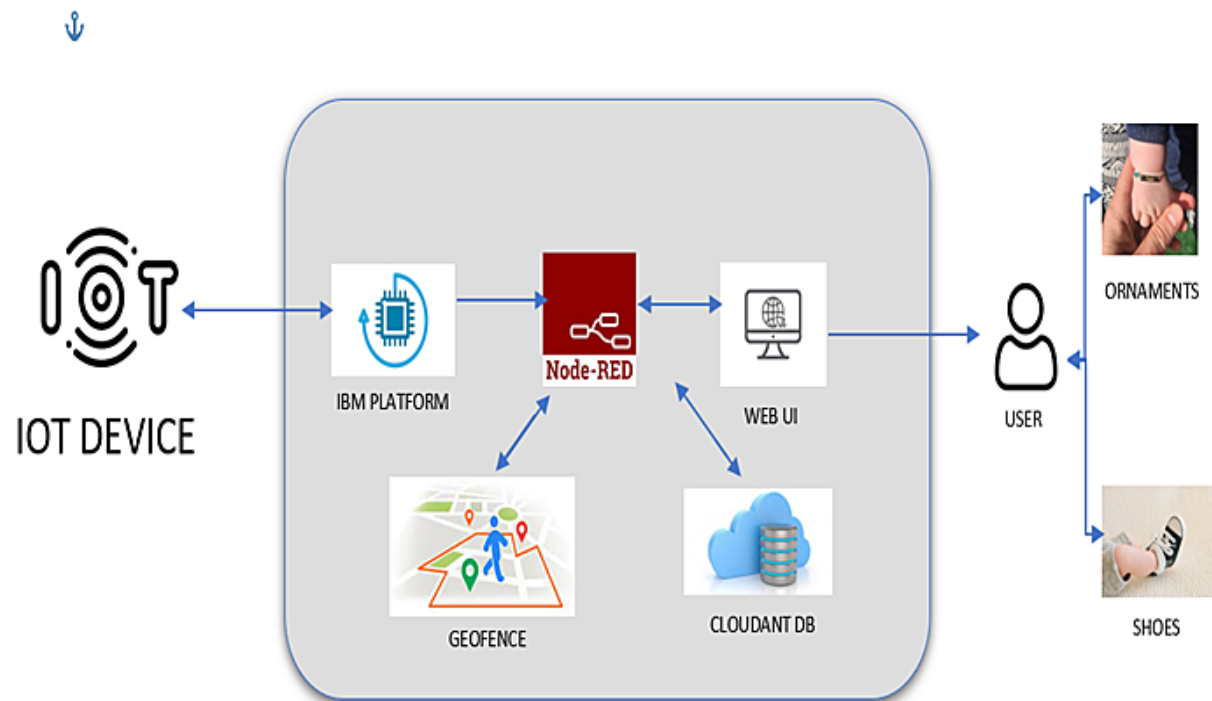
5.1 Data Flow Diagrams



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)	<ul style="list-style-type: none">➤ The rate of child kidnapping was increasing➤ Lack of tracking technology for child.➤ Limited application for child monitoring.
2.	Idea / Solution description	<ol style="list-style-type: none">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 Child3. 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	<ul style="list-style-type: none">➤ 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)	<ul style="list-style-type: none">➤ 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	<ol style="list-style-type: none">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
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none">➤ The rate of child kidnapping was increasing➤ Lack of tracking technology for child.➤ Limited application for child monitoring.
2.	Idea / Solution description	<ol style="list-style-type: none">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 Child3. 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	<ul style="list-style-type: none">➤ 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)	<ul style="list-style-type: none">➤ 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	<ol style="list-style-type: none">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 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 Nov 2022	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	<u>22 Nov 2022</u>
Sprint-4	20	6 Days	23 Nov 2022	29 Nov 2022	20	<u>25 Nov 2022</u>

Velocity:

Average Velocity = $61/24 = 2.51$

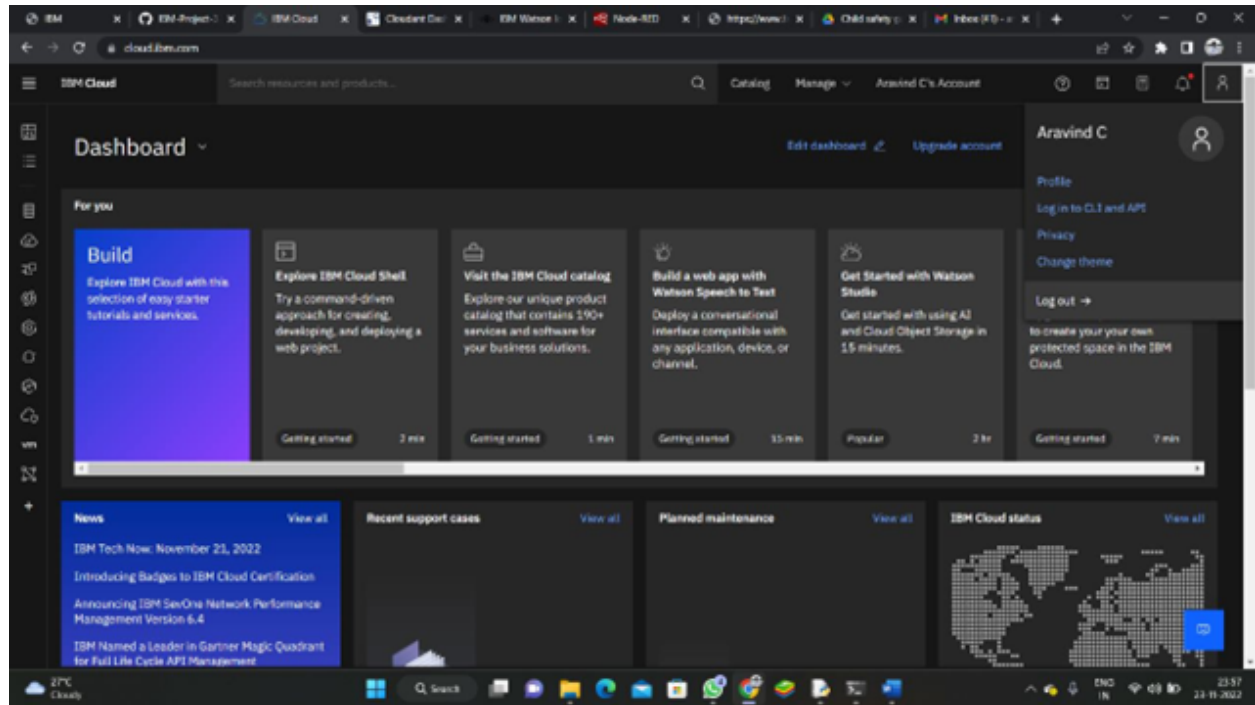
6.3 Reports from Jira

The screenshot displays the Jira Software interface. The top navigation bar includes 'Jira Software', 'Your work', 'Projects', 'Filters', 'Dashboards', 'People', 'Apps', and a 'Create' button. A search bar is located on the right. The left sidebar shows a navigation menu with options: 'Child Safety Monitorin...', 'Back to project', 'Details', 'Access', 'Notifications', 'Automation', 'Issue types', 'Features', and 'Board'. The main content area is titled 'Columns and statuses' and includes a 'Save changes' button and a 'Discard' button. Below the title, there is a description: 'Use columns and statuses to define how work progresses on your board. Store statuses in the left panel to hide their associated issues from the board and backlog.' The interface shows a list of 'Unsigned statuses' with a magnifying glass icon and a note: 'Drag and drop a status here to hide it from the board and backlog. Issues with these statuses won't be visible.' The right side of the interface displays a list of statuses for the project, including 'IBM CLOUD ACCOUNT CREAT...', 'ADDING DEVICE TO IOT PLATF...', and 'NODE RED FLOW AND CONFL...'. Each status has a corresponding count and a 'Manage workflow' button.

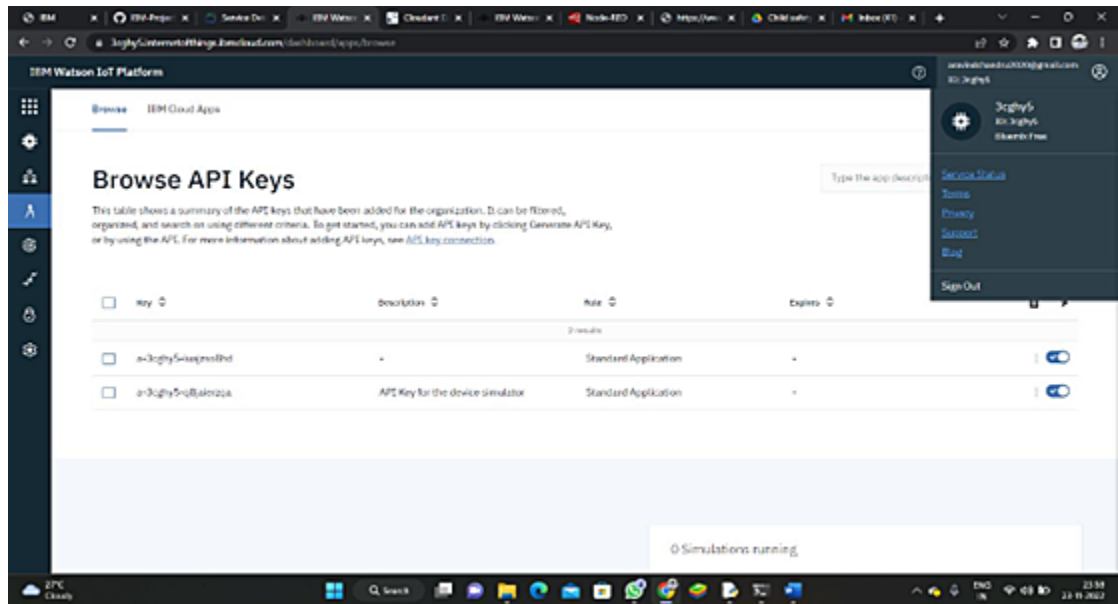
7. CODING & SOLUTIONING

7.1 Feature 1

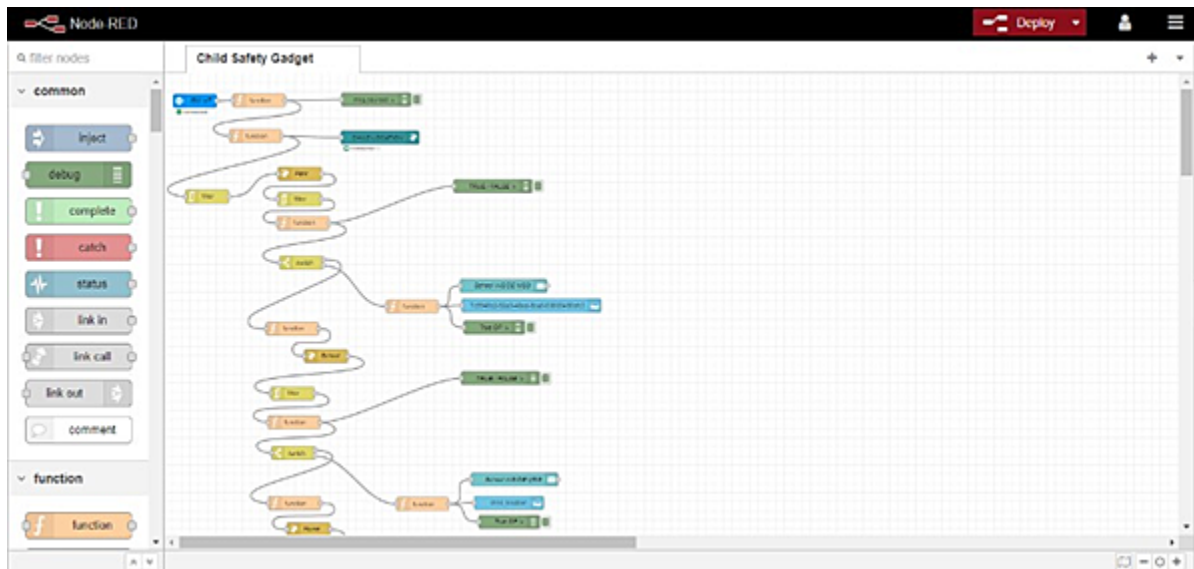
Creating IBM Cloud Account

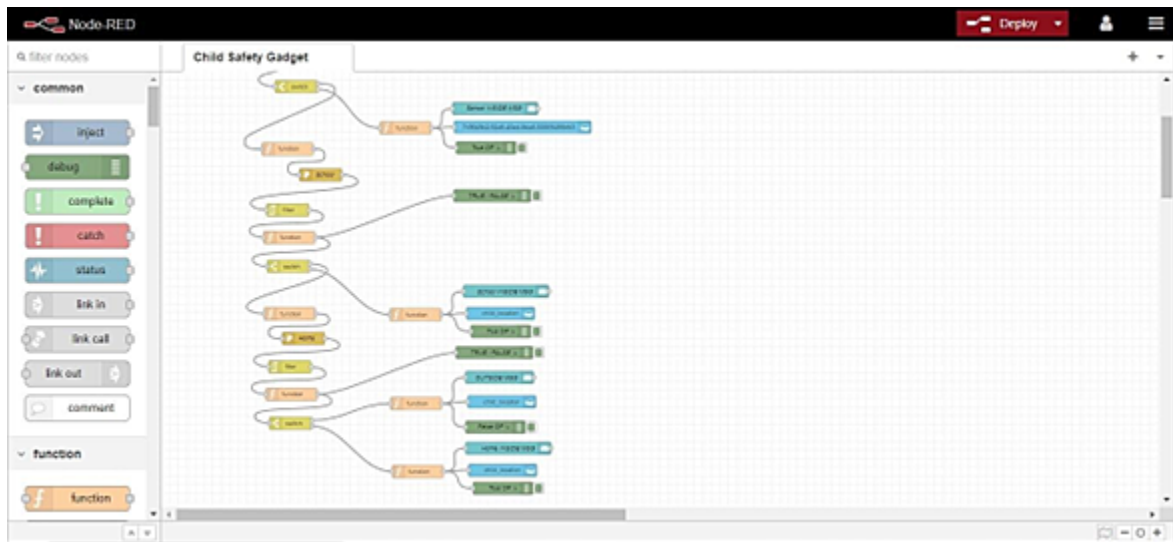


Connecting the Device in IOT Watson Platform

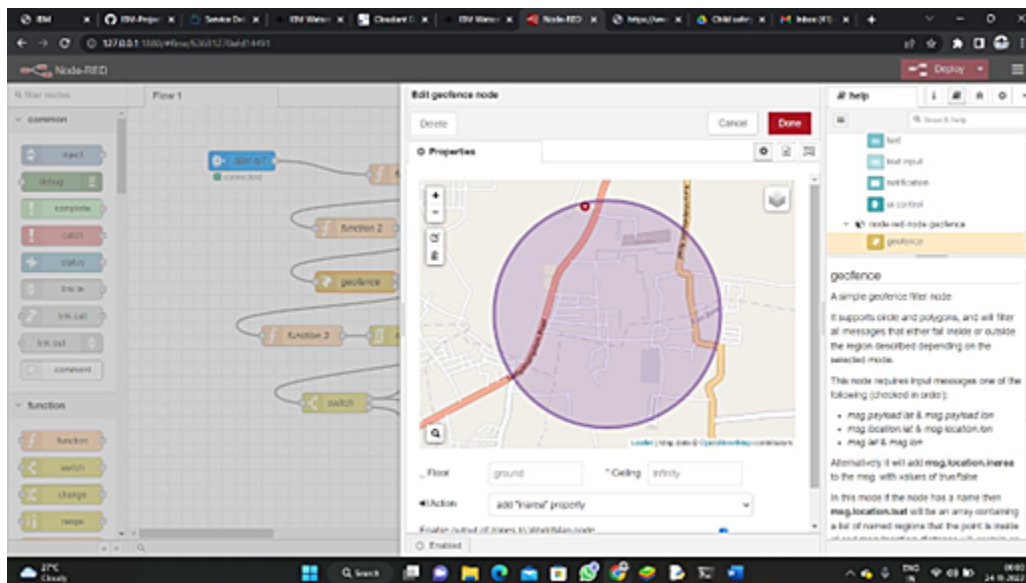


Developing Node Red flow and Connecting it to the IOT Device





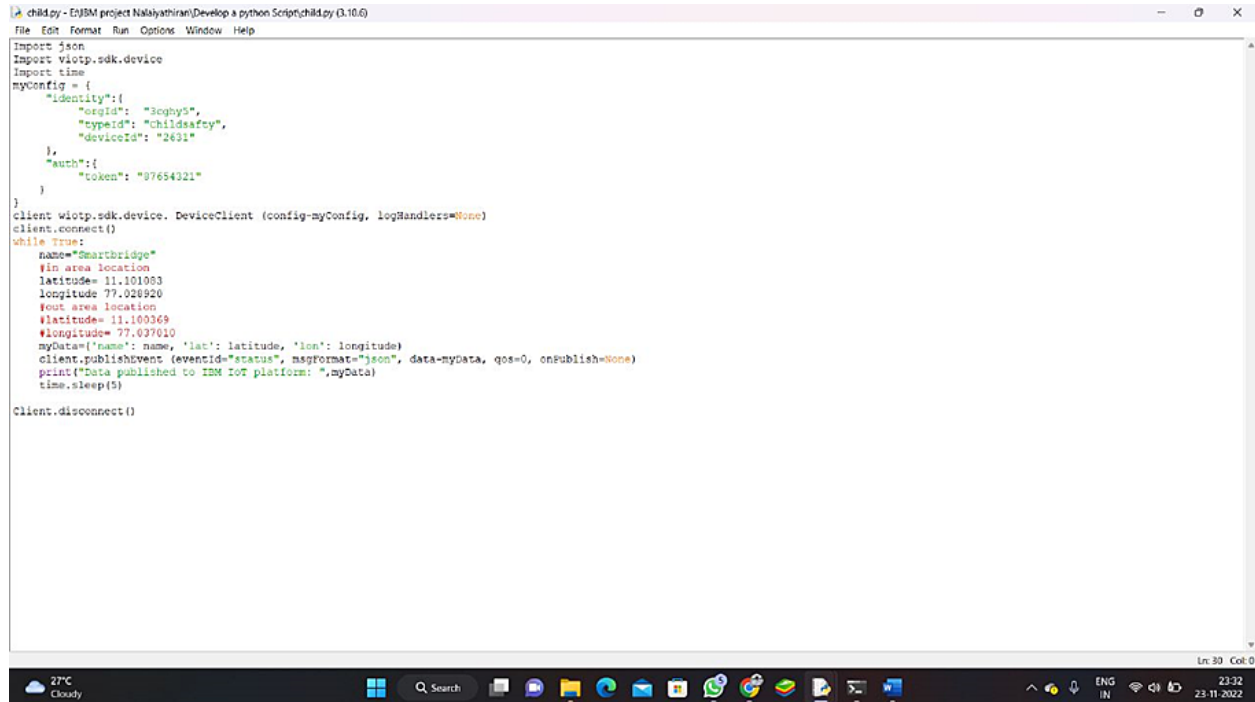
Created the Geofence in Node Red



Code: [Python](#), [Node Red](#), [JavaScript](#), [IBM Cloudant](#)

7.2 Feature 2

Added code to get child location in python using IDLE



```
childpy - EnjBM project Nalakyathiran(Develop a python Script)childpy (3.10.6)
File Edit Format Run Options Window Help

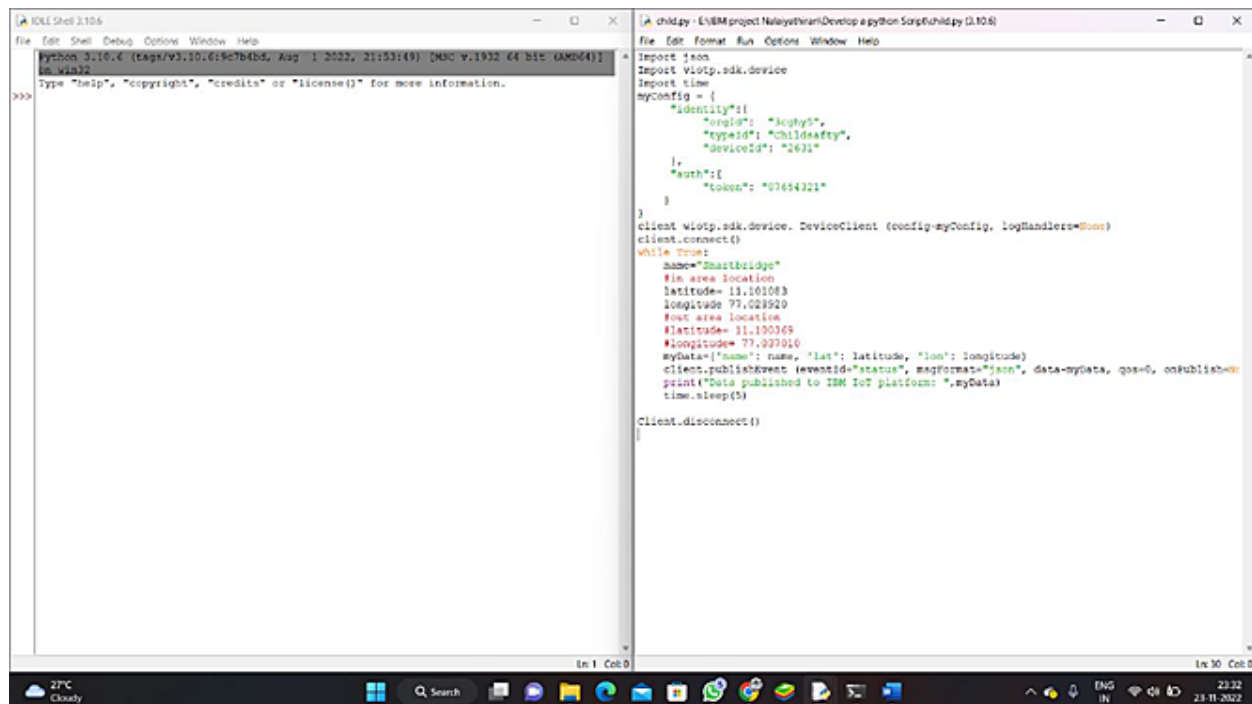
import json
import wiotp.sdk.device
import time
myConfig = {
    "identity":{
        "orgId": "3cghy5",
        "typeId": "Childsafey",
        "deviceId": "2631"
    },
    "auth":{
        "token": "97654321"
    }
}
client = wiotp.sdk.device.DeviceClient (config=myConfig, logHandlers=None)
client.connect()
while True:
    name="Smartbridge"
    #in area location
    latitude= 11.101083
    longitude= 77.026920
    #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()
```

27°C Cloudy

23:32 23-11-2022

Running the Python Script to send requests to IBM Watson

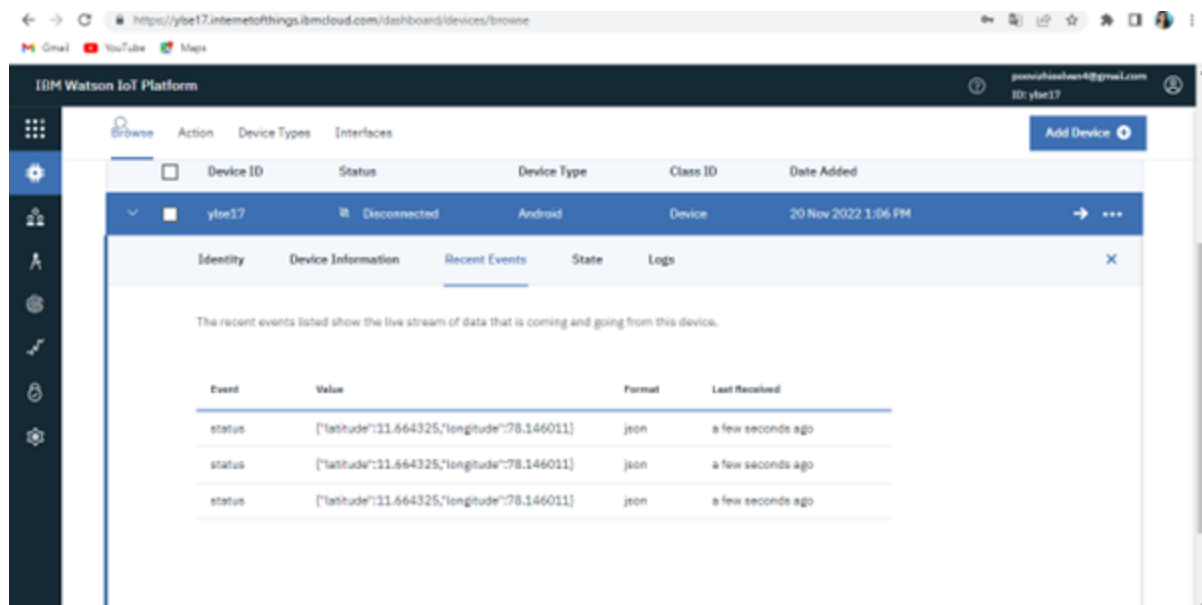


```
python 3.10.6 (tags/v3.10.6:19e7b48d, Aug 1 2022, 21:53:49) [MSC v.1932 64 bit (AMD64)]
File Edit Shell Debug Options Window Help
Type "help", "copyright", "credits" or "license()" for more information.
>>>

chldipy - E:\IBMproject\Nalayetharan\Develop a python Script\chldipy (3.10.6)
File Edit Format Run Options Window Help
import json
import Watson.sdk.device
import time
myconfig = {
    "identity":{
        "orgid": "acphy5",
        "typeid": "ChildSafety",
        "deviceid": "2631"
    },
    "auth":{
        "token": "07654321"
    }
}
client = Watson.sdk.device.DeviceClient (config=myConfig, logHandlers=None)
client.connect()
while True:
    name="SmartBridge"
    #in area location
    latitude= 11.664325
    longitude 78.146011
    #out area location
    #latitude= 11.664325
    #longitude= 78.146011
    mydata={"name": name, "lat": latitude, "lon": longitude}
    client.publishEvent (eventid="status", msgformat="json", data=mydata, qos=0, onPublish=
    print("Data published to IBM IoT platform: ",mydata)
    time.sleep(5)

Client.disconnect()
```

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



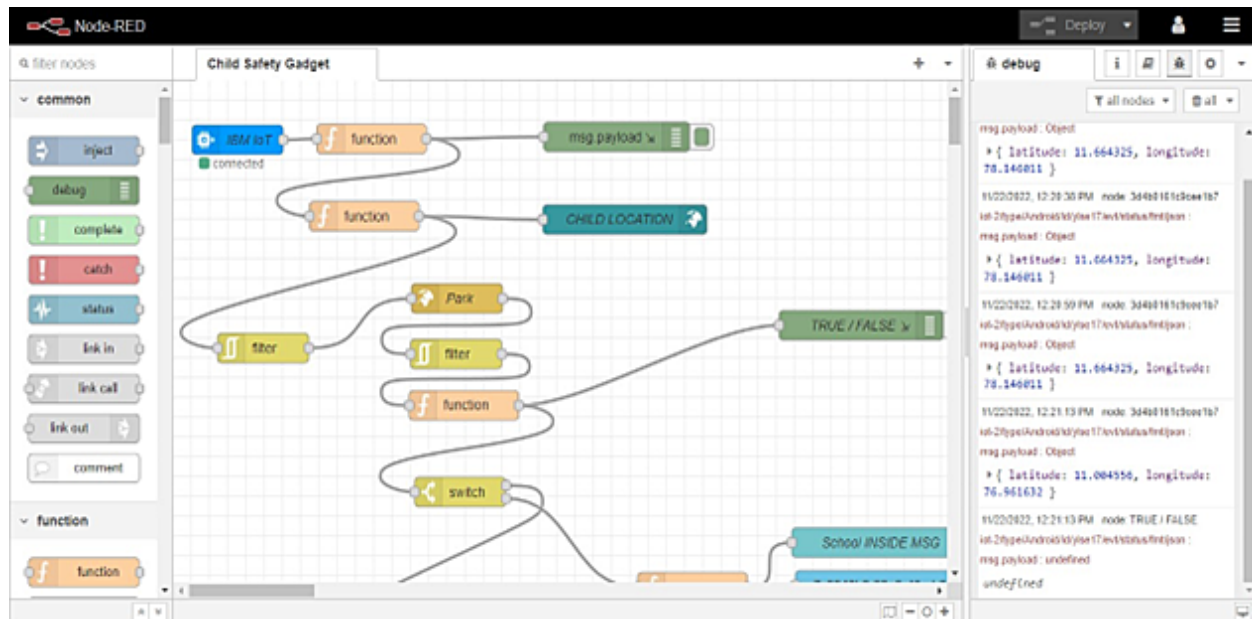
IBM Watson IoT Platform

Device ID: ylse17, Status: Disconnected, Device Type: Android, Class ID: Device, Date Added: 20 Nov 2022 1:06 PM

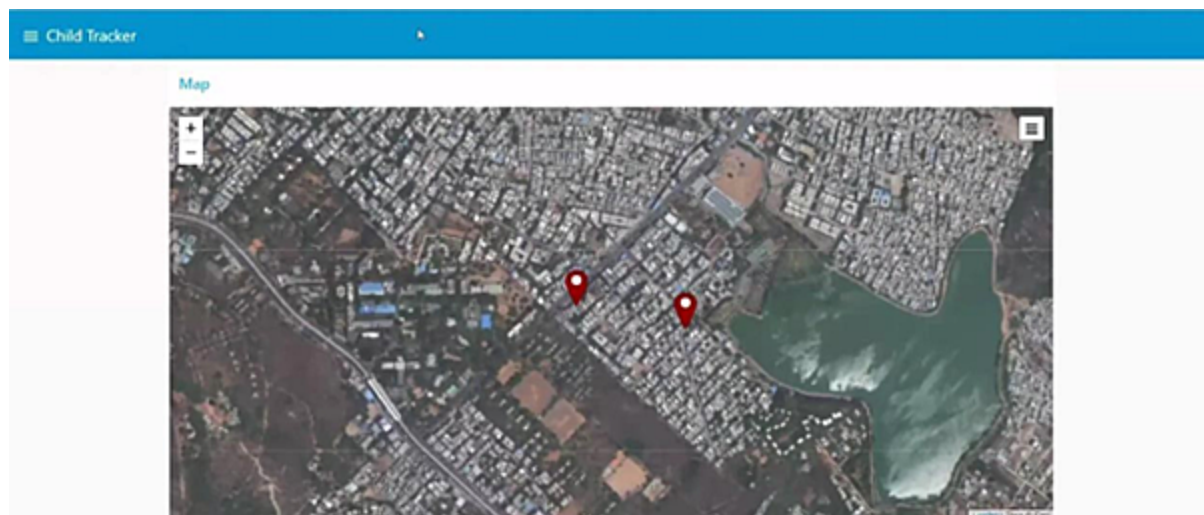
The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
status	["latitude":11.664325,"longitude":78.146011]	json	a few seconds ago
status	["latitude":11.664325,"longitude":78.146011]	json	a few seconds ago
status	["latitude":11.664325,"longitude":78.146011]	json	a few seconds ago

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 parents and can be helpful even 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 child fails to board or de-board at the other stop.
5. Prevent abduction and let your children play and walk around safely. Our Personal GPS trackers for kids are great options for parents for monitoring their children 24/7.

Disadvantages:

1. Young children may refuse to cooperate unless allowed to play with their gadgets.
2. Excess use of electronic gadgets can lead to children spending less time outdoors and limiting their social interaction.
3. It may lead to poor concentration in studies and lack of interest in day-to-day activities.
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 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.

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 keep the 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 modified by installation of small solar panels for charging the 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's smart phone to the GSM shield will activate the camera to start clicking a 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 module which send it to the user via SMS/MMS text.

11. APPENDIX

Source Code:

Python Script

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

myConfig={
    "identity":
        {
            "orgId" : "ylse17",
            "typeId"
            :
            "Android",
            "deviceId"
            :
            "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
    #longitude = 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

