PROJECT BASED EXPERIENTIAL LEARNING PROGRAM (NALAIYA THIRAN)

IOT-BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

A PROJECT REPORT

Submitted by

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1. INTRODUCTION

Nowadays attacks on children are increasing at an unprecedented rate and the victims are in dangerous conditions, where they are not allowed to interact the family members. The key knowledge prearranged in this research work is a progressive skill that offers “Smart Child Safety” for the children. Therefore, the awareness of this method is to send an SMS from the children’s wear tool to their parent or guardian. In the prevailing structure, there is no monitoring method for children, which should generate many problems for them, and the no safety mechanism to guard the child against naughtiness. In addition, there is no aware device for the child’s fortification; it must be completed by hand only. Thus, the premeditated method will be highly effective when compared to the other existing techniques in helping the victims. Child chaser helps the parents in unceasingly checking the child's location. They can merely leave their kids in school or parks and create a geofence from place to place the actual location. By continuously examining the child's location warnings will be generated if the child crosses the geofence. Notifications will be sent affording the child's location to their parents or caretakers. The entire location data will be kept in the database. It aims at providing a safe and conducive environment for all children through the prevention and response to child abuse, exploitation, and neglect.

2. LITERATURE SURVEY

2.1. EXISTING WORK

In the real world, children's safety is a huge question mark in everyone’s mind. Parents always expect their children should live in a secure place where they can spend their time and mind without any problem. But, typically half of them are facing so many issues. This issue can be monitored by using IoT components and sensors to check whether people with unaccepted behavior are moving in the child's environment. If children are close to them, then the system has to give an alert message that someone stands with the child. By tracing the children’s locations, the parents can locate where the problem is and how they can help the child with such issues.

2.2. REFERENCES

[1] Kamat, Mr DK, Ms Pooja S. Ganorkar, and Mrs RA Jain. "Child activity monitoring using sensors." International Journal of Engineering and Techniques 1.3 (2015): 129-133.

[2] Gipsa Alex, Benitta Varghese, Jezna G Jose, AlbyMol Abraham, “A Modern Health Care System Using IoT and Android”, IJCSE, Vol. 8 No.4 Apr 2016.

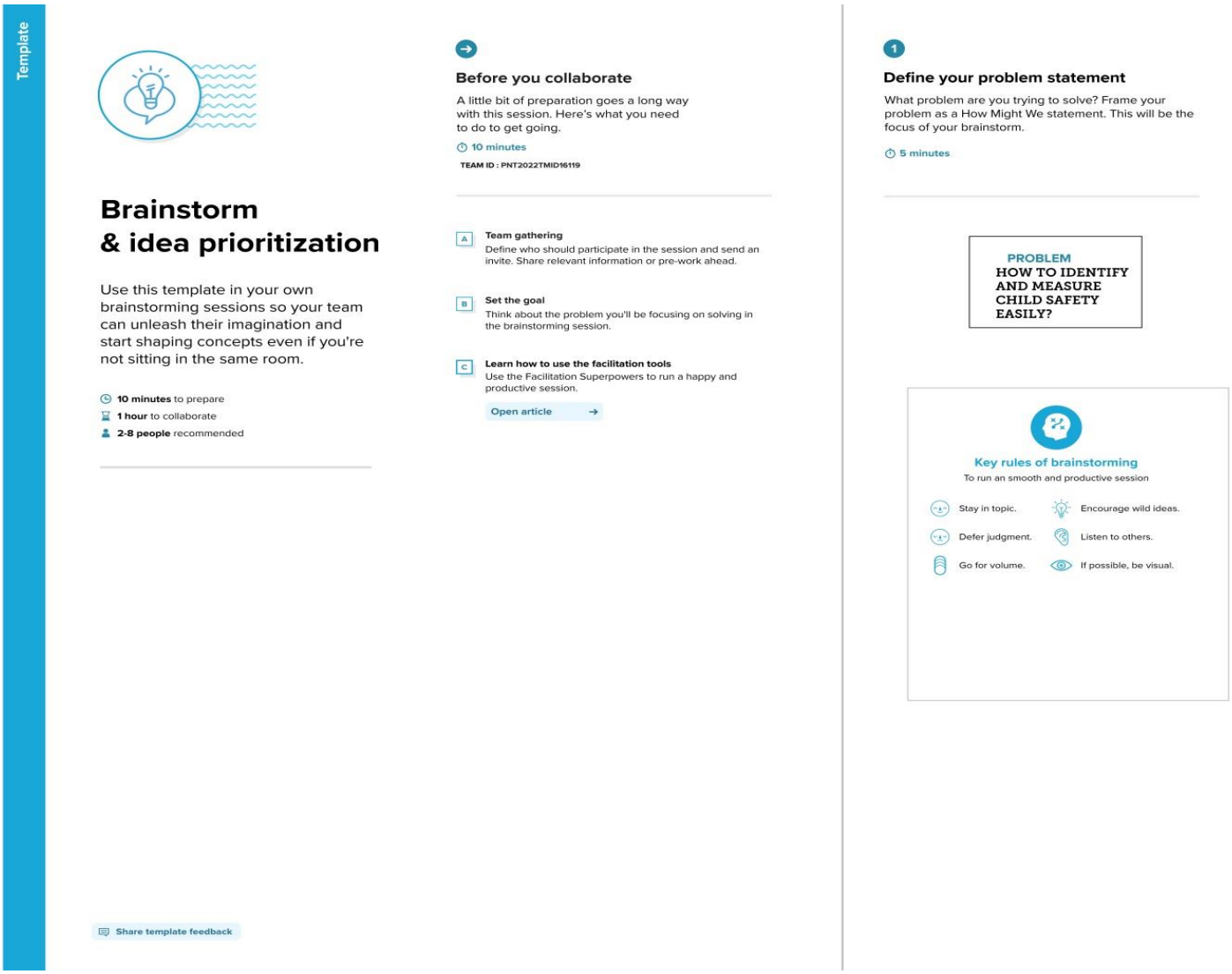
3.IDEATION AND PROPOSED WORK:

3.1. EMPATHY MAP

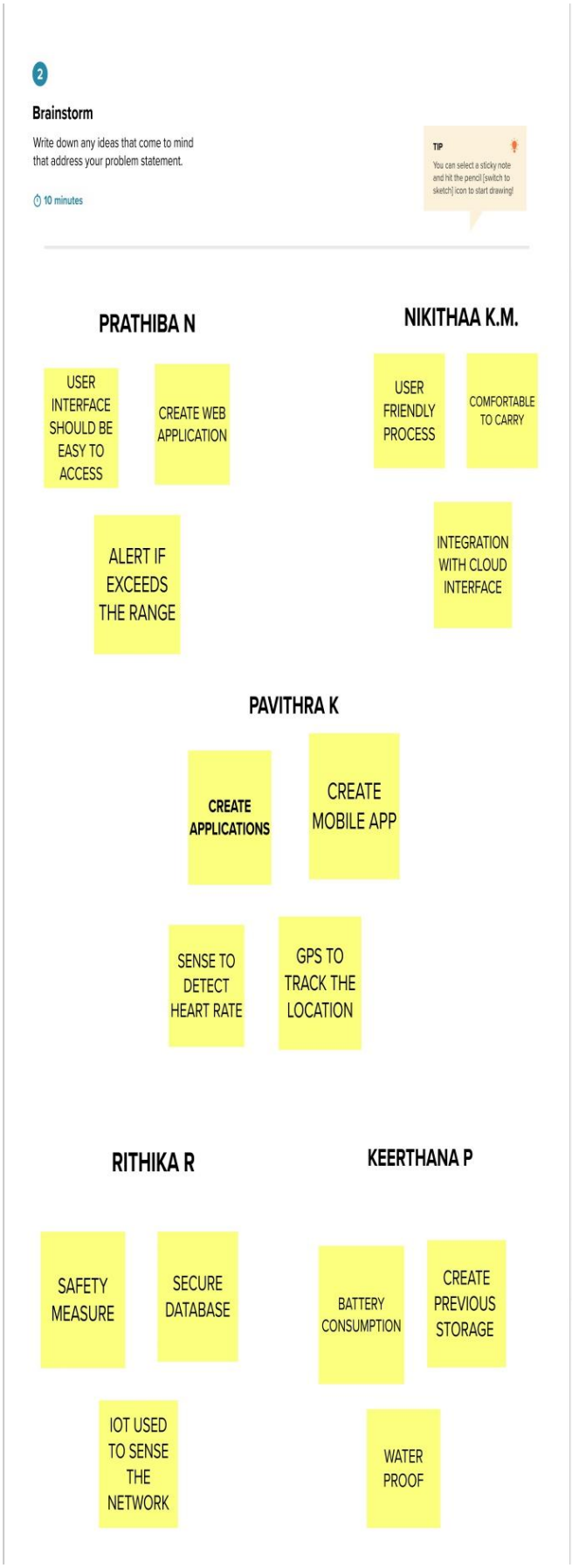
3.2. IDEATION AND BRAINSTROMING:

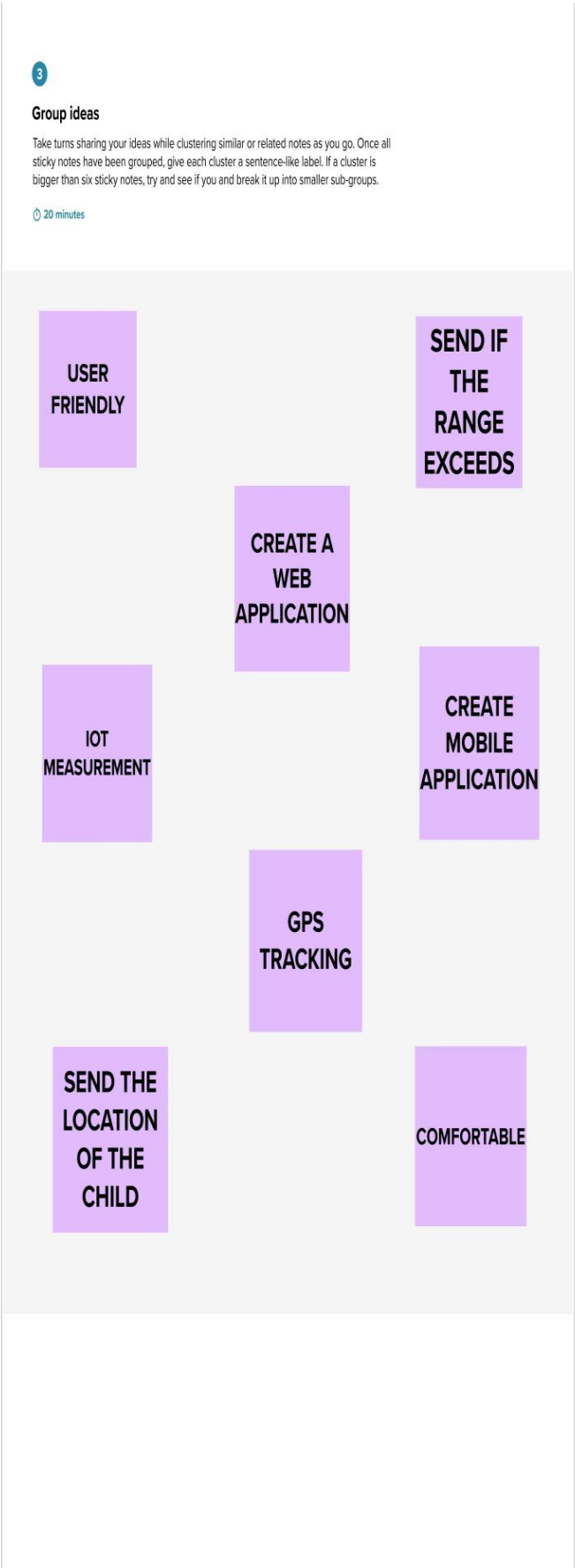
Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping





Step-3: Idea Prioritization

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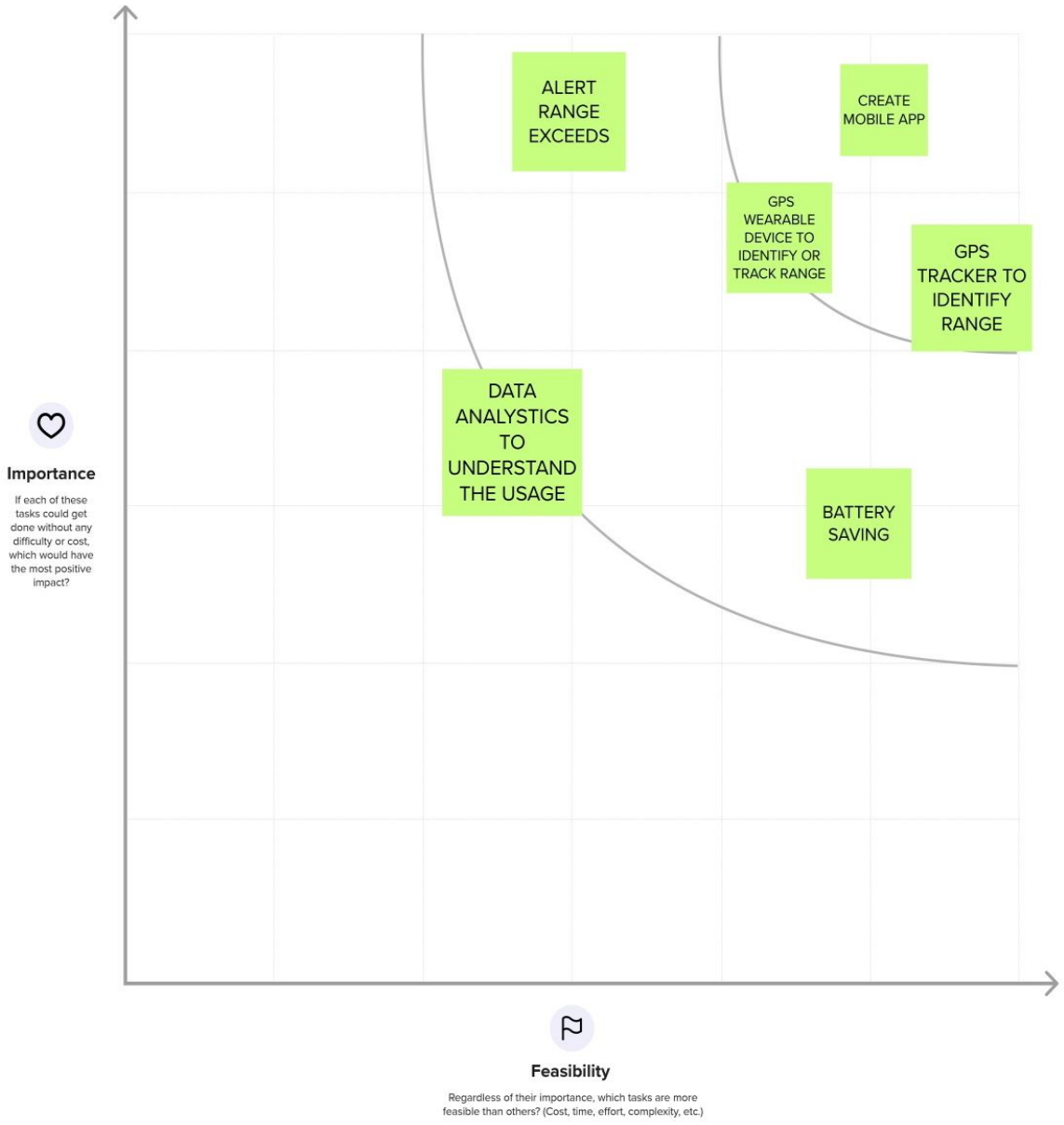
Prioritize

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

20 minutes



3.3. PROPOSED SOLUTION:

Problem Statement:

Currently, parents concern more about serious cases such as missing children, snatching and abuse. They cannot sit with their children or 24*7 hours to protect their children and monitor the children's activities.

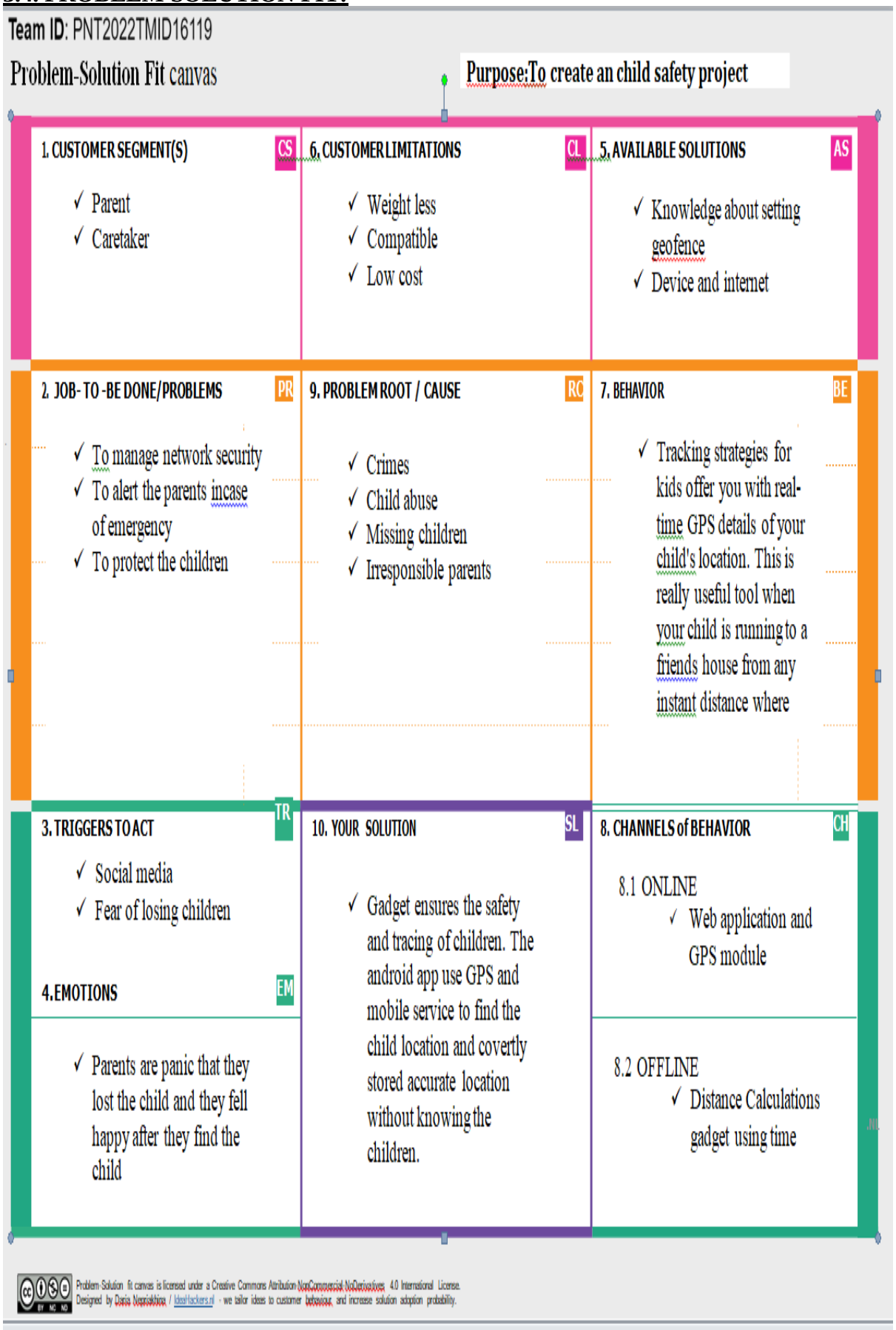
Proposed Solution:

Create a Child tracker which helps the parents with continuously monitoring the child's location. The notification will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in the database. The system automatically alerts the parent/caretaker by sending notification, when immediate attention is required for the child during emergency it can make children parents more assure about their kid's security, we have a feature in our device called Geo-Fence. Geo-Fencing feature allows you to mark a particular area as safe-zone. Whenever your child crosses that specific area, you will get an instant notification on your phone.

Advantages:

- ✓ Easy to use
- ✓ Compatible
- ✓ Weight less

3.4. PROBLEM SOLUTION FIT:



4.REQUIREMENT ANALYSIS:

4.1.FUNCTIONAL REQUIREMENTS

Functional Requirements are:

1. User registration and confirmation
2. App Installation
3. Settings geofence
4. Detecting Child location
5. User interface
6. Database
7. Server
8. GPS Tracking
9. API
10. React JS
11. GPS modules
12. Battery life
13. Location history

USER REGISTRATION AND CONFIRMATION:

Registration through Gmail and Phone number.Confirmation via Email and OTP.

APP INSTALLATION:

Installation through link and playstore.

SETTINGS GEOFENCE:

Setting by user to find child location.

DETECTING CHILD LOCATION:

Detecting location via app and sms.

USER INTERFACE:

User login form and admin login form.

DATABASE:

Stored in cloud for seamless connectivity. Parents and kids link with the distance and the location values obtained from the mobile devices are stored here. The values include parent id,kid id,distance,longitude,latitude etc.

SERVER:

It connects the database and the front end application. The backend server has been implemented to run as a service and is deployed in an IBM cloud instance. The backend server has been implemented to run as a service and is deployed in an IBM cloud instance.

GPS TRACKING:

The system is implemented with a GPS module, which acquires the location information of the user and stores it to the database.

API:

The value collected is sent to the database using an API.

REACT JS:

We are using react js as front end for our project. Node JS for the back end we are using node js.

GPS MODULES:

It receives data directly from satellites.

BATTERY LIFE:

If the child or parent forgets to charge the device for a whole day then also the device will work. That's why we aim to make this device last the whole day with one charge. It should be long-lasting.

LOCATION HISTORY:

The location history will help to track the child's activity so that the aren't will be updated. Location history will be there for 30 days. For example if the child gets missing with the help of location history the aren't can track down their child's activity and also can find their child.

1) Live Location Tracking:

GPS installed in the device is used to trace the contemporary location and we can keep tabs on it through the android app and SMS requests sent from the safety gadget to the parent’s phone. The child's precise locations are found by parents through the Wearable gadget which in turn employs Global Positioning System to track real-time locations. The software along with relinquishing it allows you to trace down your wards when they’re within Bluetooth limit, it also works when your kids go farther afield. Its adroitness asa tracker is exceptional if you live in densely colonised neighbourhoods like cities.

2) Panic Alert Systems:

The panic alert mechanism on the device is set off during emergencies; the system software involuntarily alerts the parent/guardian by redirecting a textmessage where expeditious scrutinization is essential for the child during a catastrophe. The alert is also refurbished to the cloud for the motive of app monitoring.

3) Ceaseless Surveillance:

The gadget ensures utmost security and ensures live tracking for their kids. The device instills child safety through smartphones that can track their children's location and give the precise coordinates of the child's location in real-time anywhere. By monitoring the activities the security state of the child isexamined.

4) Cloud Database:

The safety device is equipped with GSM and GPS modules for sending and receiving calls, and SMS between the gadget and the parental phones. The system also consists of a Wi-Fi/cellular data module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring onthe parental phones. The panic alert system is used during panic situations alerts are sent to the parental phone, seeking help also the alert parameters are updatedto the cloud. The history of the location can be stored in the cloud. The wearabledevices should feature the child's exact locations and be updated continuously without being interpreted in the cloud database.

1) Security Implementations:

To activate the alarm and facilitate video recording whenever the emergency button is pressed. We can use the cloud to accumulate the surveillance data of the children. The wifi modules are of assistance in sending the monitoring particulars, the user will be notified with an update if any errors are found, for the efficient functioning of the device.

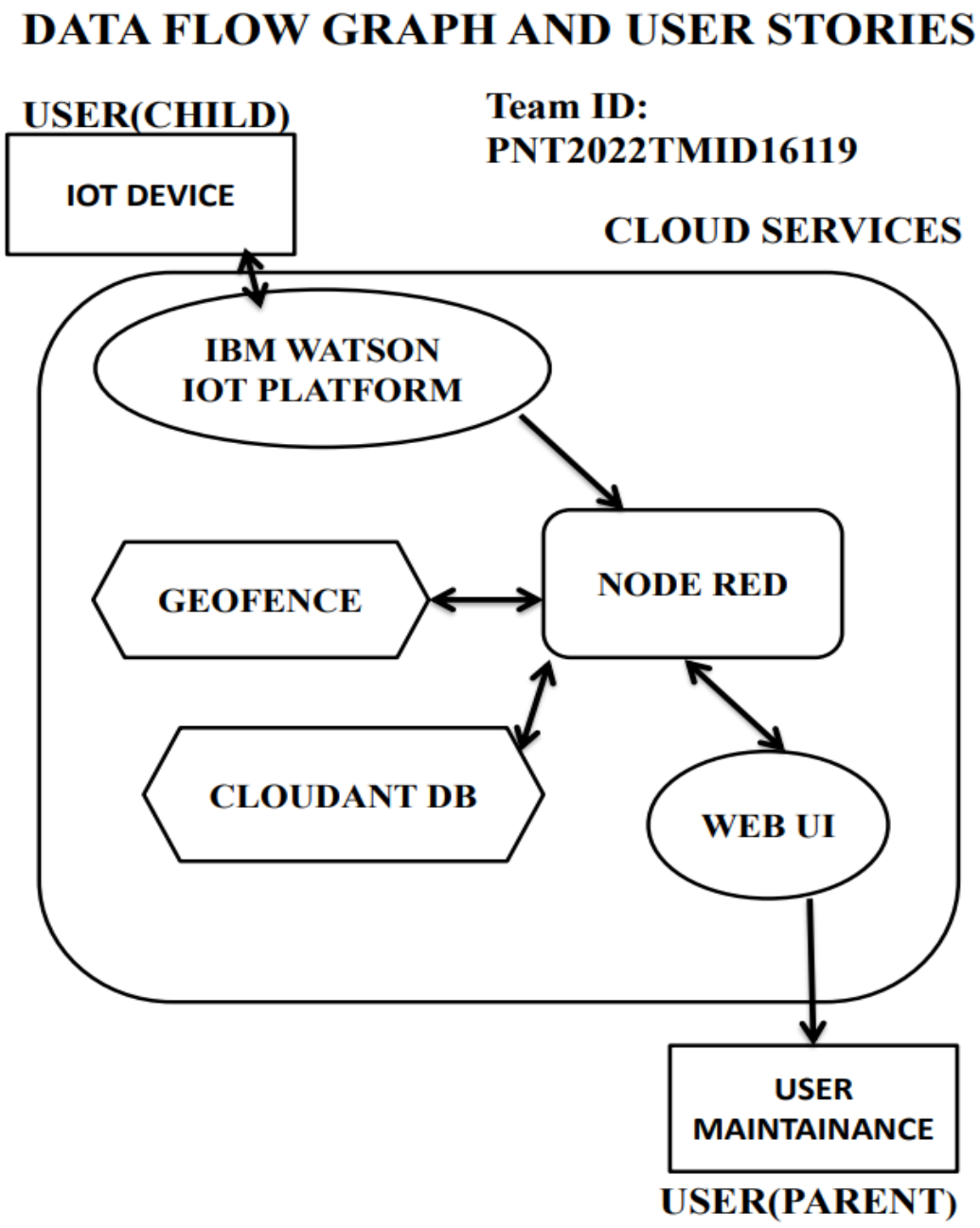
2) Extensive range monitoring system:

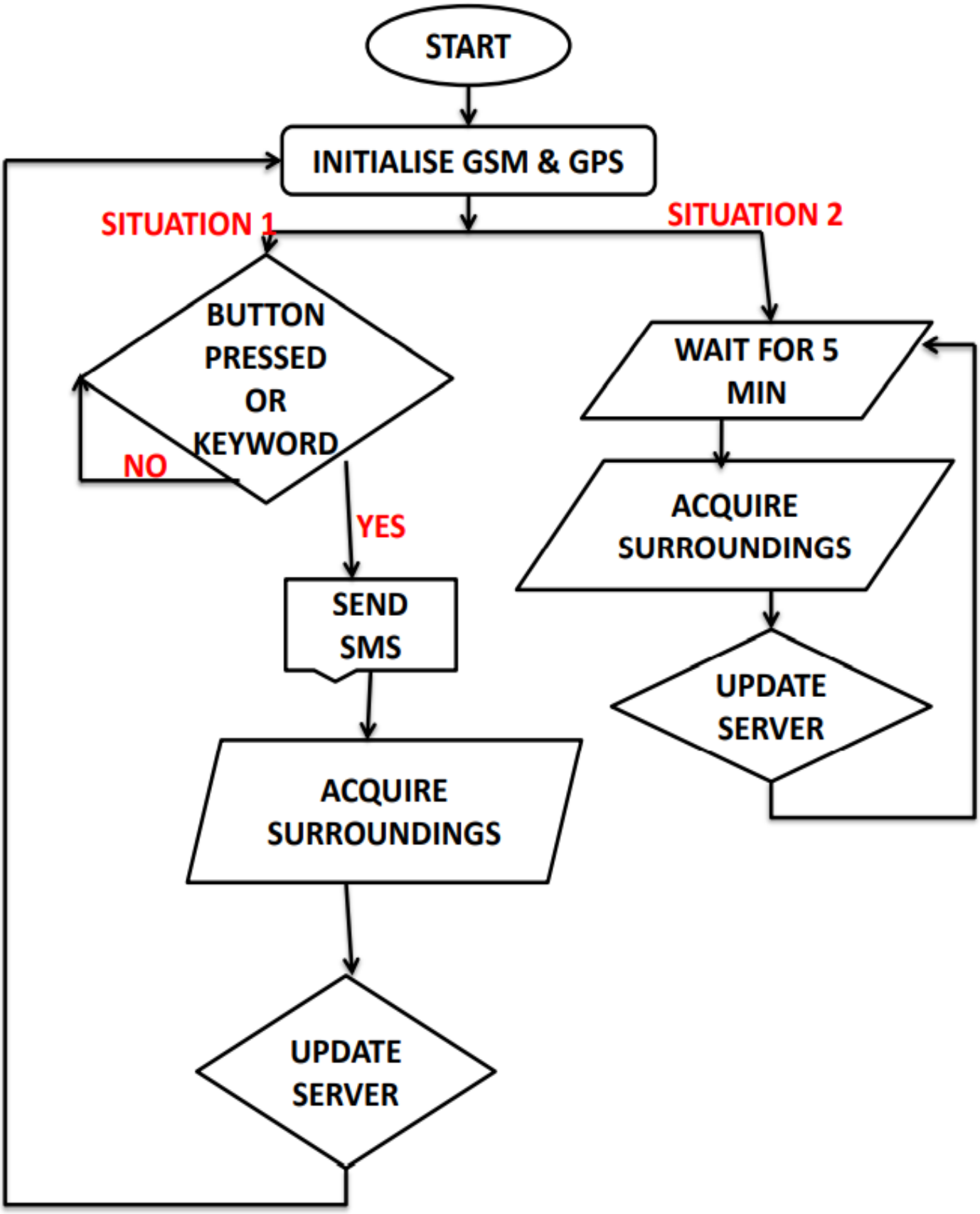
The application aside from conceding you to track down your children when they're within Bluetooth range, also functions when your kids go farther afield. Its competence as a tracker is outstanding if you live in densely populated areas like cities or big towns. This means you will be able to see the

identity of the participating devices and it helps to diminish their vulnerabilityin harmful situations and also protects the children in emergency situations.

5.PROJECT DESIGN:

5.1.DATA FLOW GRAPH




START
INITIALISE GSM & GPS
SITUATION 1
SITUATION 2
BUTTON PRESSED OR KEYWORD
NO
YES
SEND SMS
ACQUIRE SURROUNDINGS
UPDATE SERVER
WAIT FOR 5 MIN
ACQUIRE SURROUNDINGS
UPDATE SERVER

5.2. SOLUTION AND TECHNICAL ARCHITECTURE:

SOLUTION ARCHITECTURE

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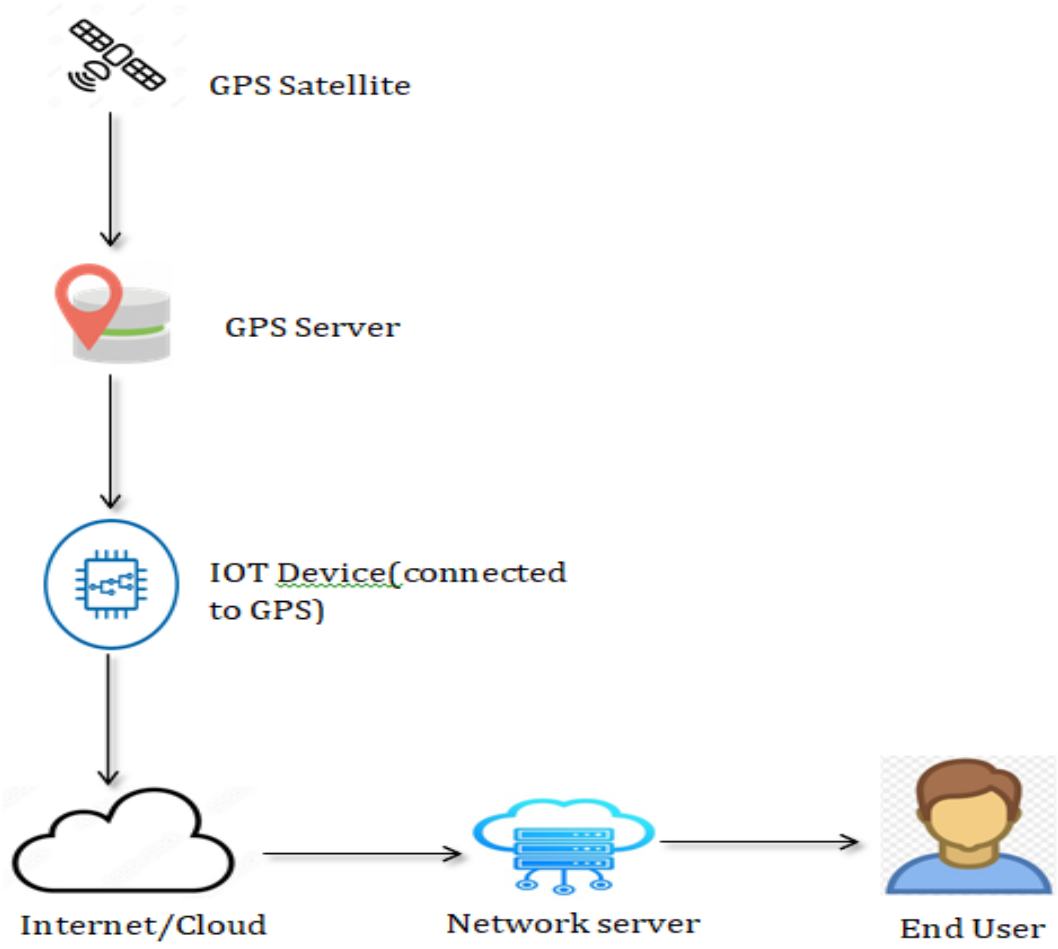
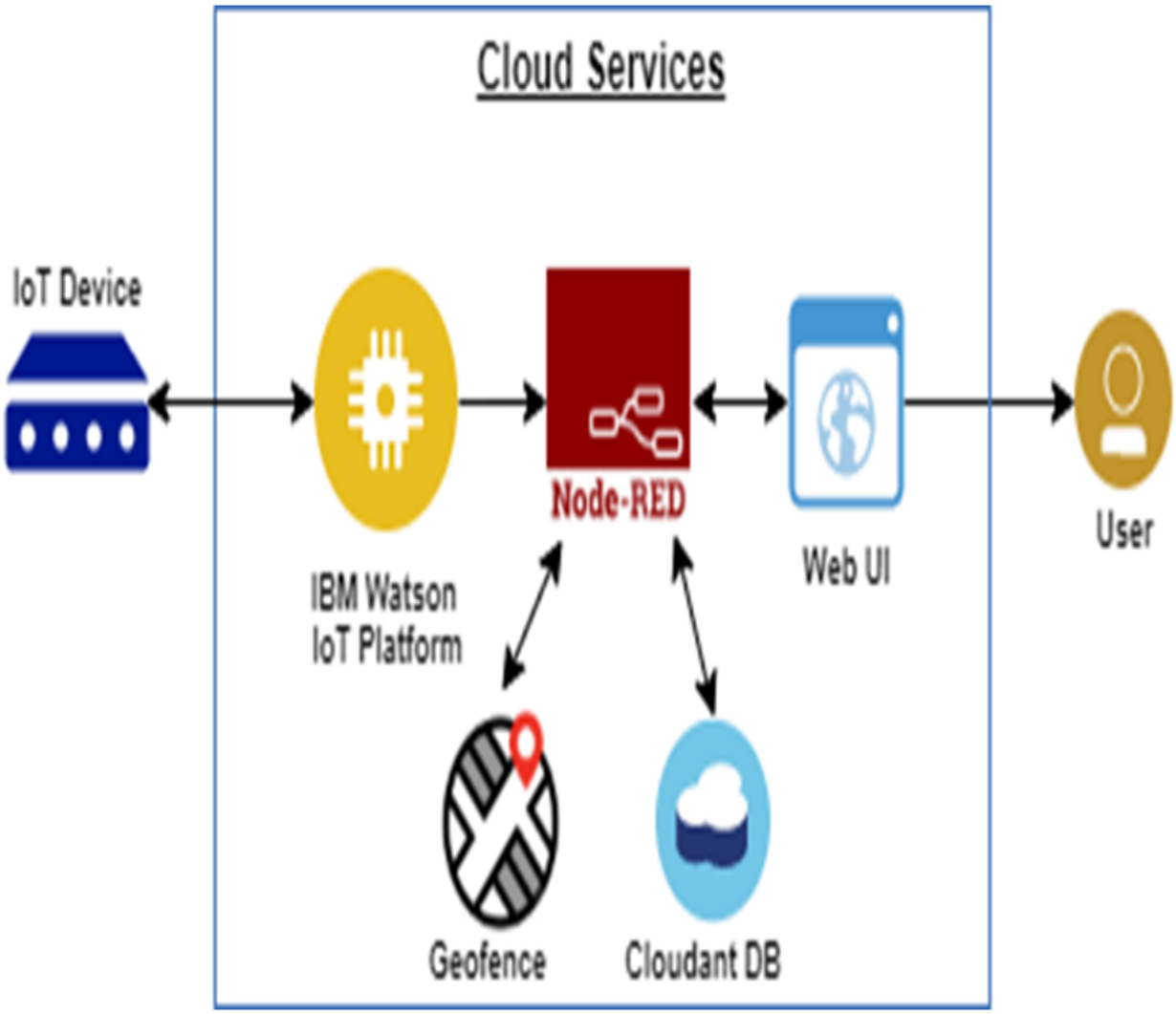
ARCHITECTURE



TECHNOLOGY ARCHITECTURE

Team ID: PNT2022TMID16119

ARCHITECTURE



5.4. USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) and (Web user)	Registration	USN-1	As a user, I can register my account by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered myself	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through apple account	I can register & access the dashboard with apple account Login	High	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering user id & password		High	Sprint-1
Customer Care Executive	Login		As I enter 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.	I can login only with my provided credentials	Medium	Sprint - 3
Administrator	Login		Maintaining and making sure the database containing the locations are secure and accurate and updated constantly.	I can login only with my provided credentials	High	Sprint - 3

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6. PROJECT PHASING AND SCHEDULING:

Sprint Schedule, and Estimation

Use the below template to create sprint schedule

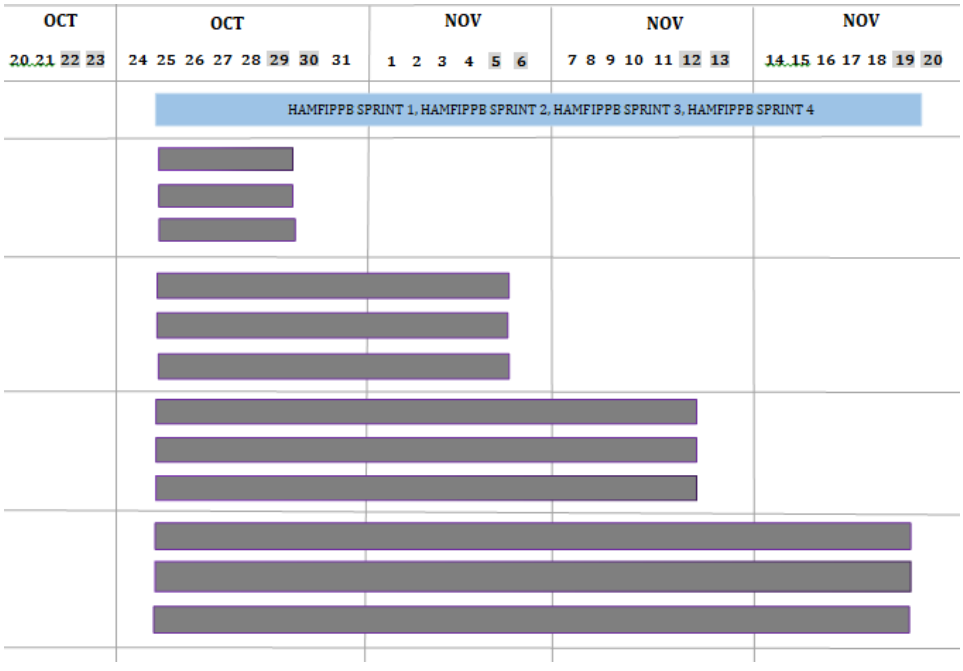
Sprint	Functional Requirement (Epic)	User Story / Task	Priority	Team Members
Sprint-1	Registration	As a user, I can register for the application by entering my email, password, and confirming my password.	High	PAVITHRA K
Sprint-1	Confirmation Email	As a user, I will receive confirmation email and SMS once I have registered for the application	High	PRATHIBA N NIKITHAA K M
Sprint-2	Authentication	As a user, I can register for the application through Email ID and Mobile App.	Low	PAVITHRA K
Sprint-1	Login	As a user, I can log into the application by entering email & password.	Medium	RITHIKA R
Sprint-1	Dashboard	As a user, I can monitor, measure, analyze relevant data in key areas.	High	KEERTHANA P
Sprint-2	Notification	As a user, I should be able to receive notification when the child is in emergency situations.	High	NIKITHAA K M
Sprint-2	Store data	As a user, I need to store the location data and child information into the database.	High	PRATHIBA N
Sprint-2	Communication	The child and the parent should be able to communicate.	Medium	RITHIKA R KEERTHANA P

Sprint	Functional Requirement (Epic)	User Story / Task	Priority	Team Members
Sprint-3	IoT Device	We automatically monitor the child in real time using Internet of Things, with the help of GPS, GSM, and Raspberry Pi.	Medium	NIKITHAA K M PRATHIBA N
Sprint-3	Node RED	The data stored in IBM Cloud should be integrated properly.	High	KEERTHANA P PAVITHRA K
Sprint-4	User Interface	The point of human-computer interaction and communication in a device.	Medium	RITHIKA R NIKITHAA K M
Sprint-4	Geofencing	Based on the geographical coordinates, the geofence of the child can be done.	High	PAVITHRA K PRATHIBA N KEERTHANA P

Project Tracker:

Sprint	Duration	Sprint Start Date	Sprint End Date (Planned)	Sprint Release Date (Actual)
Sprint-1	6 Days	26 OCT 2022	31 OCT 2022	18 NOV 2022
Sprint-2	6 Days	29 OCT 2022	04 Nov 2022	18 NOV 2022
Sprint-3	6 Days	05 Nov 2022	10 Nov 2022	18 NOV 2022
Sprint-4	6 Days	12 Nov 2022	18 Nov 2022	18 NOV 2022

BURNDOWN GRAPH:



7. CODING:

Creating and Connecting IBM cloud for Project

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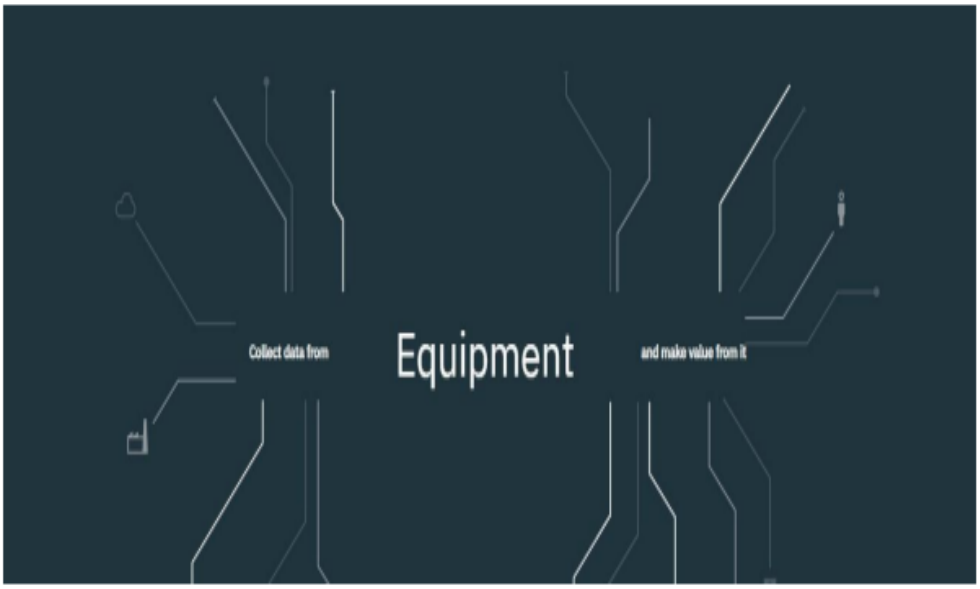
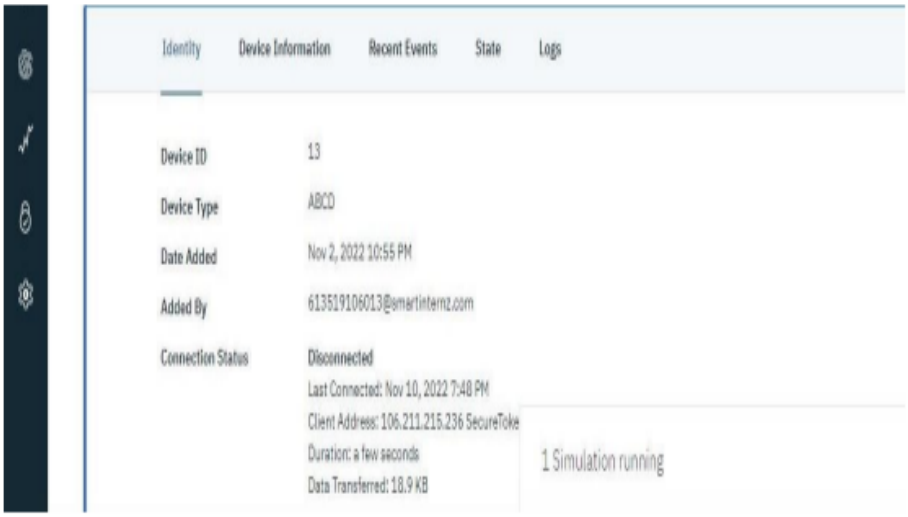
Creating IBM Cloud Service and creating the device:



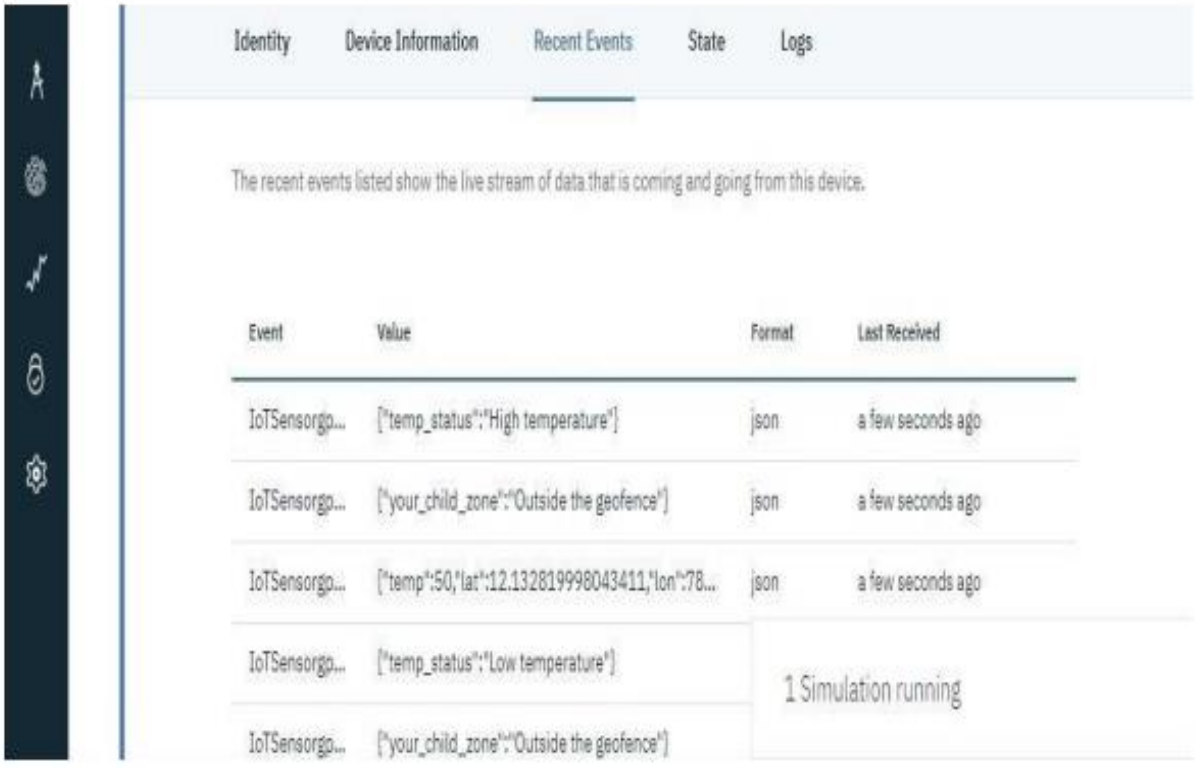


Utilization and Optimization of Python Code:

```
import timeimport
sys
import ibmiotf.applicationimport
ibmiotf.device import random
#Provide your IBM Watson Device Credentialsorganization = "zwx6lb"
deviceType = "ABCD" deviceId = "13"
authMethod = "token" authToken =
"12345678"
#api key {a-illza1-mbdxqo6z0s} #api token
{zSYzlSuAWF&F_x7GkT}

try:
        deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
authMethod, "auth-token": authToken}
        deviceCli = ibmiotf.device.Client(deviceOptions)#.....
except Exception as e:
        print("Caught exception connecting device: %s" % str(e))sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type"greeting" 10 times
print("power on ")
print("checking connection to waston iot...")time.sleep(2)
deviceCli.connect()
print("dear user ... welcome to IBM-IOT ")
print("i can provide your children live location and temperature ")print()
name=str(input("enter your child name:"))while True:
    temperature=random.randint(20,50)#random temperature for your child latitude=random.uniform(10.781377,10.78643)#random
    latitude for your child longitude=random.uniform(79.129113,79.134014)#random longitude for your childa="Child inside the geofence"
    b=" Child outside the geofence"c="High
    temperature"
    d="Low temperature"
    x={'your_child_Zone':a}
    y={'your_child_Zone':b}
    z={'temp_condition':c}
    w={'temp_condition':d}

    data = { 'temp' : temperature, 'lat': latitude,'lon':longitude,'name':name  }#print data
    def myOnPublishCallback():
        print ("Published Temperature = %s C" % temperature, "latitude = %s %%" % latitude,"longitude = %s %%" % longitude, "to IBM Watson")
        print("\n")
    success = deviceCli.publishEvent("IoTSensorgpsdata", "json", data, qos=0,on_publish=myOnPublishCallback)

    if latitude>=10.78200 and latitude<=10.786000 and longitude >=79.130000 and longitude
<=79.133000:
```

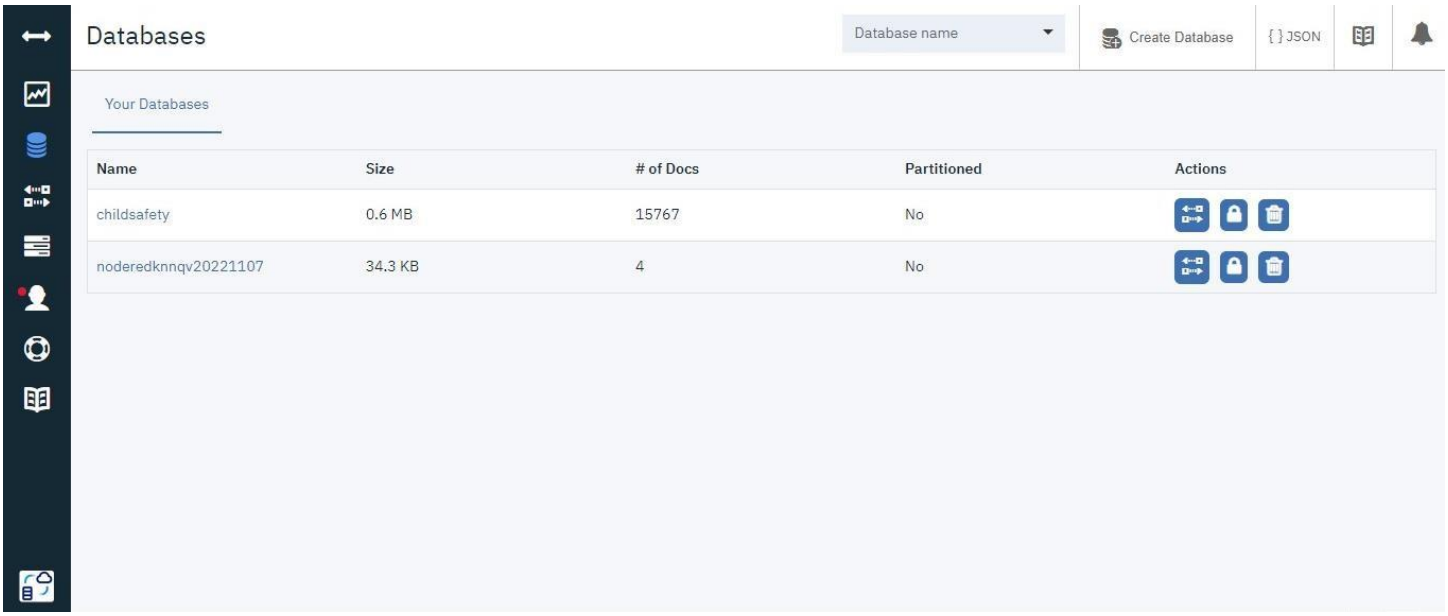
```
deviceCli.publishEvent("IoTSensorgpsdata","json",data=x,qos=0,on_publish=myOnPublishCallb ack)

            print(x) print("\n")

        else:


deviceCli.publishEvent("IoTSensorgpsdata","json",data=y,qos=0,on_publish=myOnPublishCallb ack)

            print(y) print("\n")

        if (temperature>35):


deviceCli.publishEvent("IoTSensorgpsdata","json",data=z,qos=0,on_publish=myOnPublishCallb ack)

                print(c) print("\n")

        else:

        deviceCli.publishEvent("IoTSensorgpsdata","json",data=w,qos=0,on_publish=myOnPublishCall back)

                print(d) print("\n")

        if not success:

            print("Not connected to IoTF")print("\n")

        time.sleep(3)

# Disconnect the device and application from the clouddeviceCli.disconnect()
```

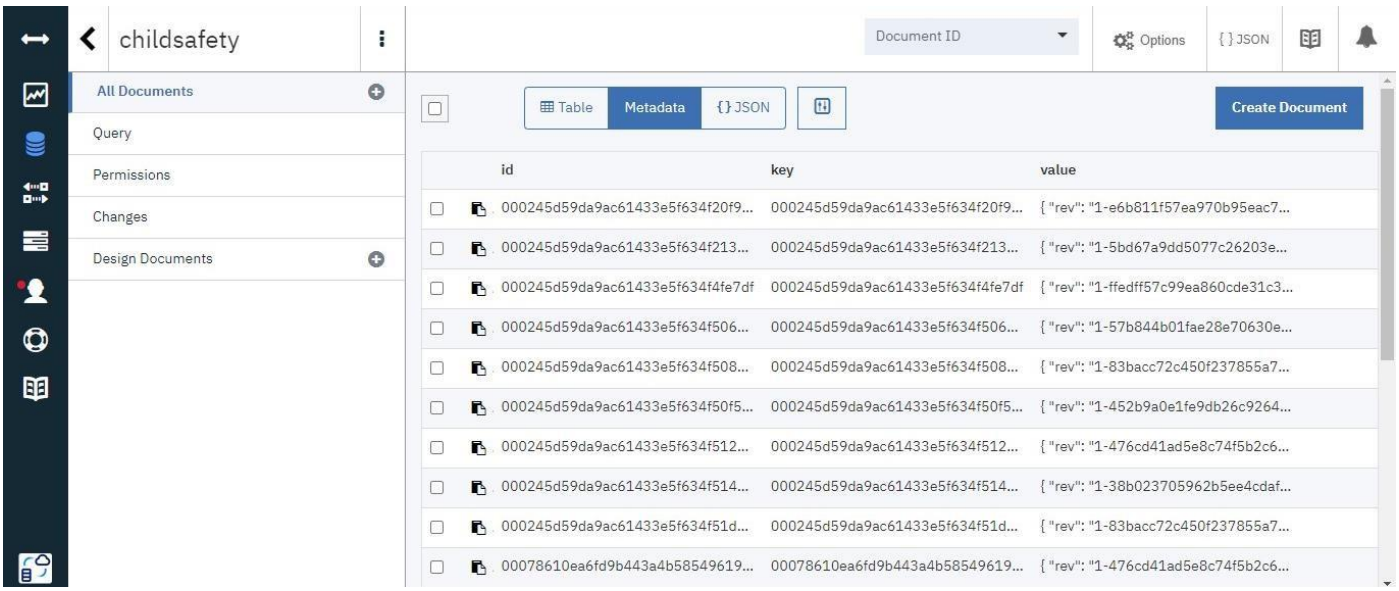
Connecting IBM Watson and python Code Debugging and Traceability:



8. TESTING:

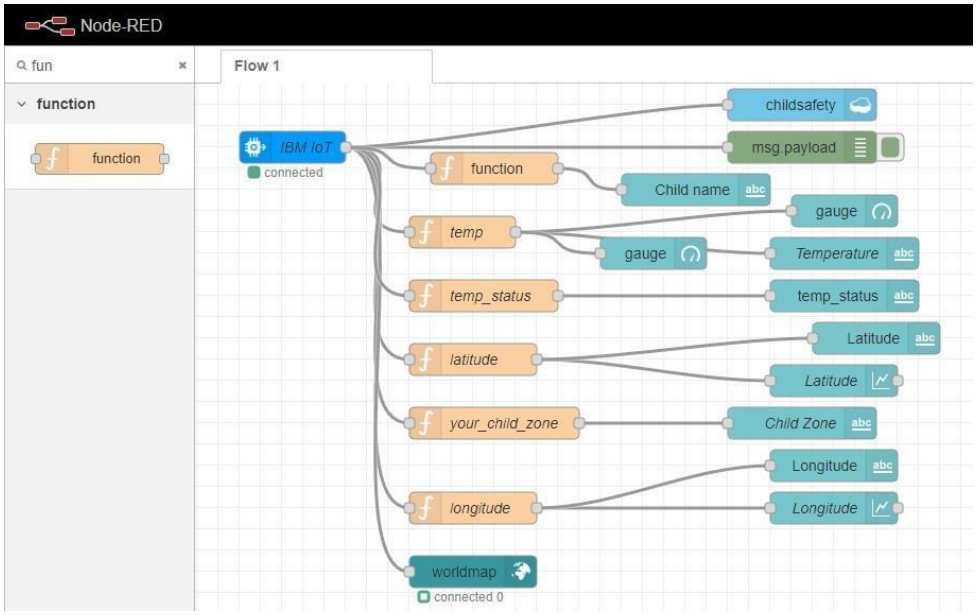
8.1. Create Cloudant DB:





8.2.UTILIZATION OF TESTING TOOLS:

1)Node-Red Service with Cloudant DB:



2) APP Inventor:

To monitor the children continuously according to their surroundings and movability.

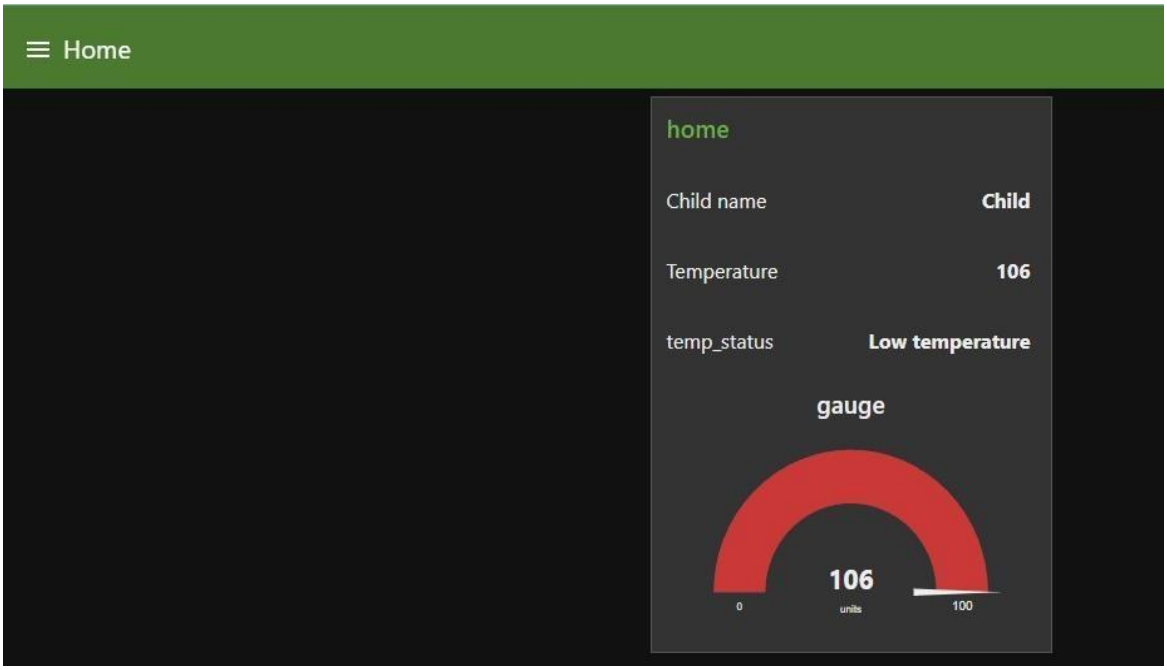
Monitor accordingly to their environments and their circumstances and alert the system and the moniter.

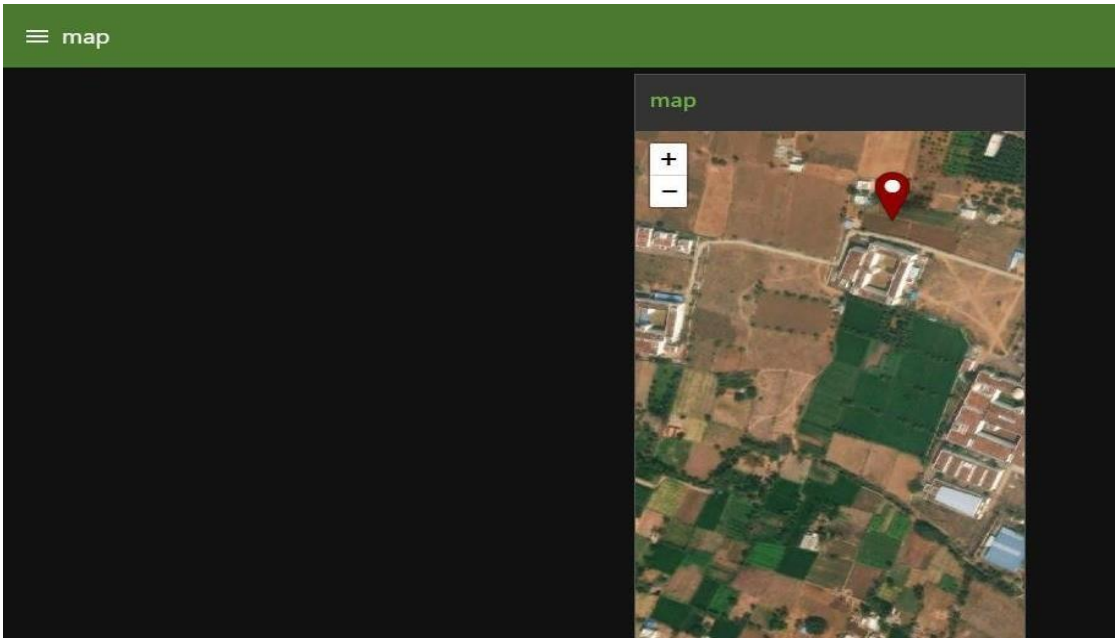
9.RESULT:

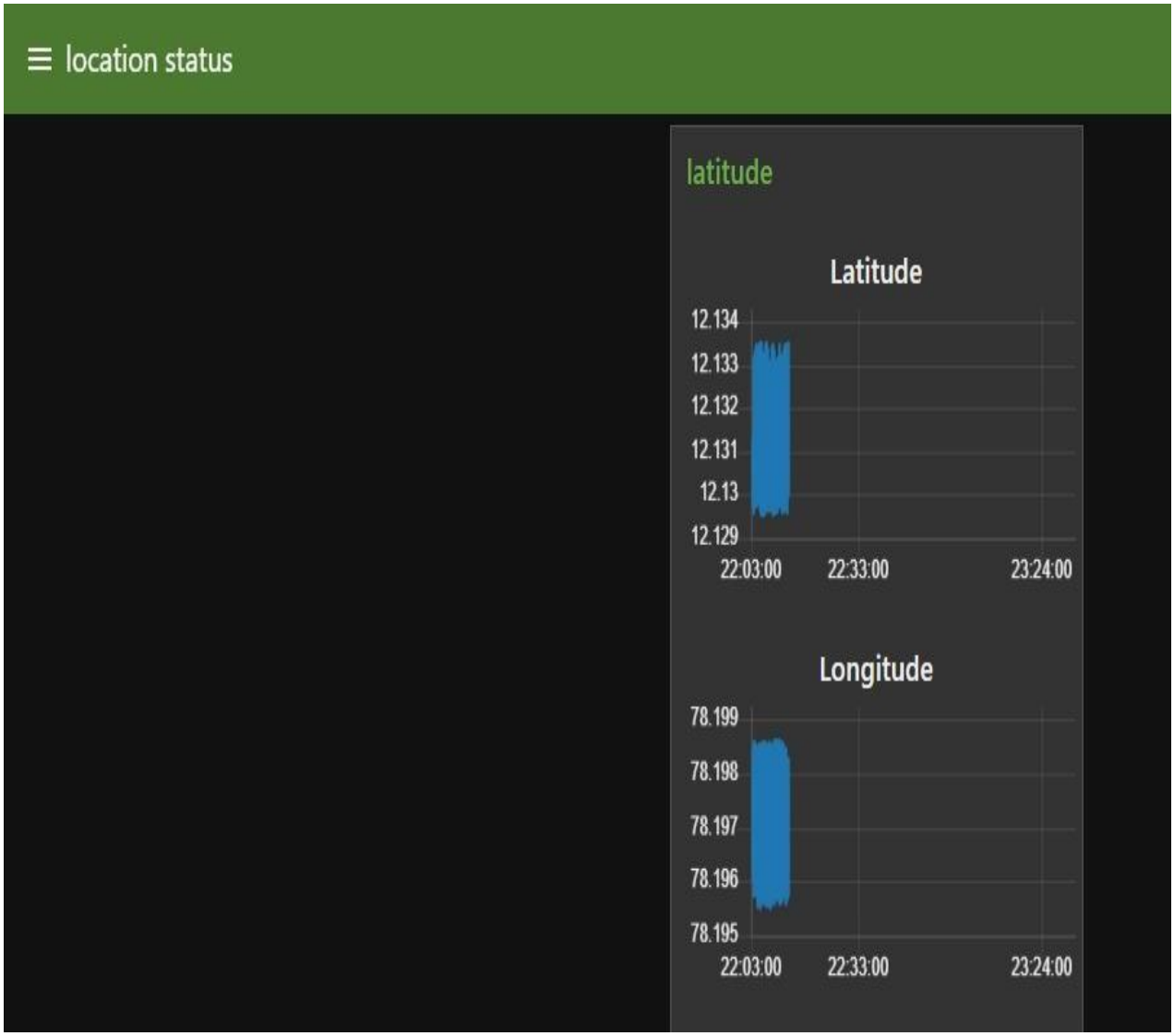
9.1. PERFORMANCE ANALYSIS:

APPLICATION PERFORMANCE METRICS:

WED UI:







10. ADVANTAGES:

- Wearable device is that, according to its design, it can be accessed from any mobile device and does not mandate a lot of technical knowledge from the user to operate.
- The device has IoT monitoring that allows the child to be monitored.
- It also has numerous sensors that are used to detect exact signals such as heart rate, temperature, and other dangers and alert the parents.

11.CONCLUSION:

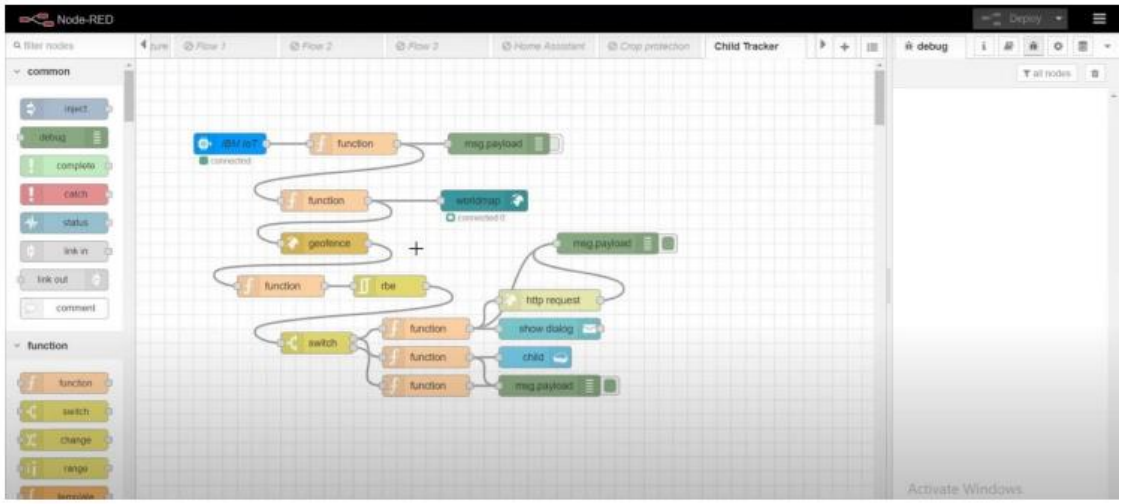
This paper surveys various papers related to an IOT based safety wearable device that helps the parents or guardians to monitor the safety of their ward or children. The main aim is to provide an effective and convenient solution to the parents or guardians to keep track of their child's safety. In summary, the parents or guardians will be alerted if abnormal values are read by the sensor or if values on these sensors cross a given threshold value, alerting them that the child could be in danger. This helps the parents to locate and monitor their child's safety.

12. FUTURE SCOPE:

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.

13.APPENDIX:

SOURCE CODE:



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

myConfig = {
    "identity": {
        "orgId": "hj5fmy",
        "typeId": "NodeMCU",
        "deviceId": "12345"
    },
    "auth": {
        "token": "12345678"
    }
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
        name= "Smartbridge"
        #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 IBM IoT platfrom: ",myData)
        time.sleep(5)

client.disconnect()
```

14.GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-30220-1660141915