KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HX 8001-PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

IoT Based Safety Gadget For Child Safety Monitoring & Notification

NALAIYA THIRAN PROJECT REPORT 2022

Submitted by

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Team ID: PNT2022TMID13499

NOVEMBER 2022

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CHAPTER 1
INTRODUCTION

The Internet of Things is extremely important to daily life. The main distinction between embedded systems and IoT is that embedded systems have a dedicated programme installed in the chip, but IoT devices are intelligent devices that can make decisions based on their surroundings. The advancement of sensor technology, the accessibility of devices with internet connections, and data analysis algorithms enable IoT devices to respond intelligently and autonomously to emergencies. IoT devices are so used in a variety of industries, including agriculture, medicine, industry, security, and communications. IoT solutions are helpful for performing deeper automation, analysis, and integration inside a system. The Internet of Things (IoT) advances technology through improvements in tools, hardware, and software. Even technology in the areas of robotics, networking, and sensing is utilised. By utilising cutting-edge components that affect users' social, economic, and political influence, IoT brings about worldwide transformations. The safety of children and women is a difficult issue in today's society because of the antisocial elements. The number of crimes is rising daily. High levels of surveillance are required in workplaces and schools to ensure the

safety of children and women. Smart Mobile applications that are based on phones and offer alert systems are playing a significant part in assuring safety.

The control room of a nearby police station or child care providers are notified by the mobile apps. Although location monitoring technology is commercially accessible, according to the literature, it does not offer a comprehensive solution to the issue. The answer to this issue is to create an Internet of Things (IoT) gadget that can track a child's whereabouts and environment and, in the event of an emergency, automatically alert the parents.

1.1 PROJECT OVERVIEW:

Mobile applications that are based on phones and offer alert systems are playing a significant part in assuring safety.The control room of a nearby police station or child care providers are notified by the mobile apps. Although location monitoring technology is commercially accessible, according to the literature, it does not offer a comprehensive solution to the issue. The answer to this issue is to create an Internet of Things (IoT) gadget that can track a child's whereabouts and environment and, in the event of an emergency, automatically alert the parents.

1.2 PURPOSE:

Parents may follow their children's whereabouts at all times with the aid of a child tracker. They can easily set up a geofence around the specific location 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 of the location information.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM

[1] RFID-based System for School Children Transportation Safety Enhancement

This study introduces a system to track school-age children's pick-up and drop-off times in order to improve their safety while travelling to and from school every day. The bus unit and the school unit are the two basic components of the system. When a child enters or exits the bus, the equipment on the bus can detect it. This information is given to the school department, which determines which of the kids missed the bus or got off early and sends out an alert message in response. The system features a created web-based database-driven application that facilitates its operation and gives authorised staff relevant information about the kids. The proposed system's full prototype was implemented and evaluated for validity. the

functionality of the system. The approach appears to have promise for daily transportation safety, according to the data.

[2]. Design and Development of an IOT based wearable device

Women's safety and security, as well as that of young girls The objective of this endeavour is to create a wearable gadget for women and girls' protection and safety. By examining physiological signals in conjunction with bodily position, this goal is accomplished. The body temperature and galvanic skin resistance are the physiological signs that are examined. The acquisition of raw accelerometer data from a triple axis accelerometer is used to calculate body position.

After gathering the raw data, a machine learning algorithm specifically designed for activity recognition is used. By wirelessly transmitting sensor data to an open source Cloud Platform, real-time data monitoring is made possible.

[3]. Child Safety Wearable Device

Parents are not required to own a smart phone. In order to extract information from the kit, a set of keywords is used. To find the child's whereabouts, utilise the location keyword. The UV keyword is used to determine the ambient temperature. The buzzer that is fixed in that device can be activated using the keyword BUZZ. The device receives a signal using SOS.

[4]. Smart Intelligent System for Women and Child Security

pressure switch-equipped portable gadget. The user can apply pressure to the device by squeezing or compressing it as soon as an attacker is preparing to attack the person or as soon as the person perceives any insecurity from a stranger. Instantaneously the pressure sensor detects this pressure, and a call is placed to the victim's parents' or guardian's mobile phone numbers that were put in the device at purchase, along with a regular SMS that includes the victim's location. The identical message will be delivered to the police if the call goes unanswered for an extended period of time. Additionally, a notification with the real-time location is sent if the user enters an area that is typically off-limits to them.

2.2 REFERENCES

[4] Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015. RFID-based System for School Children Transportation Safety Enhancement.

[2] AnandJatti, MadhviKannan , Alisha RM, Vijayalakshmi P, ShresthaSinha, Design and Development of an IOT based wearable device forthe Safety and Security of women and girl children “, IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 20-21, 2016, India.

[3] Akash Moodbidri, Hamid Shahnasser, Child Safety Wearable Device, Department of Electrical and Computer Engineering San Francisco State University.

[4] Prof. Sunil K Punjabi, Prof. Suvarna Chaure, Smart Intelligent System for Women and Child Security Department of Computer Engineering SIES Graduate School of Technology Nerul, Navi Mumbai, India.

2.3 PROBLEM STATEMENT DEFINITION

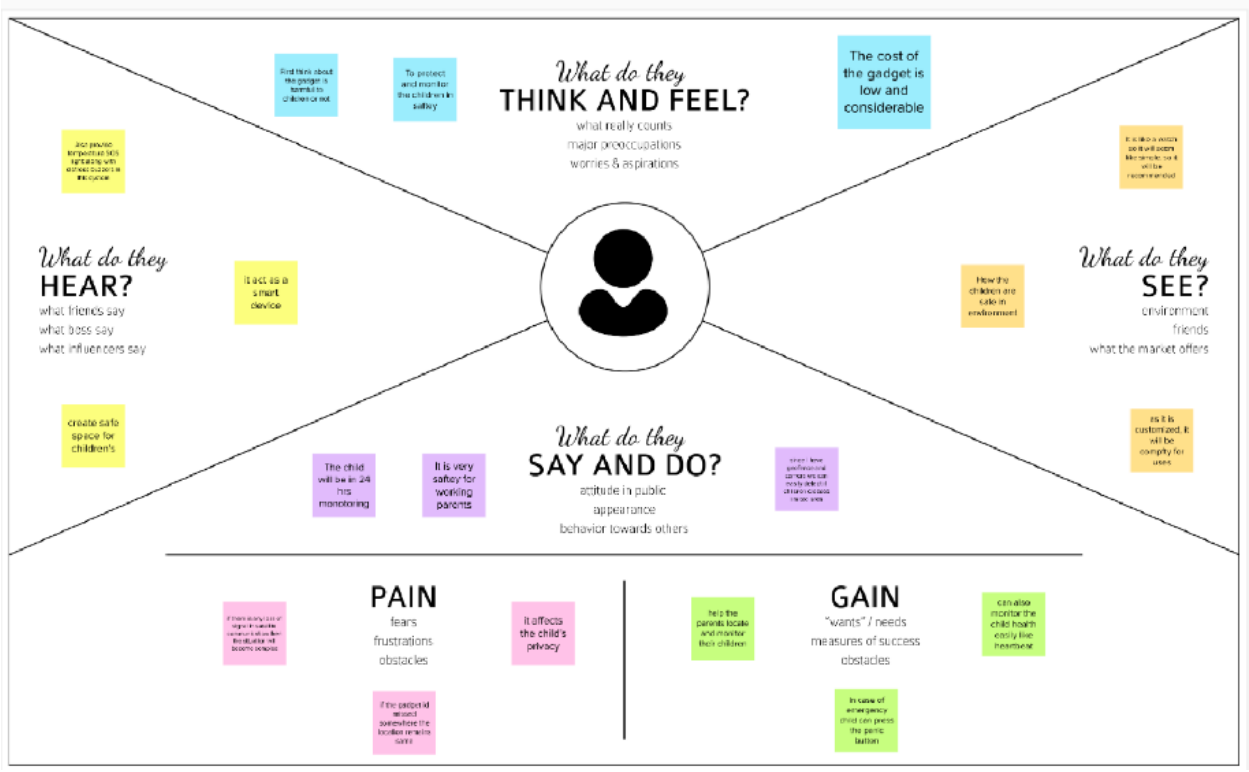
Nowadays, crime rate associated with children keeps increasing due to which draws peoples' attention regarding child safety. This research is conducted to propose a child security smart band utilizing IOT technology. A smart IOT device for child safety and tracking is developed to help the parents to locate and monitor their children. By this, parents know what is happening remotely and can take actions if something goes wrong.

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a simple, easy-to-digest visual that captures data a couple of user's behavior and attitudes. It's a great tool to helps groups higher perceive their users. making a good answer needs understanding truth drawback and therefore the one that is experiencing it. The exercise of making the map helps participants take into account things from the user's perspective in conjunction with his or her goals and challenges.



3.2 INDEATION & BRAINSTORMING

Brainstorming provides a free and open setting that encourages everybody among a team to participate within the creativity method that ends up in downside

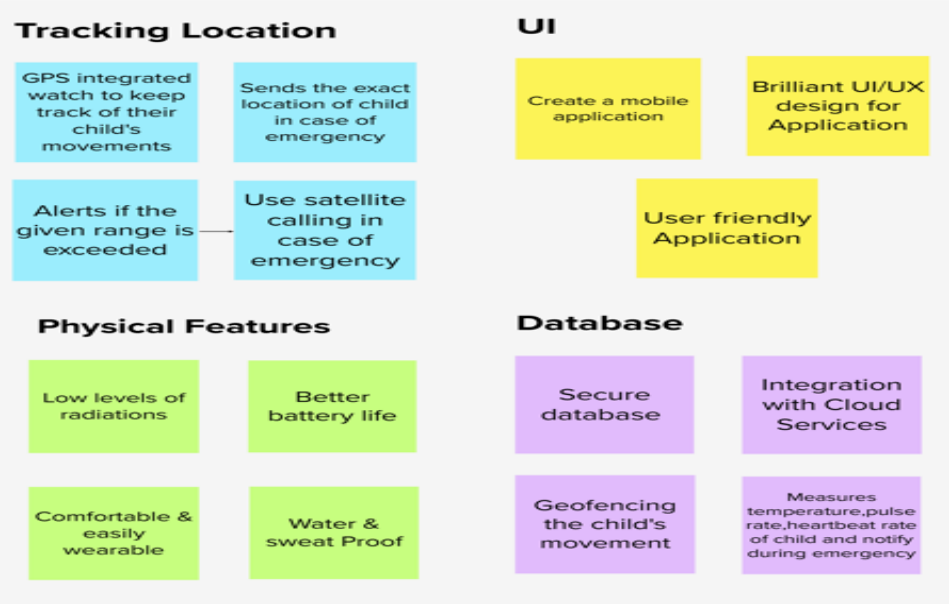
resolution. Prioritizing volume over value,out participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

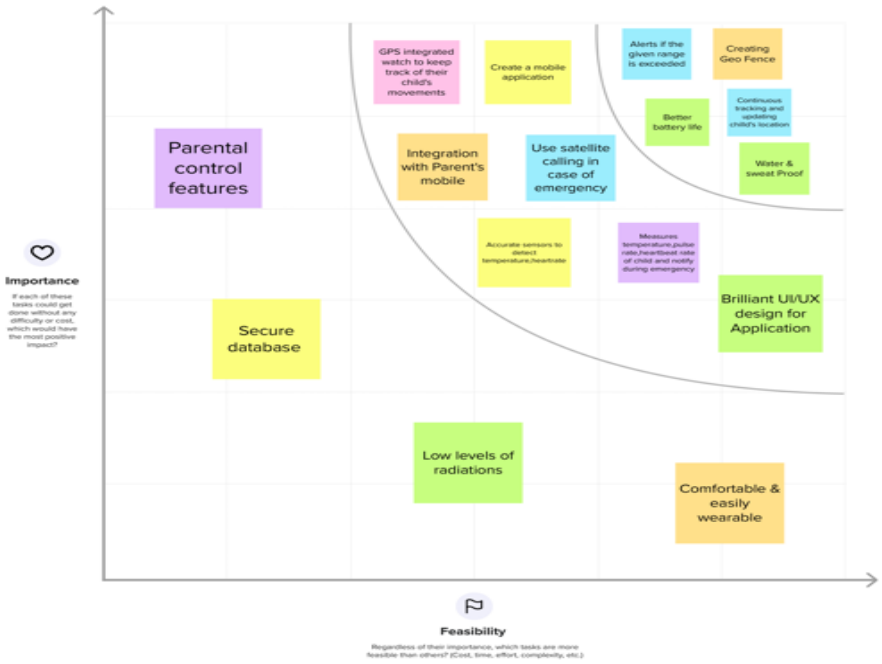


4

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

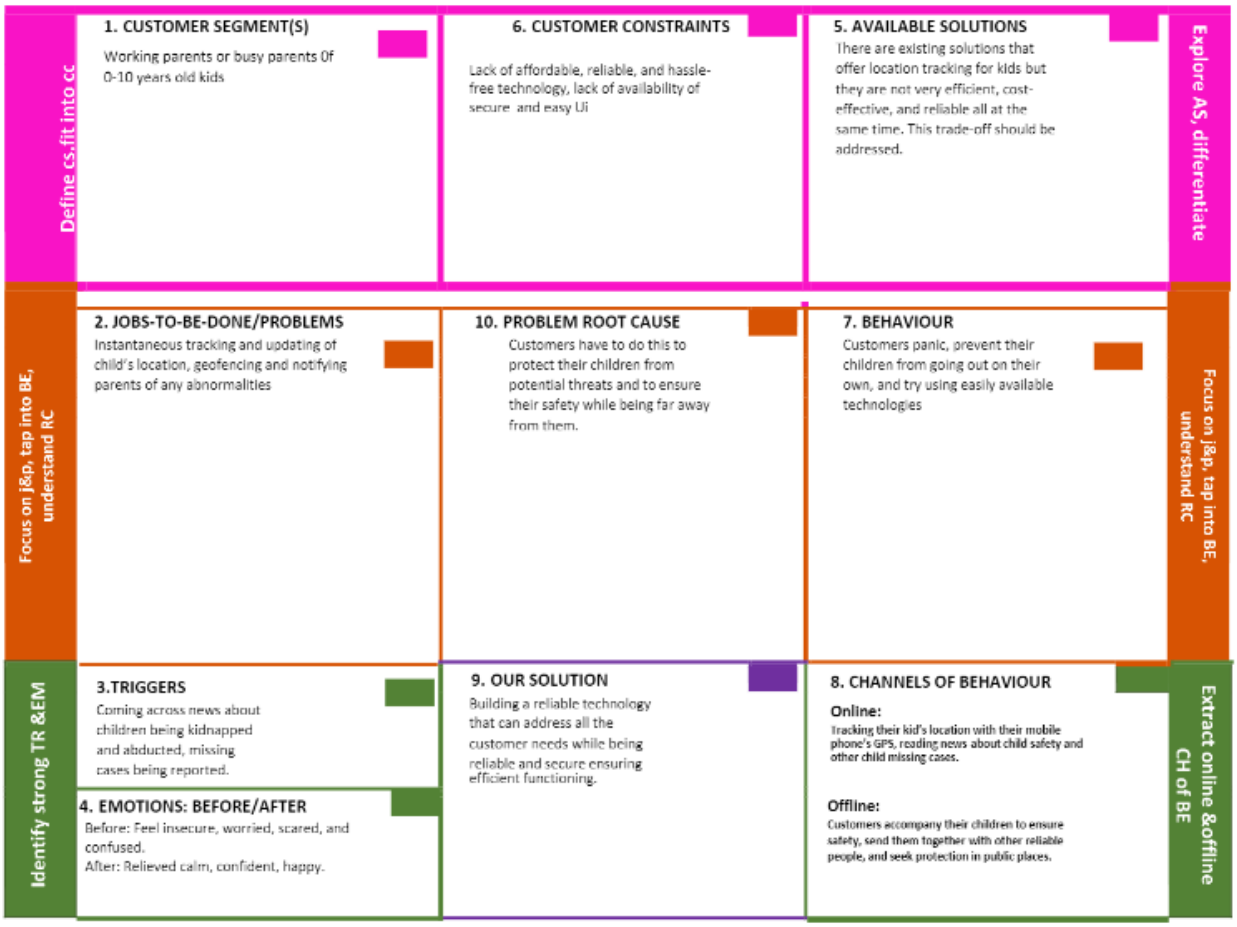


3.3 PROPOSED SOLUTION

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

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Nowadays, parents concern more about serious cases such as missing children, abduction and abuse. They cannot sit with their children 24/7 hours to secure their children and monitor the children's activities
2.	Idea / Solution description	Create a Child tracker that helps the parents monitor 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.
3.	Novelty / Uniqueness	The novelty of the work is that the system automatically alerts the parent/caretaker by sending a Notification , when immediate attention is required for the child during an emergency.
4.	Social Impact / Customer Satisfaction	The parents may get a notification about whether the child reached the school or not
5.	Business Model (Revenue Model)	• Easy to use • Low cost • Weightless • Compatible
6.	Scalability of the Solution	• Gadget ensures the safety and tracking of the children • Parents need not worry about their children.

3.4 PROBLEM SOLUTION FIT



CHAPTER 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 App
FR-4	User Interface	Mobile App- MIT App Inventor Able to see location of children when they are out ofgeofence

4.2 NON-FUNCTIONAL REQUIREMENT

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

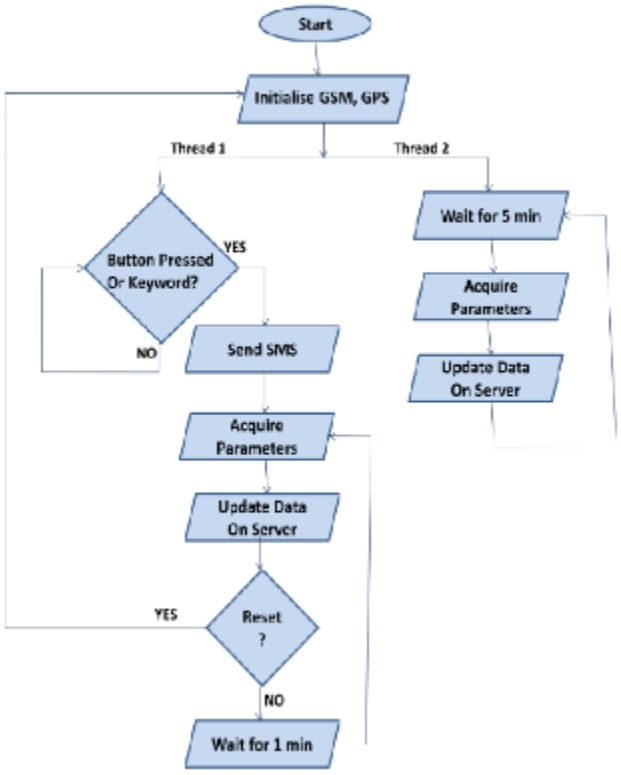
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Accessed through Mobile App Showing location (latitude and longitude) of child
NFR-2	**Security**	Database security must meet HIPAA requirements
NFR-3	**Reliability and Availability**	Once logged in ,webpage is available until logging out of the app
NFR-4	**Performance**	Each page must load within a seconds
NFR-5	**Scalability**	The process must finish within 3 hours so data is available by 8 a.m. local time after an overnightupdate

CHAPTER 5

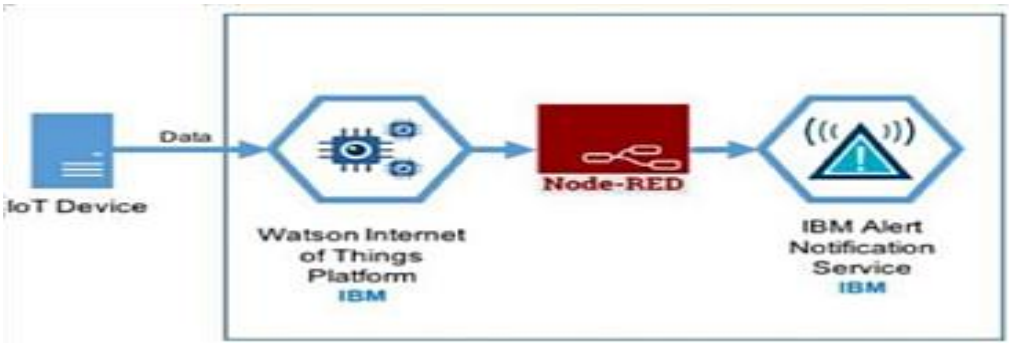
PROJECT

5.1 DATA FLOW DIAGRAM

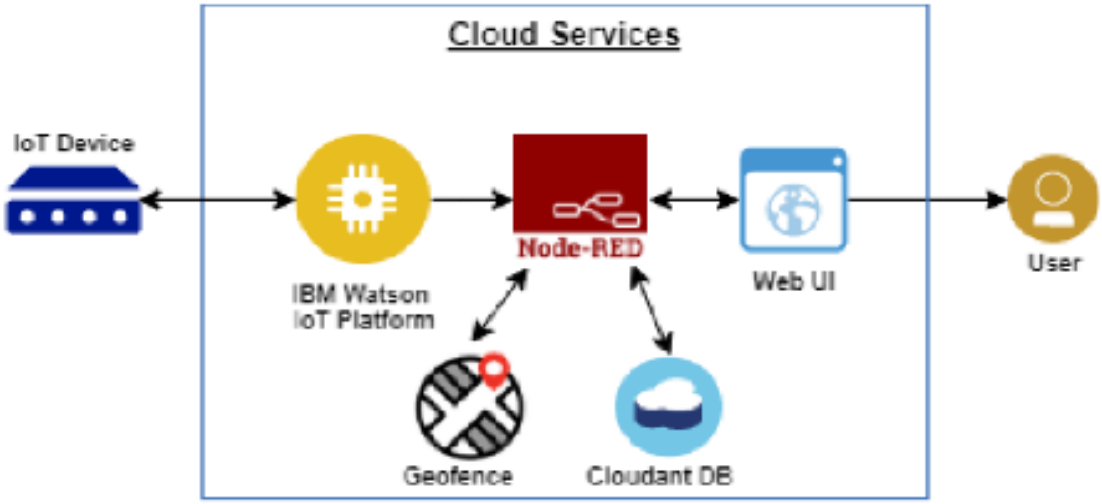
A data flow chart shows however data flows through a method or system .This includes data input and output, data storage, and various sub processes through which data moves. DFDs area unit created mistreatment standardized symbols and notations to explain varied entities and their relationships.



5.2 SOLUTION ARCHITRCTURE



5.2 TECHNICAL ARCHITECTURE



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Parents Mobile user)	Registration	USN-1 (FATHER)	I can access the location of my children using the credentials provided as a Father.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-2 (MOTHER)	I can access the location of my children using the credentials provided as a Mother.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-3 (GUARDIAN)	I too can monitor the children's activitiesusing safety gadget monitoring system.	I can access my account / dashboard and receive confirmation email & click confirm	Medium	Sprint-2
	Login	USN-4 (if required)	Same function to be performed as in previous cases.	Same function to be performed as in previouscases.	Not Yet Determined	----
	Dashboard	USN-5 (if required)	Same function to be performed as in previous cases.	Same function to be performed as in previous cases.	Not Yet Determined	- - - -

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Sprint	Functionall Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Registration	USN-1	Registration through websiteRegistration through app	2	High	Kishor M Anandhakrishnan B Guna R Kumaresan B
Sprint-1	User Confirmation	USN-2	Confirmation via EmailConfirmation via OTP	1	High	Kishor M Anandhakrishnan B Guna R Kumaresan B
Sprint-2	User login	USN-3	Setting up User Id and password	2	Low	Kishor M Anandhakrishnan B Guna R Kumaresan B
Sprint-1	App permission	USN-4	Grant the permission for the app to access location,contact etc..	2	Medium	Kishor M Anandhakrishnan B Guna R Kumaresan B
Sprint-1	Interface with the Device	USN-5	Connecting the device with the registered appwith thedevice ID.	1	High	Kishor M Anandhakrishnan B Guna R Kumaresan B

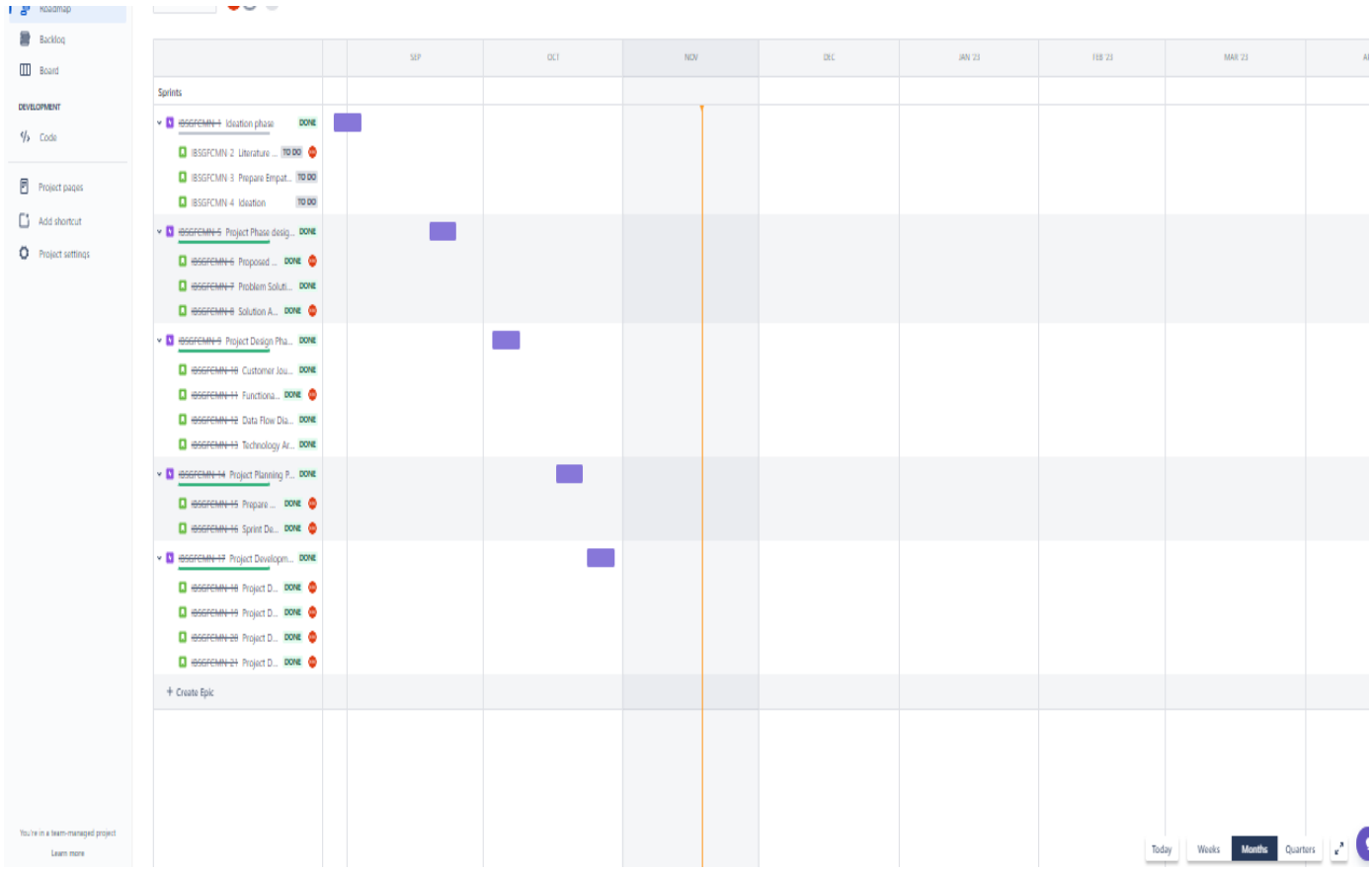
6.2 SPRINT DELIVERY SCHEDULE

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	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	31 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	07 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	14 Nov 2022

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

6.3 REPORTS FROM JIRA

JIRA helps teams plan, assign, track, report, and manage work and brings teams for everything from agile software development and customer support to start-ups and enterprises

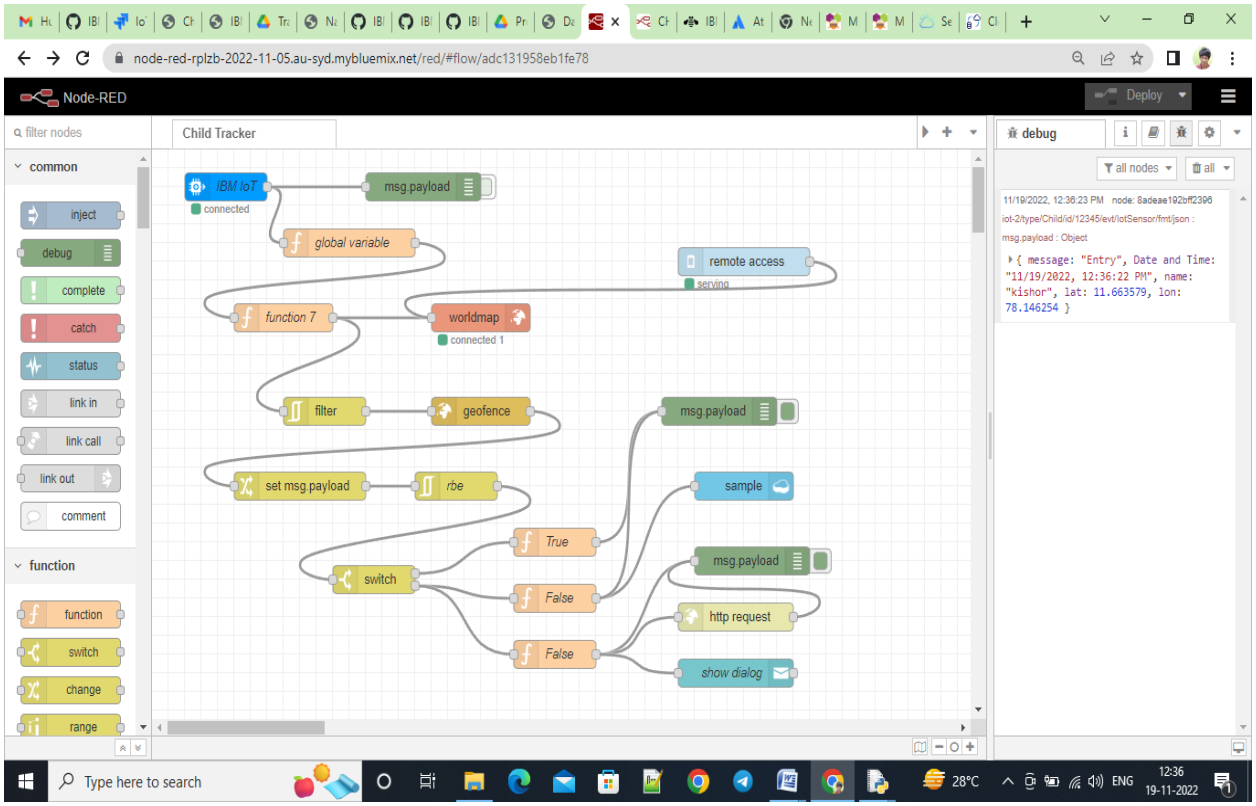


7. CODING & SOLUTIONING

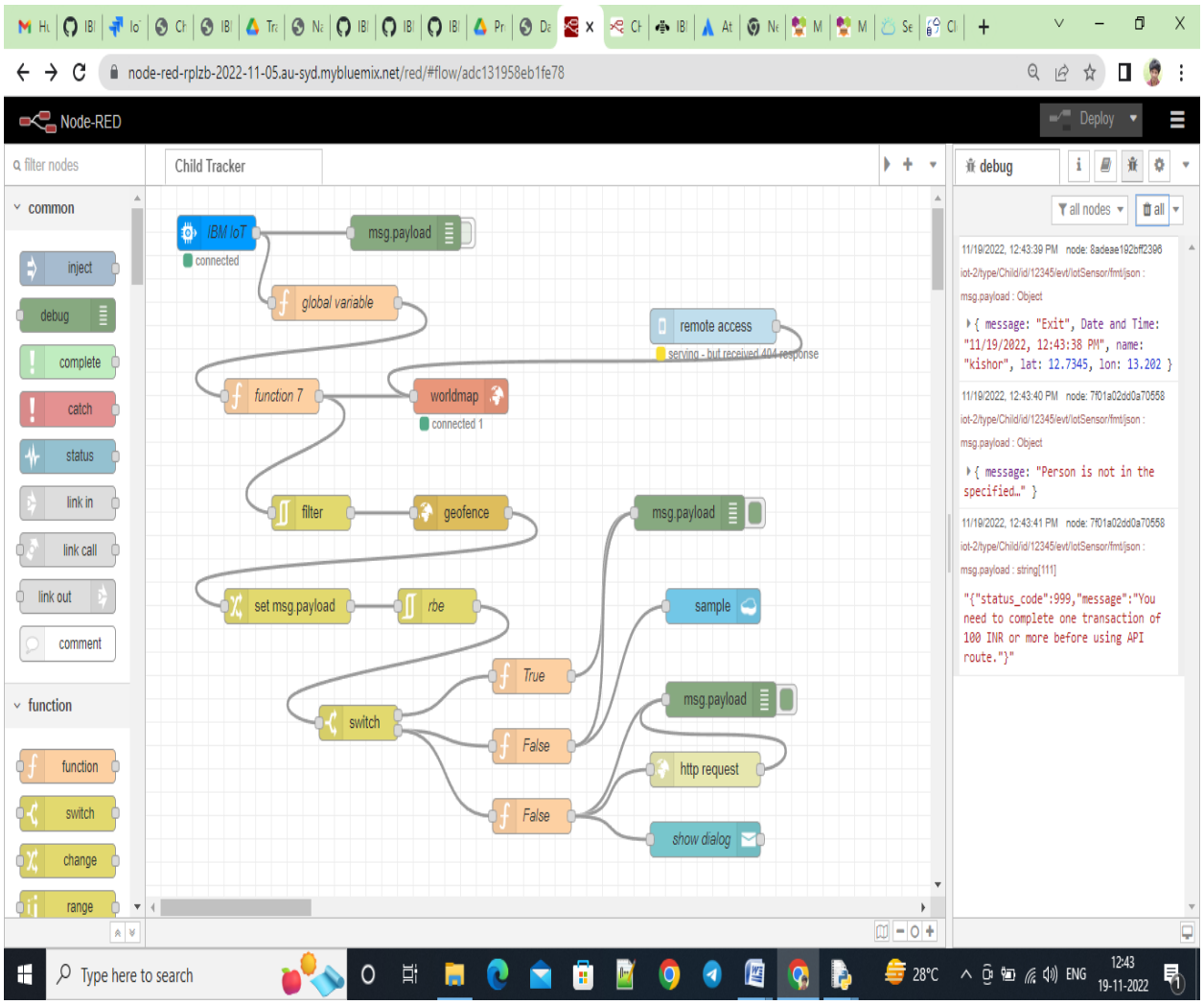
(Explain the features added in the project along with code)

7.1 Feature 1(Node-Red)

NODE RED IN AREA LOCATION



NODE RED OUT AREA LOCATION



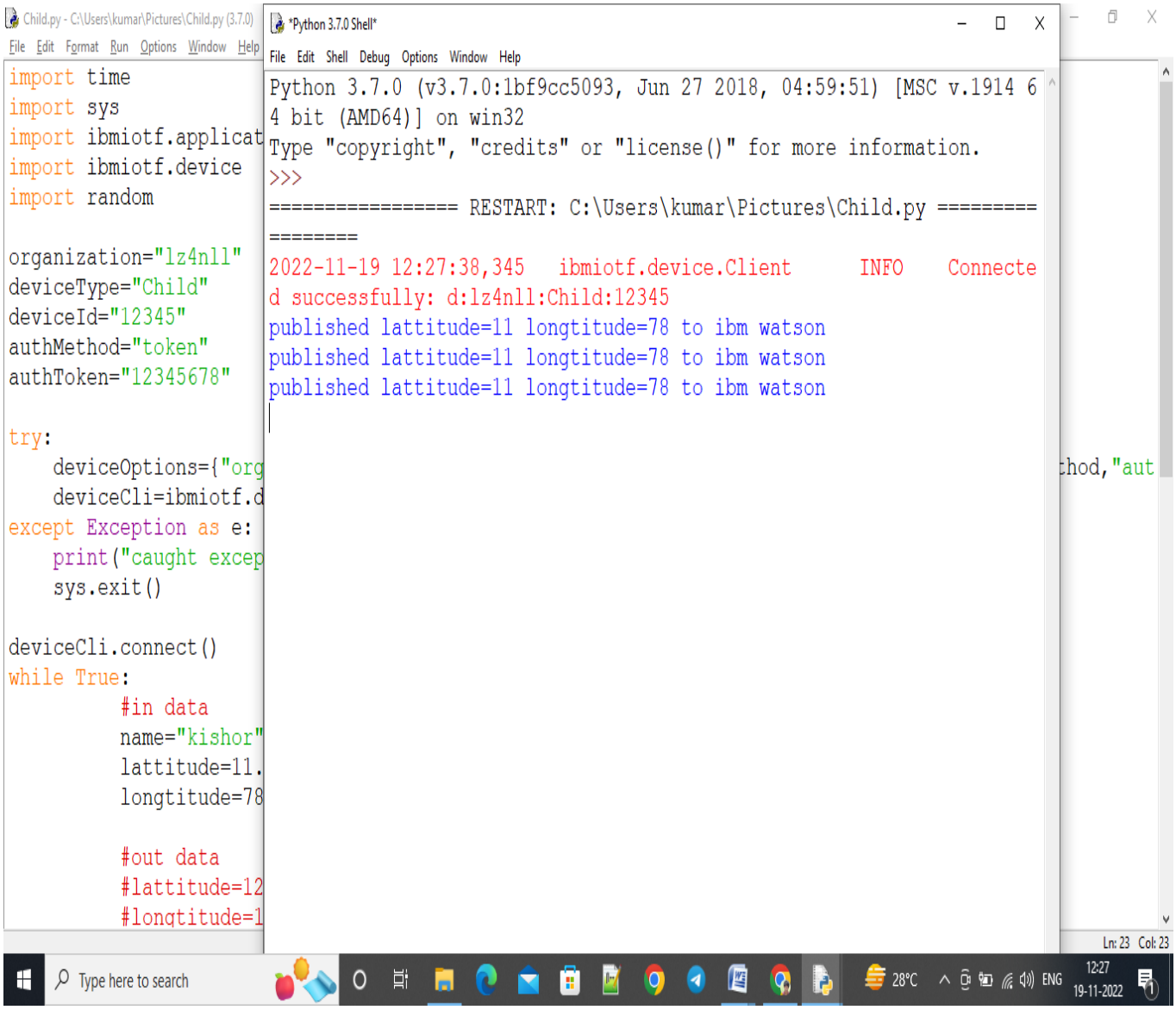
7.2 Feature 2(IBM Watson Iot platform)

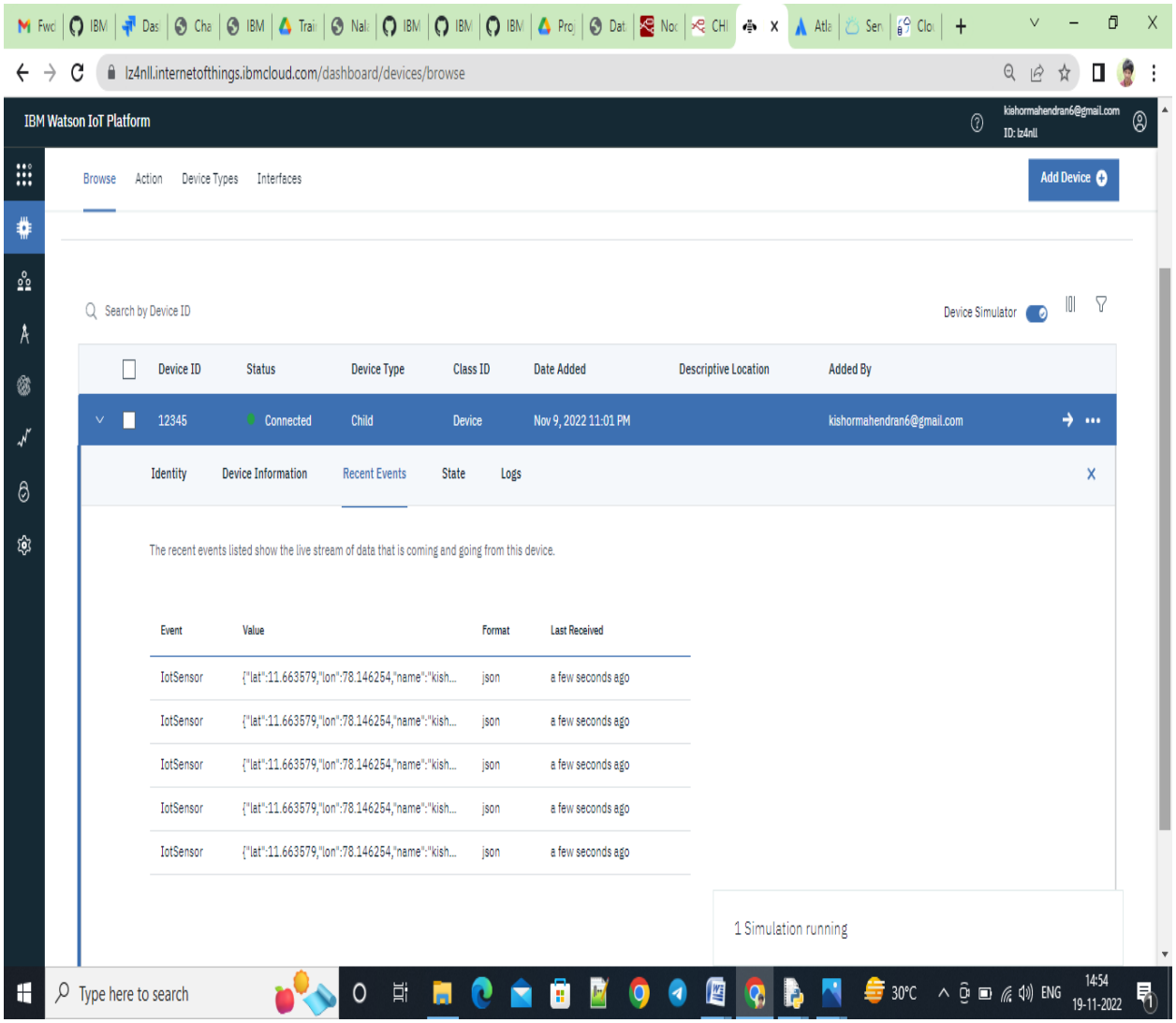
```
import time

import sys

import ibmiotf.application

import ibmiotf.device

import random

organization="lz4nll"

deviceType="Child"

deviceId="12345"

authMethod="token"

authToken="12345678"

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()
deviceCli.connect()
while True:
#in data
name="kishor"
lattitude=11.663579;
longtitude=78.146254;
#out data
#lattitude=12.7345;
```

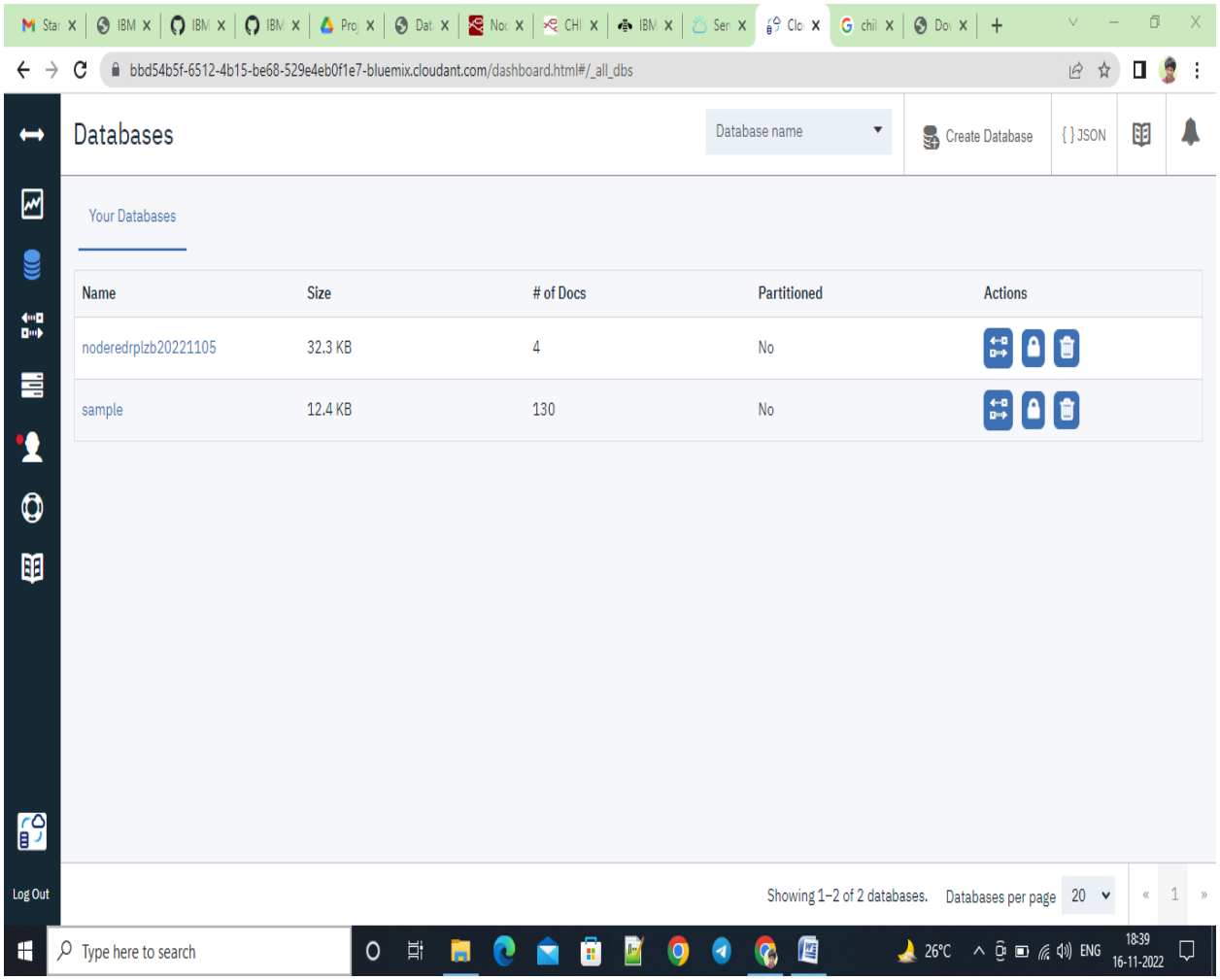
```
#longtitude=13.2020;

data={'lat':lattitude,'lon':longtitude,'name':name}

def myOnPublishCallback():

print("published lattitude=%d" %lattitude,"longtitude=%d"

%longtitude,"to ibm watson")

success=deviceCli.publishEvent("IotSensor","json",data,qos=0,on_publi

sh=myOnPublishCallback)

if not success:

print("Not connected to IoTF")

time.sleep(3)

deviceCli.disconnect()
```

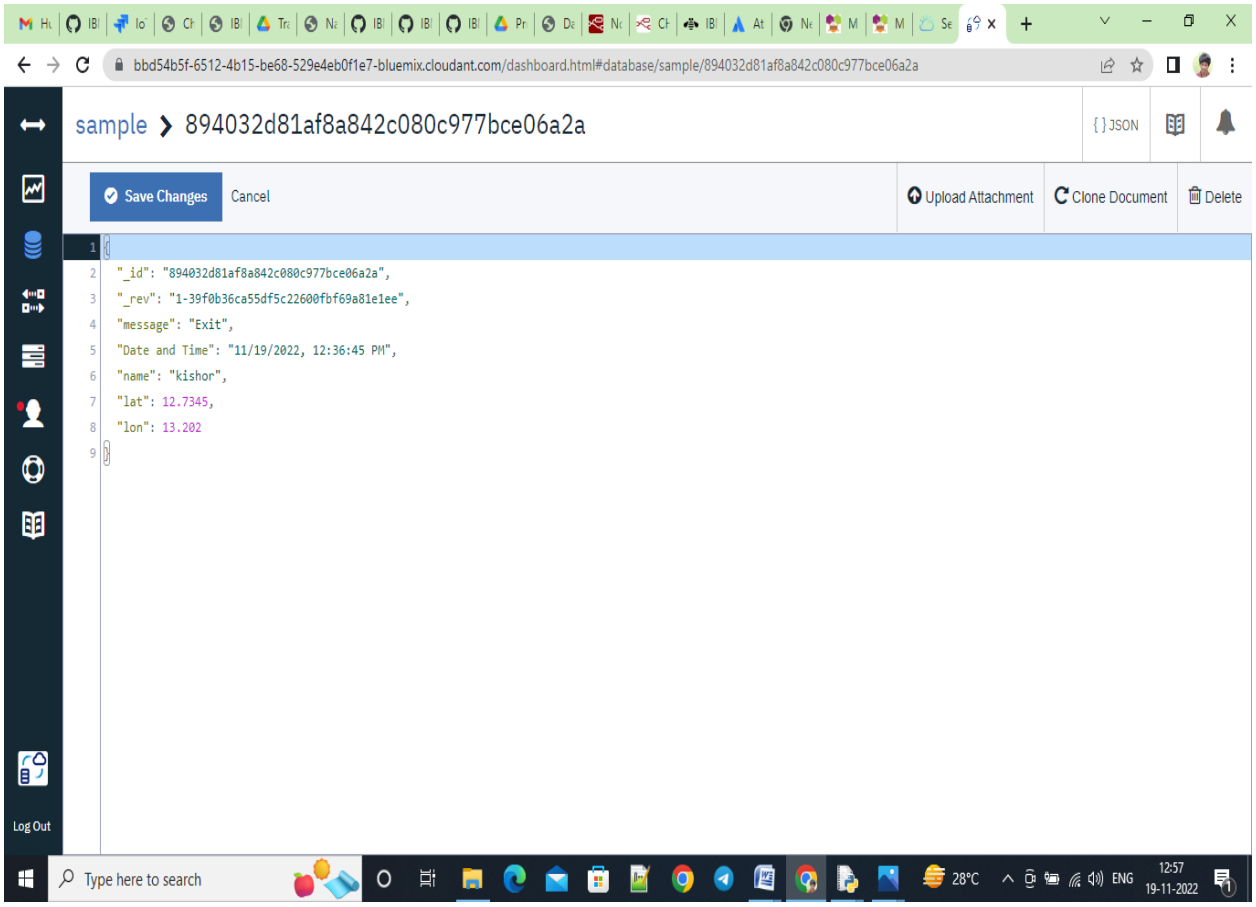
PYTHON CODE OUTPUT




lz4nll.internetofthings.ibmcloud.com/dashboard/devices/browse
IBM Watson IoT Platform
kishormahendran6@gmail.com
ID: lz4nll
Browse
Action
Device Types
Interfaces
Add Device
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
Added By
12345
Connected
Child
Device
Nov 9, 2022 11:01 PM
kishormahendran6@gmail.com
Identity
Device Information
Recent Events
State
Logs
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received
IotSensor
{"lat":11.663579,"lon":78.146254,"name":"kish...
json
a few seconds ago
1 Simulation running
Type here to search
30°C
ENG
14:54
19-11-2022

7.3 DATABASE SCHEMA




bbd54b5f-6512-4b15-be68-529e4eb0f1e7-bluemix.cloudant.com/dashboard.html#database/sample/894032d81af8a842c080c977bce06a2a
sample ❯ 894032d81af8a842c080c977bce06a2a
{ } JSON
Save Changes
Cancel
Upload Attachment
Clone Document
Delete
{
"_id": "894032d81af8a842c080c977bce06a2a",
"_rev": "1-39f0b36ca55df5c22600fbf69a81e1ee",
"message": "Exit",
"Date and Time": "11/19/2022, 12:36:45 PM",
"name": "kishor",
"lat": 12.7345,
"lon": 13.202
}
Log Out
Type here to search
28°C
ENG
12:57
19-11-2022

CHAPTER 8

TESTING

8.1 TEST CASES

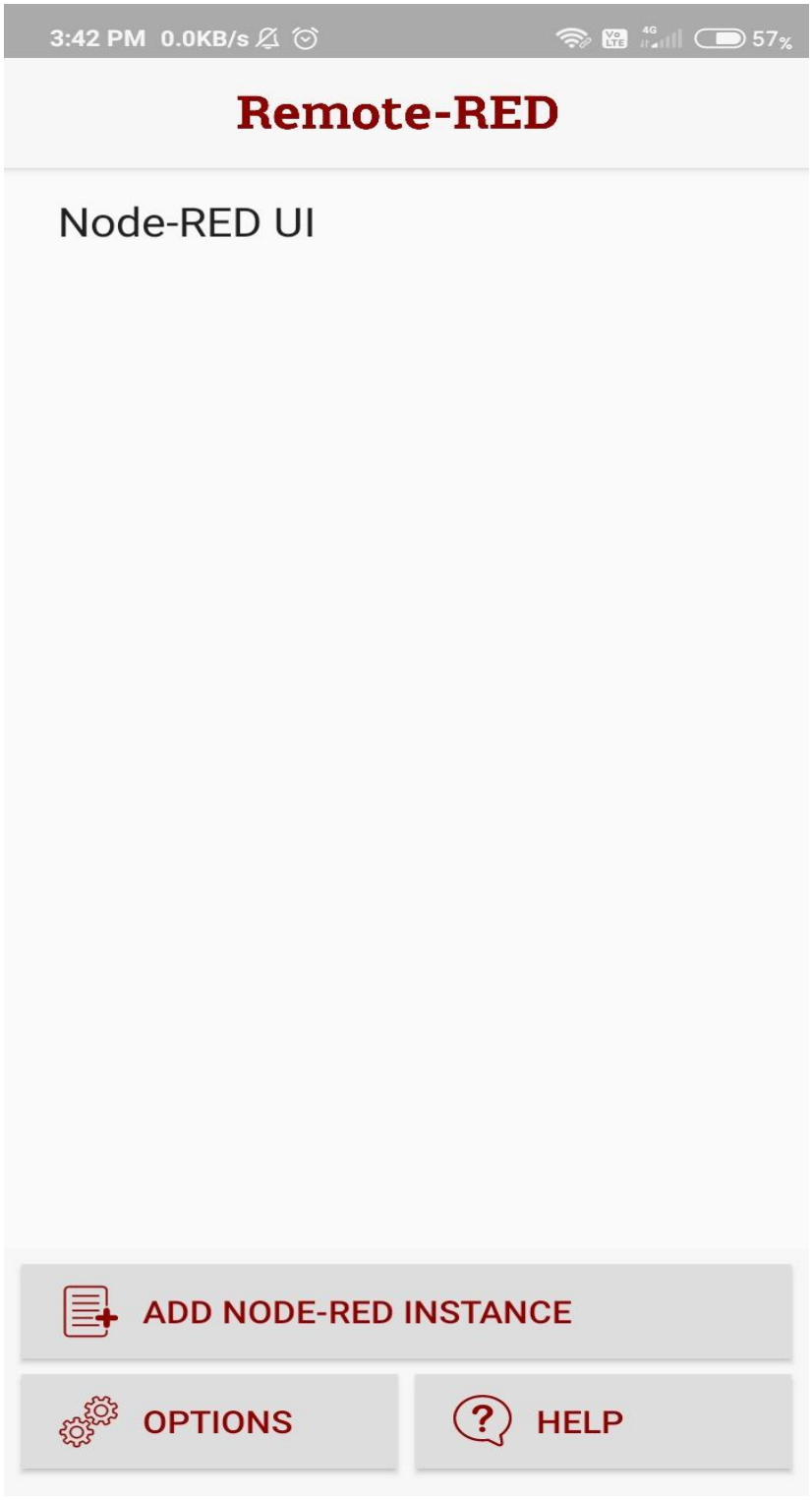
TEAM ID : Team ID : PNT2022TMID13498

PROJECT :IoT Based Safety Gadget for Child Safety Monitoring & Notificatic

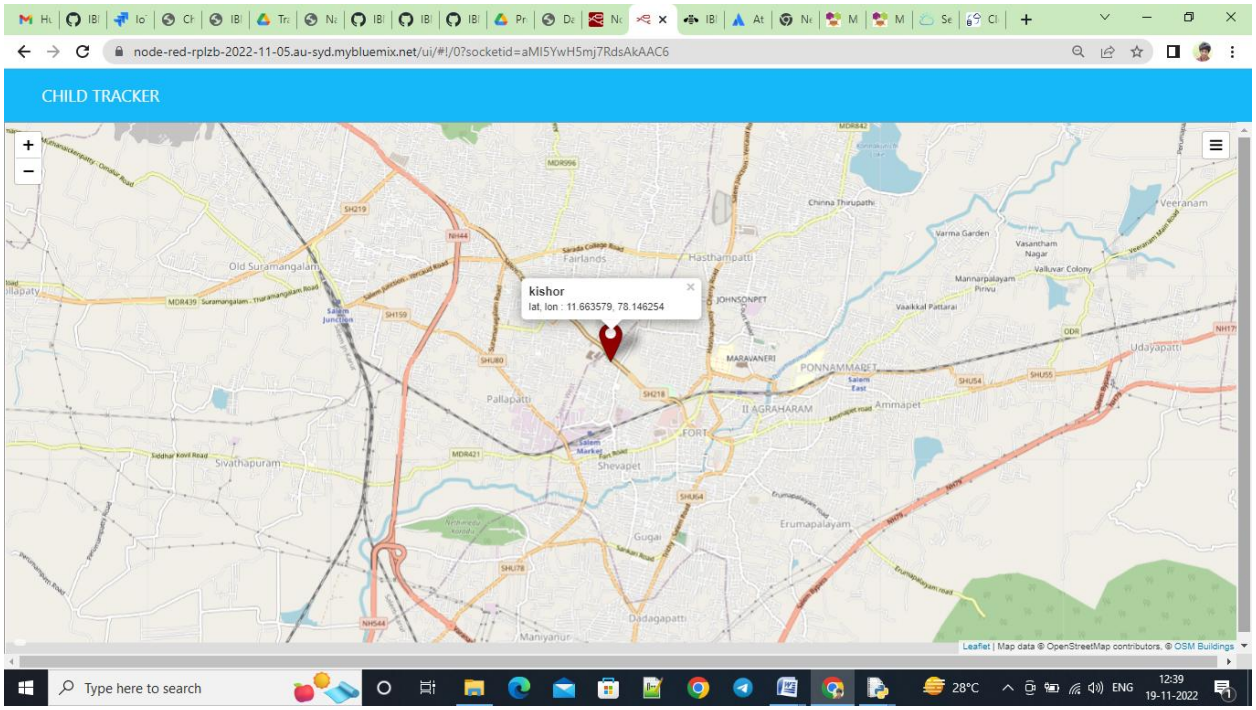
DATE : 17 NOVEMBER 2022

ESTCASE ID	TESTCASE	TEST SCENARIO	TEST STEPS	INPUTS	EXPECTED OUTPUT	ACTUAL OUTPUT	TEST RESULT	TEST COMMENTS	BUG ID	TESTED BY
1	M WATSON IOT PLATFOR	To check whether the ibm watson is get connected	login to ibm watson iot platform	id , password	it should get login to the watson page	it has been logged in to the login page	PASS	GOOD		Kishor.M
			check whether it has the separate organization id	new id	it should shows the organization id	separate organization id has been shown	PASS	GOOD		Kishor.M
			check whether team mates are get connected	team mates id	it should shows the all the team members name / id	it is showing all the team members	PASS	GOOD		Kishor.M
			check whether separate device name , id , authentication token generated	device name , type	new device should be create	new device has been created	PASS	GOOD		Kishor.M
			to check whether it is showing output	device code and inputs	it should shows device gets connected and should show the output	its showing that device gets connected and output are verified	PASS	GOOD		Kishor.M
2	Python Compiler and Wokw	to check the connection is established	To check the distance of the person	Distance measuring	it need to show the distance value sometimes	it show measured distance	PASS	GOOD		Kumaresan.B
			to check whether the distance between a person	latitude and longitude	it should show range of the person	it detect the range value for input	PASS	GOOD		Kumaresan.B
3	NODE-RED	to check whether node-red is connected and shows the output	login in to node-red	id , password	it should get login to the node-red page	its get entered into the login page	PASS	GOOD		Kumaresan.B
			check whether all the necessities are imported and connected	nodes	it should not show any error on nodes	it is not showing any errors	PASS	GOOD		Kumaresan.B
			check whether all the nodes ar connected	node connection	blocks should gets	blocks has been	PASS	GOOD		Kumaresan.B
			check whether the output are shown in nodered	output found or not	output should be obtained	output has been obtained	PASS	GOOD		Kumaresan.B
4	QR CODE	check whether qr code is generated	check whether the code shows any error	code	it should not shows any	it is not showing any errors	PASS	GOOD		Anandhakrishnan.B
			check whether the remote red provide QR code	QR Code	QR code has been	QR code is generated	PASS	GOOD		Anandhakrishnan.B
			check whether the remote red app is installed in mob	install in mobile	user should install mobile	app is install successfully	PASS	GOOD		Anandhakrishnan.B
			check whether the QR code get connected	app link	mobile gets connected	mobile has been	PASS	GOOD		Anandhakrishnan.B
			check whether the screen is found in mobile	screen found	screen should be	screen has been generated	PASS	GOOD		Anandhakrishnan.B
5	TESTING	check entire process	check watson is connected	watson	iot watson should produce	iot watson has producing	PASS	GOOD		Guna.R
			check node-red is connected	node-red	node-red should produce its output	node-red has been producing its output	PASS	GOOD		Guna.R
			check whether python is connected	python	python should gets	python has been	PASS	GOOD		Guna.R
			check whether details are shown	Remote node red	details in remote node red should be shown(For	details in Remote node red should be shown	PASS	GOOD		Guna.R

8.2 User Acceptance Testing (View In Remote Node red)



9. RESULTS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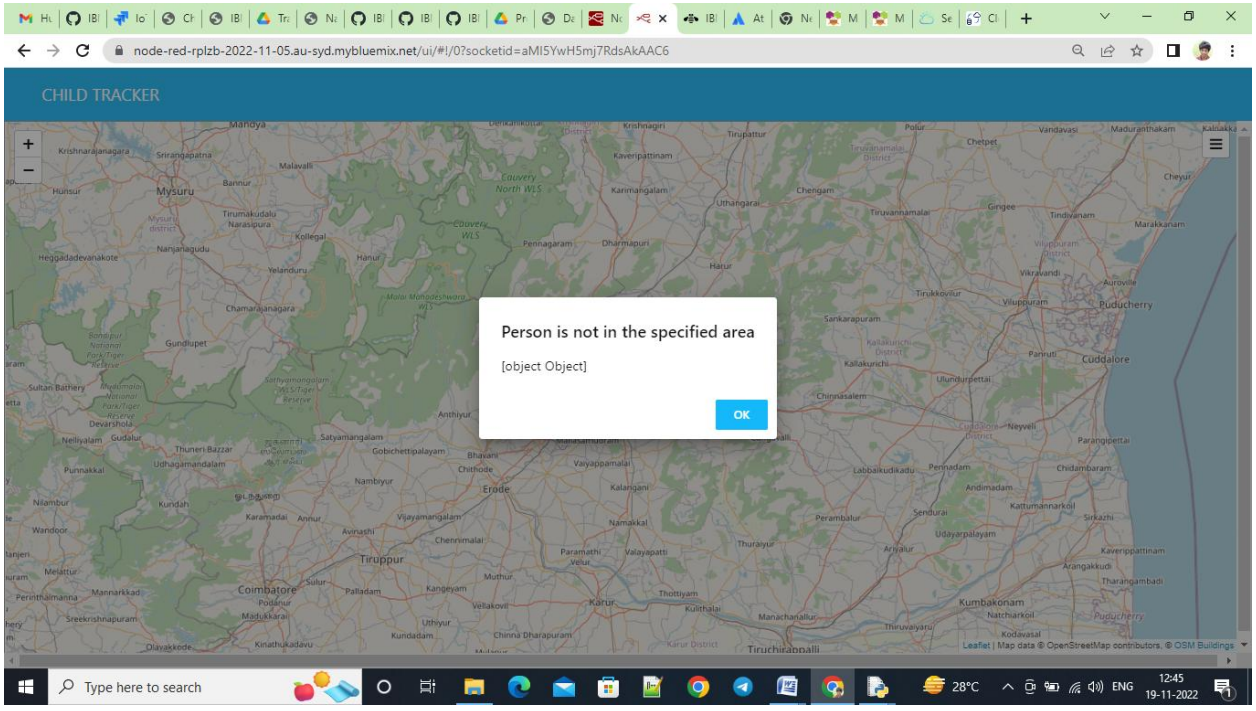
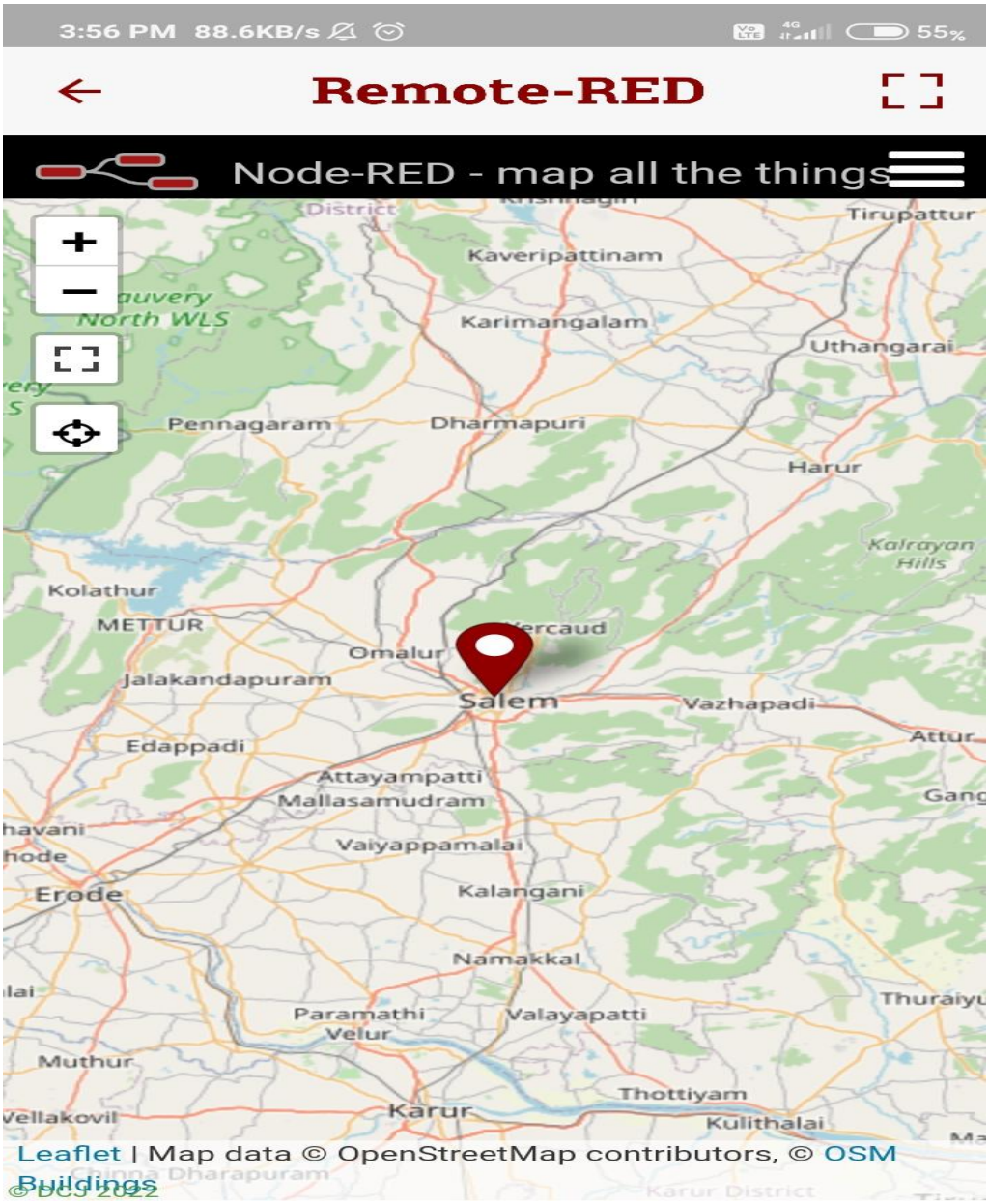
CHILD TRACKER
kishor
lat, lon : 11.663579, 78.146254
Type here to search
28°C
ENG
12:39
19-11-2022


node-red-rplzb-2022-11-05.au-syd.mybluemix.net/ui/#!/0?socketid=aMI5YwH5mj7RdsAkAAC6
CHILD TRACKER
Person is not in the specified area
[object Object]
OK
Type here to search
28°C
ENG
12:45
19-11-2022

9.1 PERFORMANCE METRICS

REMOTE RED IN MOBILE APP :



CHAPTER 10

10.1 ADVANTAGES

1. A Child's 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 travelling.
3. Usually, children tend to wander a lot with the help of the GPS Tracking devices, you can easily and quickly know where you children are.
4. Parents will get all the details like kid boarding and de-boarding school bus.
5. They can get emergency alerts when the child fails to board or de-board at the other stop.
6. Prevention abduction and let your children play and walk around safely.

10.2 DISADVANTAGES

1. Young children may refuse to coperate unless allowed to play with their gadgets
2. Excess use of electronics gadgets can lead to the 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. Even like sometimes the gadget may not work properly like device bugs and etc.

CHAPTER 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. 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.

This wearable device has a superior mode for viewing and locating the children\'s whereabouts 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

FUTURE SCOPE 12

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 of time.

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 stand by 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 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.

APPENDEX 13

SOURCE CODE :

```
import time

import sys

import ibmiotf.application

import ibmiotf.device

import random

organization="lz4nll"

deviceType="Child"

deviceId="12345"

authMethod="token"

authToken="12345678"

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()
deviceCli.connect()
while True:
        #in data
        name="kishor"
        lattitude=11.663579;
        longtitude=78.146254;
        #out data
        #lattitude=12.7345;
```

```
        #longtitude=13.2020;

        data={'lat':lattitude,'lon':longtitude,'name':name}

        def myOnPublishCallback():

          print("published lattitude=%d" %lattitude,"longtitude=%d"
%longtitude,"to ibm watson")
success=deviceCli.publishEvent("IotSensor","json",data,qos=0,on_publi
sh=myOnPublishCallback)

        if not success:

           print("Not connected to IoTF")

        time.sleep(3)
deviceCli.disconnect()
```

Github Link : https://github.com/IBM-EPBL/IBM-Project-2701-1658481510

Demo Link: https://youtu.be/_dBIyBJV414