ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai)

KARAIKUDI – 630003

PROFESSIONAL READINESS FOR INNOVATION

EMPLOYABLITY AND ENTERPRENEURSHIP

IBM PROJECT REPORT

Submitted by,

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IN
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ALAGAPPA CHETTIAR GOVERNMENT COLLEGE OF ENGINEERING AND TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this PROJECT REPORT **"IoT Based Safety Gadget for Child Safety Monitoring and Notification"** is the bonafide work of for **IBM NALAIYATHIRAN** in VII semester of B.E., degree course in Computer Science and Engineering branch during the academic year of 2022 - 2023.

Staff-In charge Evaluator	**Industrial Evaluator**
Mrs.K.Chandraprabha	Mr.Baradwaj

ABSTRACT

This paper is based on IOT (Internet of Things). As we know in present era everything is based on digital technology. Human being is going to connect each other by using mobile network.
This paper proposes an SMS based solution to reduced parents insecurity and schools to track children's in real time. Different devices are connected with a single device through The concerned device is connected to mobile via SMS.

The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is send location by using mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module. This device will also have the facility of different status of children by measuring the speed of hand movement of children.

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1.INTRODUCTION

1.1.Project Overview

Child tracker helps the parents in continuously monitoring the child's location. Theycan simply leave their children in school or parks and create a geofence around theparticular location. By continuously checking the child's location notifications will begenerated if the child crosses the geofence. Notifications will be sent according to thechild's location to their parents or caretakers. The entire location data will be stored in thedatabase.

1.2.Purpose

The purpose of our project is to safeguard children from being missed, kidnapped. Itmakestheparentsalsotofeelsafeandstopworryingabouttheirkids’safety.Thepurposeis to create a secured environment with this project. By continuously checking the child'slocationnotificationswillbegeneratedifthechildcrossesthegeofence.Notificationswillbe sent according to the child's location to their parents or caretakers. The entire locationdata will be stored in the database. Especially who live in urban area, needed to work dayand night to sustain the family which causes them cannot know where their child is goingduringtheworkinghour.However,withthechildtrackingapp,parentcantrackandmonitortheir childwithjust asimpleapp.Theparentisnotpossibletoalwaysstaybesideof children as most of the parents needs to go for work. By having this child trackingsystem, parents can track the location of their children. In order to avoid the kidnappingcases,thechild trackingsystem is needed.

2.LITERATURE SURVEY

2.1.Existing problem

SL.NO	IEEE PAPER	AUTHORS	METHODOLOGY	MERITS	DEMERITS	YEAR OF PUBLICATION
1	Smart IoT Device for Child Safety and Tracking	M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari	The system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency	The Parameters such as temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same	To implement the IoT device which ensures the complete solution for child safety problems	2019
2	Child safety wearable device	Akash Moodbidri, Hamid Shahnasser	The purpose of this device is to help the parents to locate their children with ease. At the moment there are many wearable's in the market which helps to track the daily activity of children and also helps to find the child using Wi-Fi and Bluetooth services present on the device	This wearable over other wearable is that it can be used in any phone and it is not necessary that an expensive smartphone is required	As, this device's battery gives short life-time	2017
3	Child Safety & Tracking Management System by using GPS	Aditi Gupta, Vibhor Harit	This paper proposed a model for child safety through smart phones that provides the option to track the location of their children as well as in case of emergency children is able to send a quick message and its current location via Short Message services	The advantages of smart phones which offers rich features like Google maps, GPS, SMS	This system is unable to sense human behavior of child	2016
4	Children Location Monitoring on Google Maps Using GPS and GSM	[4] Authors: Dheeraj Sunehera, Pottabhatini Laxmi Priya	The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the location services provided by GSM module. It allows the parents to get their child's current-location via SMS	A child tracking system using android terminal and hoc networks	This device cannot be used in rural areas	2016

2.2.References

1.Starner, T Schiele, B and Pentland, A. (1998) ‘Visual contextual awareness in wearable computing’, Second International Symposium on Wearable Computers, Pittsburgh, PA, IEEE Computer Society, pp. 50-57.

2. AkashMoodbidri, Hamid Shahnasser (Jan 2017) ‘Child safety wearable device’, International Journal for Research in Applied Science & Engineering Technology, Vol. 6 Issue II, IEEE, pp. 438- 444.

3. AsmitaPawar, PratikshaSagare, TejalSasane, KiranShinde (March– 2017) ‘Smart security solution for women and children safety based on GPS using IOT’, International Journal of Recent Innovation in Engineering and Research, vol. 02, Issue. 03, pp.85-94.

4. Nitishree, (May-June, 2016) ‘A Review on IOT Based Smart GPS Device for Child and Women Safety’, International Journal of Engineering Research and General Science, Vol.4, Issue. 3, pp. 159- 164.

5. Kok Sun Wong, Wei Lun Ng, Jin Hui Chong, CheeKyun Ng, AduwatiSali, Nor KamariahNoordin, (15 -17)December 2009) ‘GPS Based Child Care System using RSSI Technique’, Proceedings of the Malaysia International Conference on Communications. pp. 899-904.

2.3.Problem Statement Definition

Child safety and tracking is a major concern as the more number of crimes on children are reported nowadays. With this motivation, a smart IoT device for child safety and tracking is developed to help the parents to locate and monitor their children.

3.IDEATION & PROPOSED SOLUTION

3.1.Empathy Map Canvas

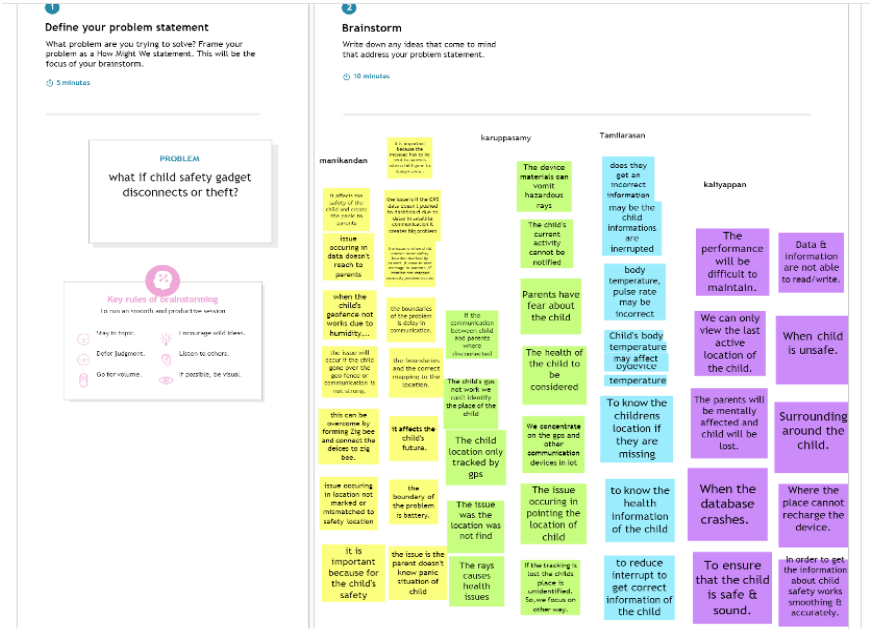
In this activity we are expected to prepare the empathy map canvas to capture the user Pains & Gains, Prepare list of problem statements.

3.2.Ideation& Brainstorming

In this activity we are expected to list the ideas by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.

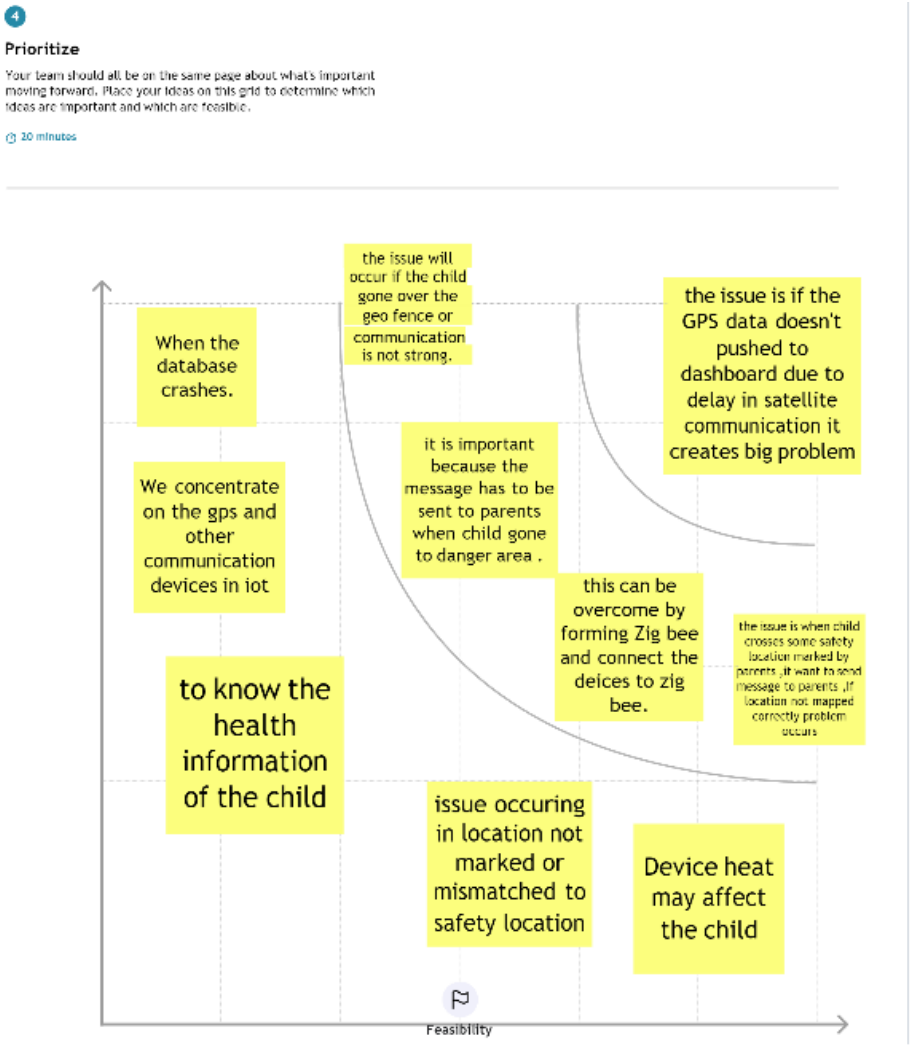
Step-1:TeamGathering,CollaborationandSelecttheProblemStatement

Step-2:Brainstorm,IdeaListingandGrouping




3
Group ideas
20 minutes
Based on location:
We can only view the last active location of the child.
To know the childrens location if they are missing
issue occuring in location not marked or mismatched to safety location
the issue is if the GPS data doesn't pushed to dashboard due to delay in satellite communication it creates big problem
based on safety
In order to get the information about child safety works smoothing & accurately.
the issue is when child crosses some safety location marked by parents ,it want to send message to parents ,if location not mapped correctly problem occurs
it's important because the message has to be sent to parents when child gone to danger area .
based on health
it affects the safety of the child and create the panic to parents
the issue is the parent doesn't know panic situation of child
The device materials can vomit hazardous rays
Child's body temperature may affect bydevice temperature
If the communication between child and parents where disconnected
based on communication
Device heat may affect the child
to know the health information of the child
the issue will occur if the child gone over the geo fence or communication is not strong.
We concentrate on the gps and other communication devices in iot
Data & information are not able to read/write.
based on data
to reduce interrupt to get correct information of the child
When the database crashes.
the boundaries of the problem is delay in communication.
the issue is if the GPS data doesn't pushed to dashboard due to delay in satellite communication it creates big problem

Step-3:IdeaPrioritization



3.3.Proposed Solution

Project team shal lfill the following information in the proposed solution template.

The counter should be started for counting time. The sensors output data should be read from the child safety device. The counter time should be checked for time interval of 30minutes. For every 30minutes except serial camera, the data from GPS, temperature, touch, pulse rate data is pushed into the cloud. The monitoring parameters are displayed on webpage. The counter is reset to restart the timer. So as to post the data into the cloud for every 30minutes. The sensors data is continuously read by the controller. When the value of temperature read from the sensor crosses the threshold1, notification messages are sent. The threshold value of the temperature is considered here is 38°C. Similarly, when the touch sensor value is crocess threshold2, notification messages are sent. Threshold of the touch sensor is considered here is 100. The Pulse rate intervel is analog value from the sensor, it is converted into the beats per minute (BPM) by formulae.

Flow chart of the proposed system,

BPM = (1.0/Pulse Intervel) * 60.0 * 1000

The pulse rateintervel and the BPM are inversely proportional to each other. If the pulse rateintervel of the child decreases then BPM increases. Pulse rate of the Child is less than the threshold3, then device gives an notification message to the parents mobile phone.Afternotification message an MMS is sentto mobile phone module which consists of an image indicating the surrounding area of the child. Three throusholds are used threshold1 is 38°C for Temperature sensor, threshold2 is 100 for Touch sensor and threshold3 is 400 for Heartbeat sensor.

3.4.Problem Solution fit

The LinkIt ONE board is an open source platform. It consists of inbuilt Wi-Fi, GSM, GPS and Bluetooth modules. The link it one board is similar to the arduino board and it is termed as all-in-one prototyping board for wearable's and IoT devices. The board consists of ARM7 EJ-S and the clock speed is 260MHz. A SIM and SD card slots are provided on the board itself. For the audio purpose a headset slot is also provided. The link it one is a robustdevelopment board for the hardware and also used for industrial applications. Different components such as Temperature sensor, Touch sensor, heartbeat sensor, GSM, GPS modules and serial camera are connected to the LinkIt ONE Board along with builtinGSM, GPS modules.

Lithium ion battery is used as DC supply required to energize it. A rechargeable battery can also be used for the above purpose. Temperature sensor block is shown in figure 1; temperature is one of the most commonly measured variables and is therefore there are many ways of sensing temperature.

For measuring body temperature of the child LM35 temperature sensor is used. The touch sensor has three main components on the circuit board. The first component comprises of resistors, transistors, capacitors, inductors, and diodes whose area is measured physically and its analogue signal is sends to an amplifier. Depends upon the resistant value of the potentiometer the amplifier amplifies the signal and sends the signal to analogue output of the module. The third component is comparator, when the signal falls under a specific value it is used to switch the output. A serial camera is used for the purpose of taking snapshot of the area surrounding the child.

A miniature TTL serial JPEG camera is used because it is the best one for the purpose of wearable type. The camera can snap the images of different sizes of pixels and those images are pre-compressed into JPEG images. The heartbeat sensor is used in the proposed system for measuring the pulse rate. There is a heartbeat pulse sensor which is combined to simple optical heart rate sensor with amplification and nullification circuitry making it is fast and easy to get reliable pulse reading. The GSM/GPRS block is activated with a SIM card on the board. GSM standard used here is GSM900. They mainly differ‘s based on bandwidth and RF carrier frequency. GSM network consists of mobile station, Base station subsystem network and operation subsystem. The GPS module is provided for identifying the location of the child. GPS module receives the signals from satellites which are located miles away. The latitude and longitude of the location can be identified by the GPS module.

The Link it ONE board consists of micro SD/SIM combo. The device sends the monitored parameters data such as Temperature, touch and pulse rate to cloud. When there are any abnormalities in temperature or touch or pulse rate readings, a SMS is sent to the parent/caretaker mobile phone immediately.

3.4.1. Pulse Rate formula:

BPM = (1.0/Pulse Intervel) * 60.0 * 1000

Pulse rate in graph of adult person = 735 BPM

= (1.0/735) * 60.0 * 1000 BPM

= 81.63

If the pulse rate of the child decreases then BPM increases. Whenever the pulse rate value is less than 400 then automatically sent an SMS alert to the mobile and also an MMS is sent to parent mobilemodule which consists of an image indicating the surrounding area of the child.

4.REQUIREMENT ANALYSIS

4.1.Functional requirement

Followingarethefunctionalrequirementsoftheproposedsolution.

System Required : RAM-Minimum 4GB Processor-Min.
Configuration OS : Windows/Linux/MAC.
Software Required : Python IDLE.

4.2.Non-functionalRequirements

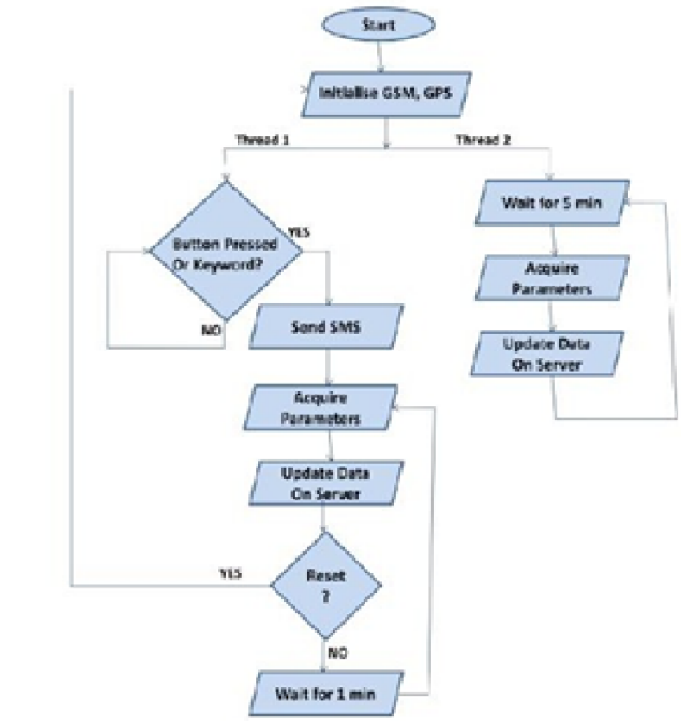
Followingarethenon-functionalrequirementsoftheproposedsolution.

- Node-RED.
- Web UI.
- Cloudant DB.
- Geofence.

5.PROJECT DESIGN

5.1.Data Flow Diagrams

A Data Flow Diagram(DFD) is a traditional visual representation of the information flow swithinasystem. Aneatand clear DFD candepict theright amount of the system requirement graphically. Itshow show data enter sandlea vesthesystem, what changes the information, and where data isstore



DATA FLOW DIAGRAM: IOT based safety gadget for child safety monitoring and notification

5.2.Solution& Technical Architecture

5.2.1.Technical Architecture

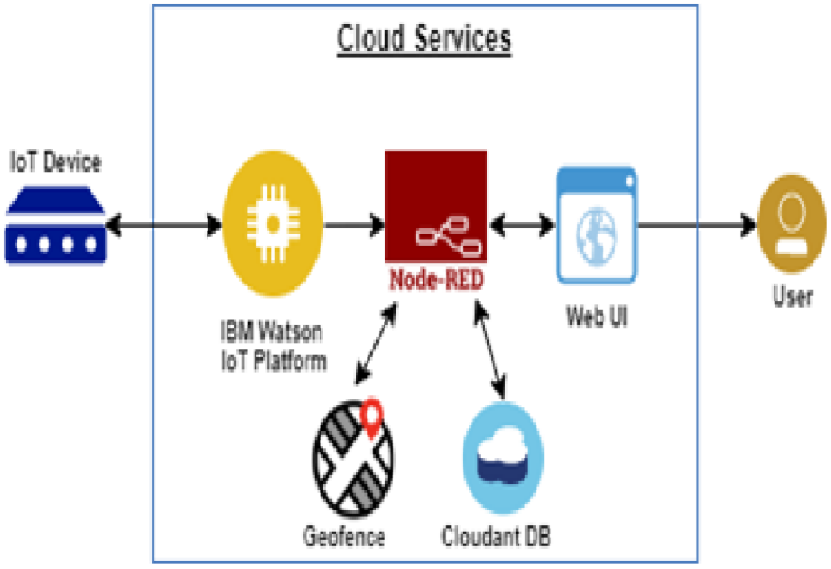


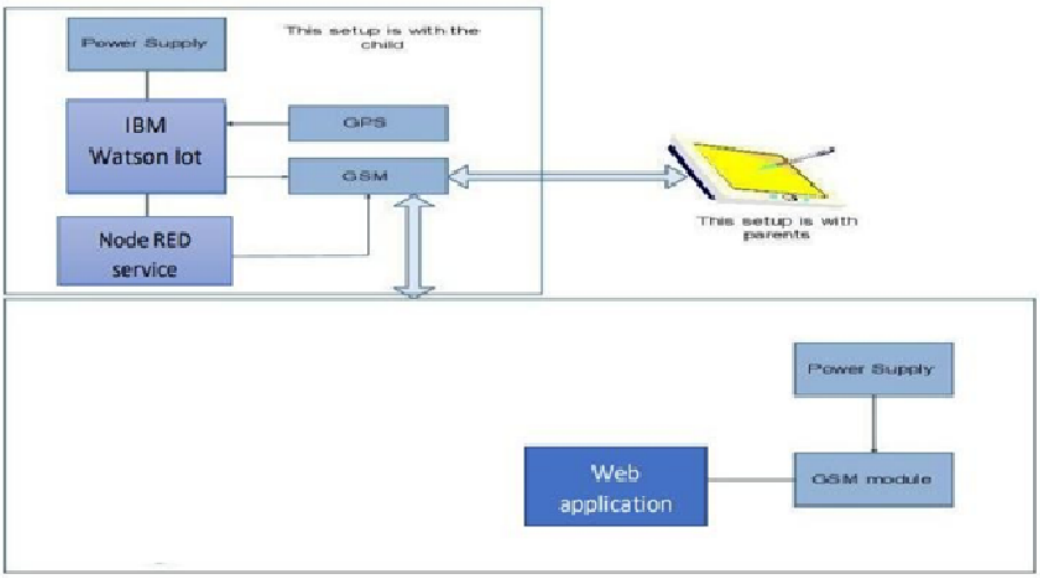
Table-1.Components and Technologies:

S.No	Component	Description	Technology
1.	User Interface	The communication protocol being used in the proposed solution might act as an interface the way like WiFi, Bluetooth and ZigBee	MIT app
2.	Application Logic	The data to be collected and sent to the authenticator's(parent) via GSM providing the GPS coordinates to easily locate access and monitor the child	IBM Watson STT service, python etc
3.	Database	Data to be segregated and secured in the form of relational DBMS	MySQL
4.	Cloud Database	IBM	IBM Cloudant
5.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
6.	External API-1	To access the children location	GPS location monitoring etc
7.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration	Cloud Foundry

Table-2:ApplicationCharacteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The proposed solution being framed in the form an android application providing the end user an easy surveillance of their children (preferably users are parents)	UI/UX design developement
2.	Security Implementations	The developed application should be accessible in the way it can only respond to the comments of the relevant users	Encryptions, IAM Controls.
3.	Scalable Architecture	The app format comes the way easier to handle and operate.	Not yet determined
4.	Availability	The developed solution tends to be available in the market at any time	Not yet determined
5.	Performance	Highly proper and betterment functionalities are to be ensured in the designed solution	Not yet determined

5.2.2.SolutionArchitecture



5.3.User Stories

Numb	UserStory/Task	Acceptancecriteria	Priority	Release
1	As a user, I can view the Child's exact location and Know theinformationabout whether child present intheGeofence	Icanaccessthe Child's Location/Geofence Notification	High	Sprint-1
	As a user, I can view the Child's exact location and Know theinformationabout whether child present intheGeofence	Icanaccessthe Child's Location/Geofence Notification	High	Sprint-1
1	AsaadmIn,IcanlogintotheIBMaccountbyusingauthorizeduserIDandpassword	Icanaccessthe Child's Location/Geofence Notification	High	Sprint-1
2	As a admin,I can log in into my account anduse the cloud object storage service of theIBMcloudtostoreandretrieve the child's location information, whenever itis needed.	I canaccess my cloudstorage	High	Sprint-1
3	As a admin,I can use the cloud object storage service of theIBMcloudtostoreandretrieve thechild'slocation information,whenever itis needed and help the user according to the situation.	Ican visualizemydata	High	Sprint-2

6.PROJECT PLANNING & SCHEDULING

6.1.Sprint Planning & Estimation

Title	Description	Date
Literature survey and Informationgathering	Literature survey	16 Oct2022
PrepareEmpathy Map	Empathy map canvas	20Sept2022
Ideation	Brainstorm	18 Oct2022
Proposedsolution	Proposedsolution	16 Oct2022
Problemsolutionfit	ProblemsolutionfitDocument	15Oct2022
SolutionArchitecture	SolutionArchitecture	15Oct2022
Customer journey	Customerjourneymaps	29Oct2022
Functionalrequirements	Functionalrequirements	18Oct2022
Data flow diagrams	Dataflowdiagrams	16Oct2022
TechnologyArchitecture	Technologyarchitecture	17Oct 2022
Prepare Milestone andActivityList	Milestoneandactivitylist	15 Nov2022
Sprint Deliveryplan	Sprintdelivery	16 Nov2022
ProjectDevelopment-Delivery of sprint-1,2,3&4	Developing code	18 Nov 2022

6.2.Sprint Delivery Schedule

Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team

6.2.1.ProductBacklog,SprintSchedule,andEstimation:

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	4	6 Days	12 Nov 2022	18 Nov 2022	4	18 Nov 2022
Sprint-2	3	6 Days	12 Nov 2022	18 Nov 2022	3	18 Nov 2022
Sprint-3	4	6 Days	12 Nov 2022	18 Nov 2022	4	18 Nov 2022
Sprint-4	4	6 Days	12 Nov 2022	18 Nov 2022	4	18 Nov 2022

6.2.2.ProjectTracker,Velocity&BurndownChart

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-1	As a customer, I might ensure login credential through gmail ease manner for the purpose of sending alert message to the parents or guardians (or) informing through normal message.	2	High	Kaliyappan. P Karuppasamy. V
Sprint-1	Registration	USN-2	As a user, I have to registered my details and tools details in a simple and easy manner by considering the safety of child, this registered system sends notification to the parents.	2	High	Tamilarasan. M Manikandan. D
Sprint-2	Dashboard	USN-3	As a user, In case of any emergency situation parents(I) must get the alert notification and location of the child.	3	Medium	Tamilarasan. M Manikandan. D

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Dashboard	USN-4	As a user, I(parent) need to safeguard child and tracking the child's location and it is important to notify near police station incase of more emergency .	2	High	Kaliyappan. P Karuppasamy.V
Sprint-3	Dashboard	USN-5	As a user, Its good to have a IOT based system to safeguard monitoring without presence of parent.	2	High	Kaliyappan. P Karuppasamy. V
Sprint -4	Monitoring the environment	USN 1	User can monitor the situation of the environment from a dashboard that displays sensor information about the environment and child health.	2	High	Tamilarasan. M Manikandan. D
Sprint- 4	Event Notification	USN 6	Sending an alert SMS to the parents and guardians in case of panic situation.	2	High	Tamilarasan. M Manikandan. D

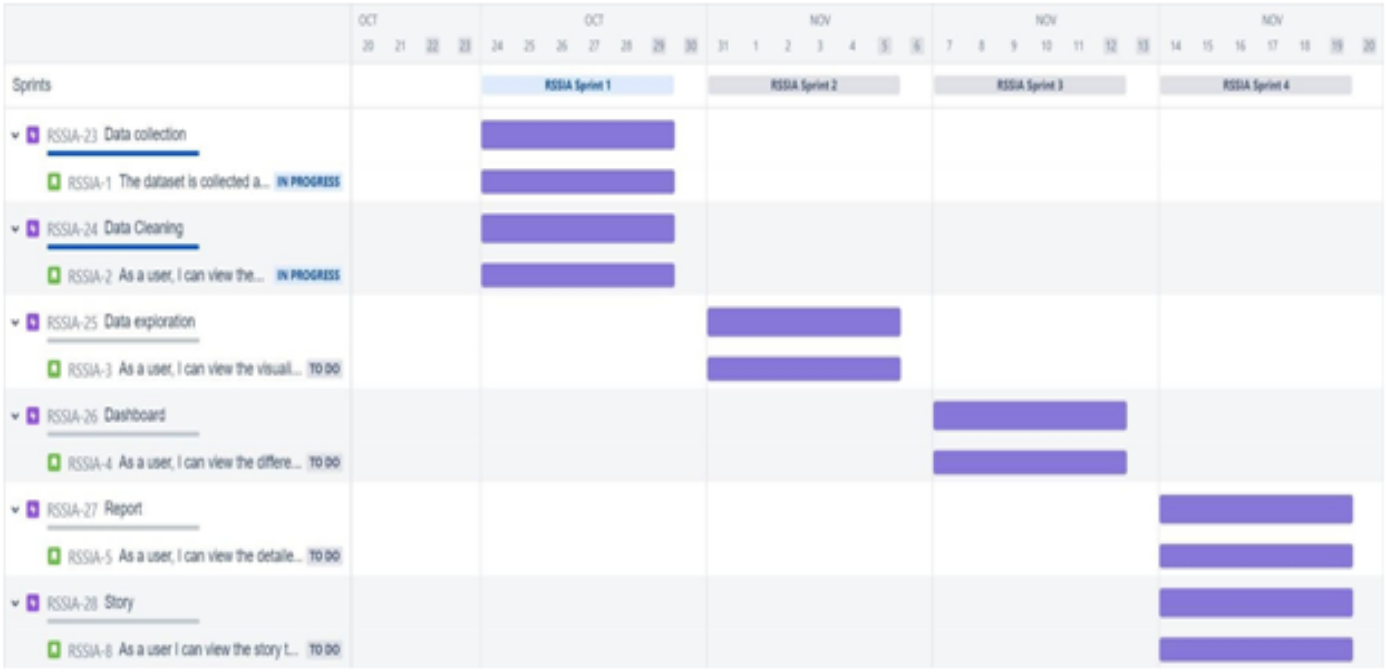
Velocity:

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

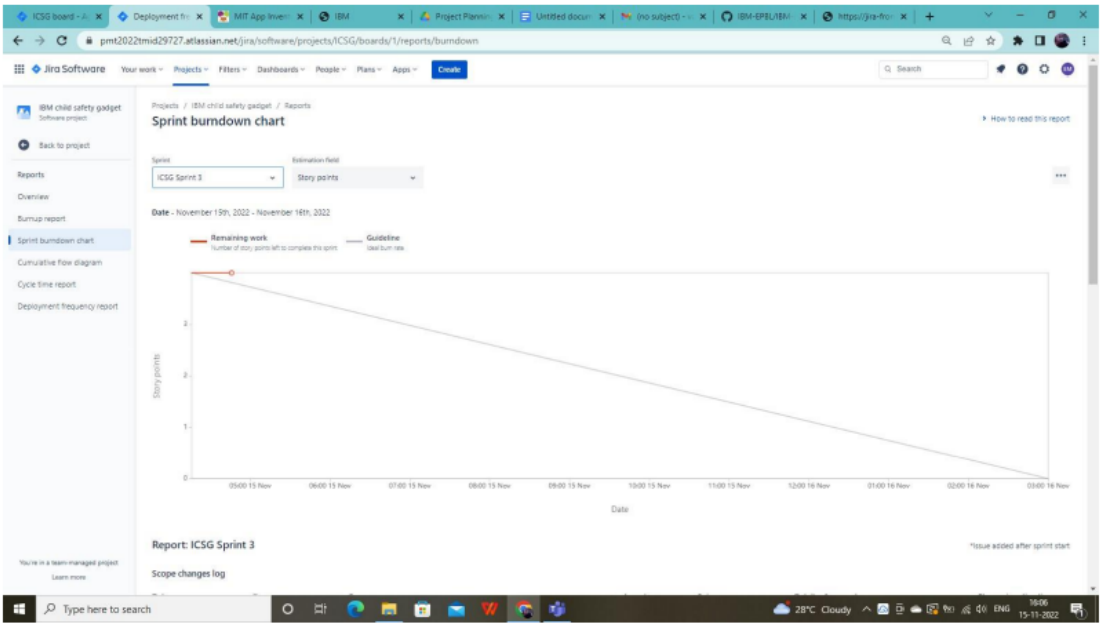
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) periteration unit (storypoints per day).

Sprint	Storypoints	Duration	Averagevelocity
Sprint-1	5	6	0.83
Sprint-2	8	6	1.33
Sprint-3	8	6	1.33
Sprint-4	16	6	2.66
Total	37	24	1.54

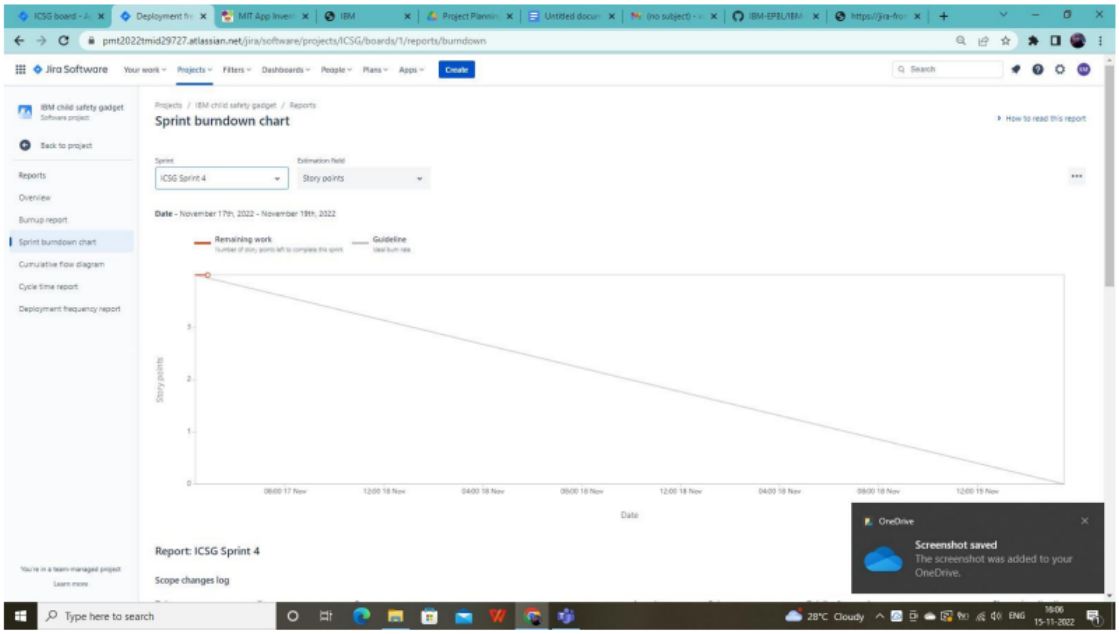
6.3Reports from JIRA



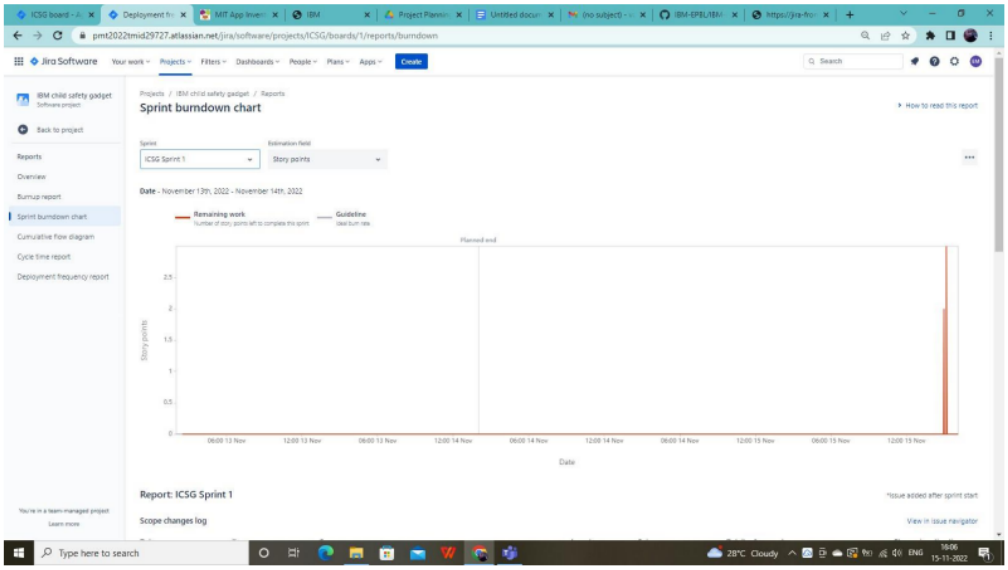
Sprint-1



Sprint-2



Sprint-3



7.CODING & SOLUTIONING

7.1.Features 1

1.Live Location Tracking:

GPS is installed on gadget to track its current location can be tracked on android app and via SMS request sent from parent phone to safety gadget. Fig. 3. Outputs of live location tracking.

2. Panic Alert Systems:

Panic alert system on gadget is triggered during panic situation, automatic call and SMS are triggered to parental phone. The alert is also updated to the cloud for purpose of app monitoring. Fig. 4. Outputs of panic alert system.

3.Stay Connected Feature:

Stay connected feature is used to trigger call and pre-defined SMS anytime fromgadget to parental phone by just pressing a button and also parent can make SMS and call to the gadget anytime.

4. Health Monitoring System:

Health monitoring system is implemented using heart beat sensor, temperature sensor which is updated to the cloud and also can be monitored via app. The current value of sensors can be obtained using SMS request sent to gadget from parent phone.

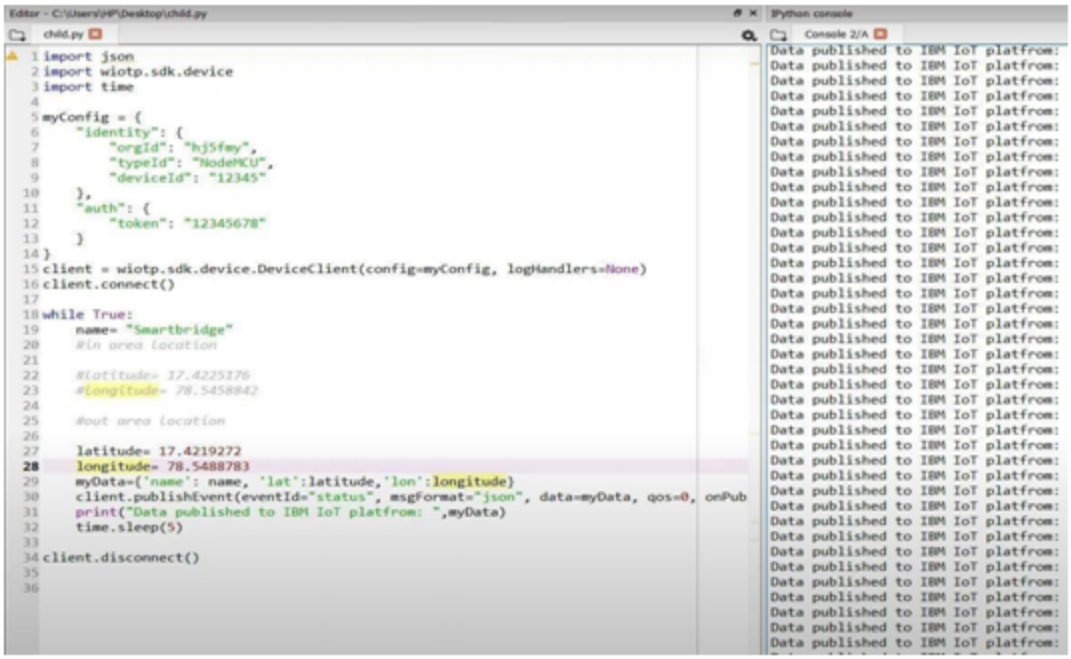
5.Gadget Plugged or Unplugged Monitoring:

Gadget plug or unplugged is monitored using contact switch installed on smart gadget, as soon as the device is unplugged, an alert is provided to parent phone via SMS and it is also updated to cloud for app monitoring.

6. Boundary monitoring system:

This is used to track the safety gadget using the binding gadget by implementing signal strength concept as soon as the safety gadget moves far away from the BLE listener gadget then an alert is provided to itself

7.2.Database Schema



8. TESTING

8.1 Test Cases

1. Application level:

This level deals with all the activities of sale like sale of an item, available discount, coupons, payment, receipt printing, more precisely functions of application level is sales and payment.

Types of testing used at this level are as:

- **Functionality Testing:**
  It is a type of testing which test that all functions of the application are working as per the requirements of the system. In the POS system, testers validate the working of all functions using functionality testing, the functions which the POS system performs are printing receipt of the purchased item, returning an item, selling, scanning an item for its price and available discount, and payment.

- **Compatibility Testing:**
  This testing is non-functional testing that is used to test whether the system is capable to work with other OS, hardware, software, mobile devices, etc. As the POS system is connected to several hardware components so testers test compatibility with all hardware and a new version of OS.

- **Payment Gateway Testing:**
  POS system supports online payment modes of the transaction so it needs to follow PCI complaints. Testers validate that the system is working successfully with various payment modes.

2. Enterprise Level:

The enterprise level is a broad term that deals with functions like payrolls, total transaction throughout the day, offers which attracted a large number of customers, database management, inventory list management, and accounts management.

Type of testing used at this level are as:

- **Performance Testing:**
  It is a type of testing which test the performance of the system in terms of response time, working with connected devices, speed, and scalability when workload increases. POS system goes through this testing to validate the responsiveness of the system and when the system crash if the load increases.

- **Interoperability Testing:**
  POS system operates on various software and hardware, and testers validate that the system is interacting with other related software and hardware as per requirements.

- **Compliance Testing:**
  It is also called conformance testing, it is used to determine that the application meets all the set standards. The POS system offers credit and debit card payment modes so. it needs to fulfill all the parameters set by PCI standards for payments, testers validate that the system is following all those set standards.

- **Data Migration Testing:**
  This form of testing is used when data is migrated from the original database to the new database storage system, it validates that all data is replaced without any loss of data, and no duplicate data is made.

- **Upgradation Testing:**
  This form of testing determines that the new versions of the software are compatible to upgrade the old version of the system. A POS system needs to be upgraded with a new OS, software, and hardware version so testers validate that the system can be timely upgrade and support new features to remain in the race of changing technology with time.

8.2 User Acceptance Testing

User Acceptance Testing (UAT), also known as beta or end-user testing, is defined as testing the software by the user or client to determine whether it can be accepted or not. This is the final testing performed once the functional, system and regression testing are completed.

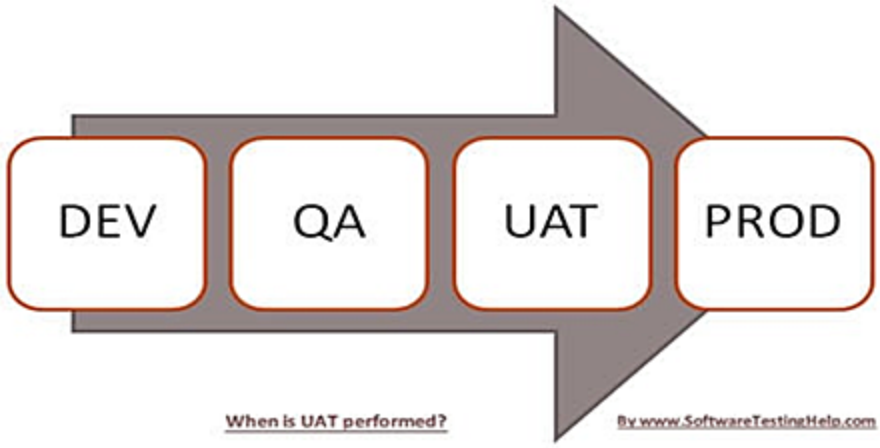
The main purpose of this testing is to validate the software against the business requirements. This validation is carried out by the end-users who are familiar with the business requirements.

UAT, alpha and beta testing are different types of acceptance testing.

urpose.As the user acceptance test is the last testing that is carried out before the softwa

When Is It Performed?

This is typically the last step before the product goes live or before the delivery of the product is accepted. This is performed after the product itself is thoroughly tested.



Who Performs UAT?

Users or client – This could be either someone who is buying a product (in the case of commercial software) or someone who has had a software custom-built through a software service provider or the end-user if the software is made available to them ahead of the time and when their feedback is sought out.

The team can be comprised of beta testers or the customer should select UAT members internally from every group of the organization so that each and every user role can be tested accordingly.

9. RESULTS

9.1 Performance Metrics

1.Live Location Tracking:

GPS is installed on gadget to track its current location can be tracked on android app and via SMS request sent from parent phone to safety gadget. Fig. 3. Outputs of live location tracking.

2. Panic Alert Systems:

Panic alert system on gadget is triggered during panic situation, automatic call and SMS are triggered to parental phone. The alert is also updated to the cloud for purpose of app monitoring. Fig. 4. Outputs of panic alert system.

3.Stay Connected Feature:

Stay connected feature is used to trigger call and pre-defined SMS anytime fromgadget to parental phone by just pressing a button and also parent can make SMS and call to the gadget anytime.

4. Health Monitoring System:

Health monitoring system is implemented using heart beat sensor, temperature sensor which is updated to the cloud and also can be monitored via app. The current value of sensors can be obtained using SMS request sent to gadget from parent phone.

5.Gadget Plugged or Unplugged Monitoring:

Gadget plug or unplugged is monitored using contact switch installed on smart gadget, as soon as the device is unplugged, an alert is provided to parent phone via SMS and it is also updated to cloud for app monitoring.

6. Boundary monitoring system:

This is used to track the safety gadget using the binding gadget by implementing signal strength concept as soon as the safety gadget moves far away from the BLE listener gadget then an alert is provided to itself.

10.ADVANTAGES & DISADVANTAGES

10.1. ADVANTAGES

- Keeps track of children in case of abduction.
- Allows children more freedom while being watched.
- Monitors children with special needs who wander.
- Helps monitor children with behavioural problems.
- Gives peace of mind to parents.

10.2. DISADVANTAGES

1. Children may feel a loss of privacy.
2. Losing confidence.
3. The system is dependent on communication signal/network signal for the smart gadget to trigger automatic phone call/SMS during panic situation.
4. It can be difficult to detect when network signal is not reachable/weak/when the smart gadget moves outside the boundary range.
5. Improved by increasing the range.

11.CONCLUSION

The word Future resembles the word Children. As Dr. A.P.J Abdul Kalam’s words “Youngsters are the future pillars of one’s nation", today's children are tomorrow's youngsters, preserving their dreams and life for a better future is necessary. Therefore, each and every parent should take care of their own children, without letting them to fall into the dark world of abusements, which entirely ruin them physically, mentally and emotionally destroying our future. Hence, considering the importance of our future, our project makes it easy for parents to track their children and to visually monitor them on regular basis, which makes them ensure the safety of their children and reduces the rate of incidents of child abuse.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. The system also consists of Wi-Fi module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring on 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.

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

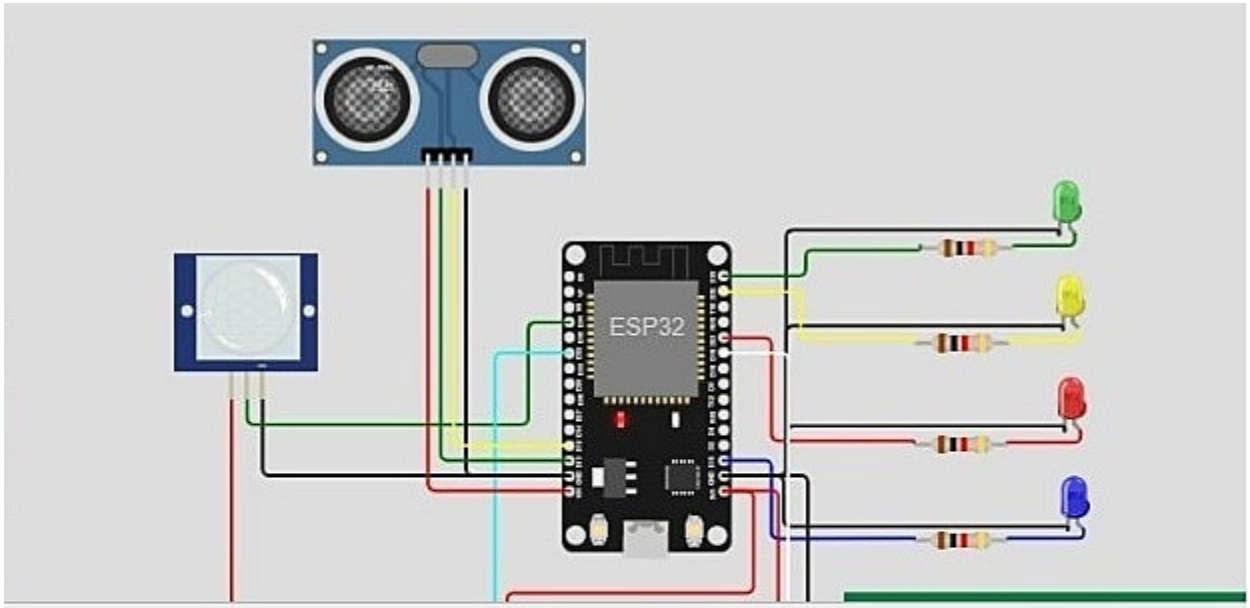
13.1. Source Code

Simulation code

esp32-blink.ino | diagram.json ● | libraries.txt | Library Manager

```
#include <WiFi.h>                                   // library for wifi
#include <PubSubClient.h>                           // library for MQTT
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 20, 4);

//---------------------- credentials of IBM Accounts ----------------------------

#define ORG "af19wm"                              // IBM organisation id
#define DEVICE_TYPE "12345678"                      // Device type mentioned in ibm wats
#define DEVICE_ID "12345678"                      // Device ID mentioned in ibm watson iot
#define TOKEN "12345678"          // Token

//---------------------- customise above values ---------------------------------

char server[] = ORG ".messaging.internetofthings.ibmcloud.com";                 // s
char publishTopic[] = "iot-2/evt/data/fmt/json";                                // t
char topic[] = "iot-2/cmd/led/fmt/String";                                      // c
char authMethod[] = "use-token-auth";                                           // a
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;                     //Cli

//-------------------------------------------------------------------------------

WiFiClient wifiClient;                                                       // cre
PubSubClient client(server, 1883, wifiClient);

#define ECHO_PIN 12
#define TRIG_PIN 13
float dist;
```

Simulation Output:



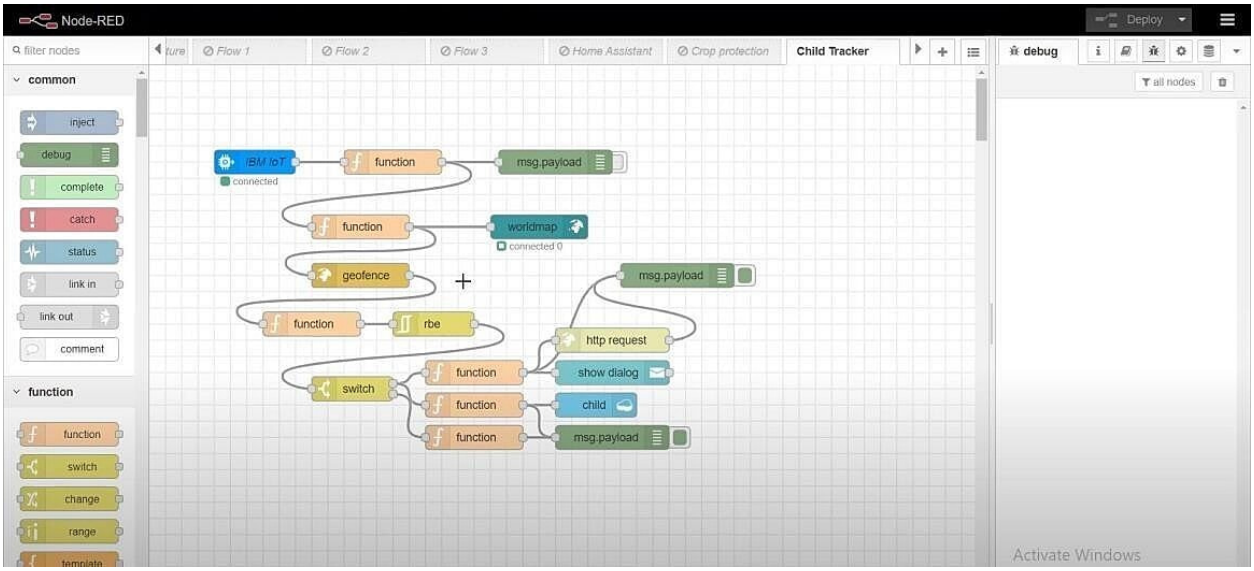

```
Sending distance: 56.97
Publish OK
No motion detected

Sending payload: {"High Alert!!":"56.97left" }
Publish OK
```

DevelopTheWebApplicationUsingNode-RED

1.ToDevelopthewebapplicationusingNode-RED

Steps:

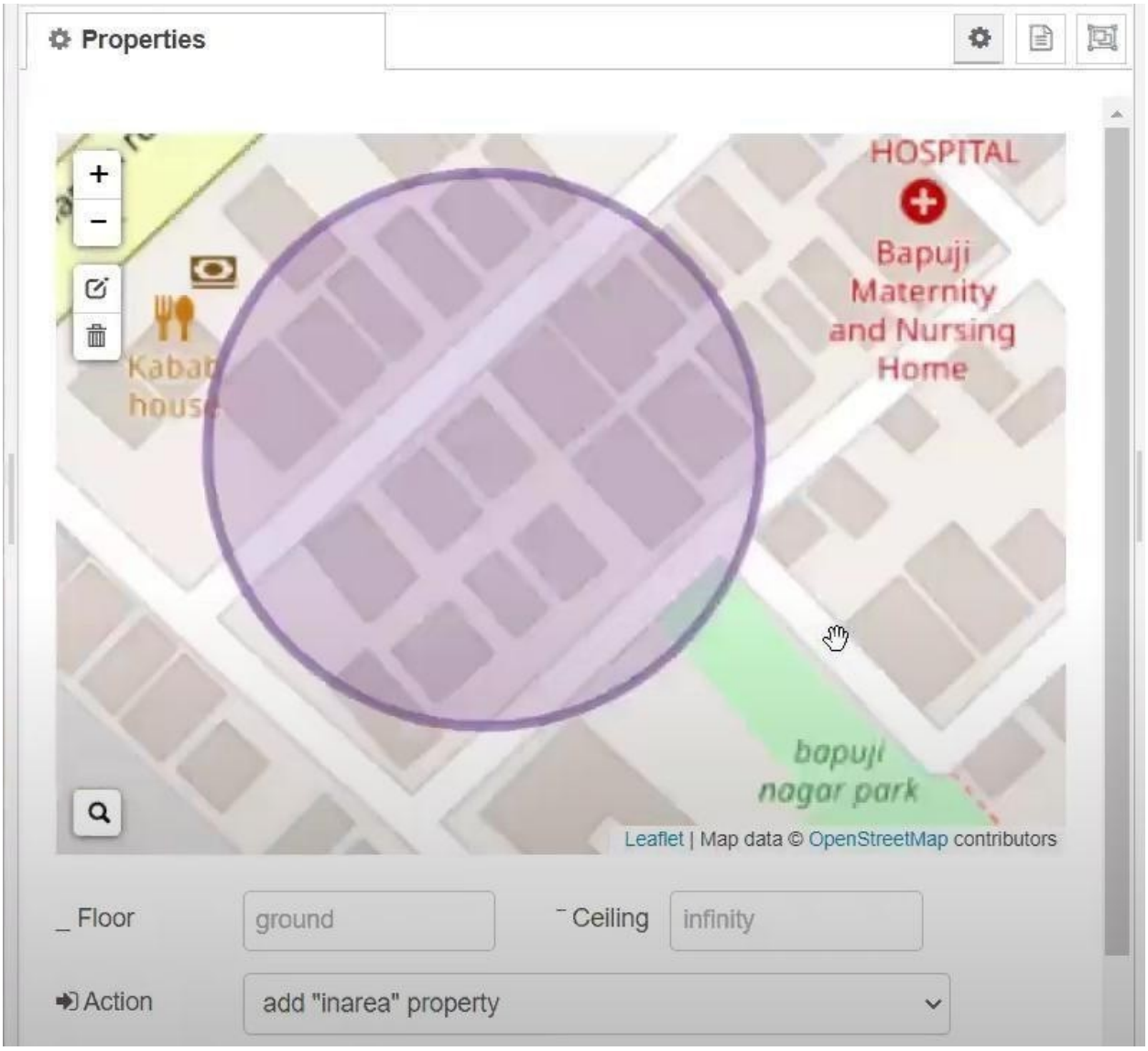
OpenaNode-REDproject:



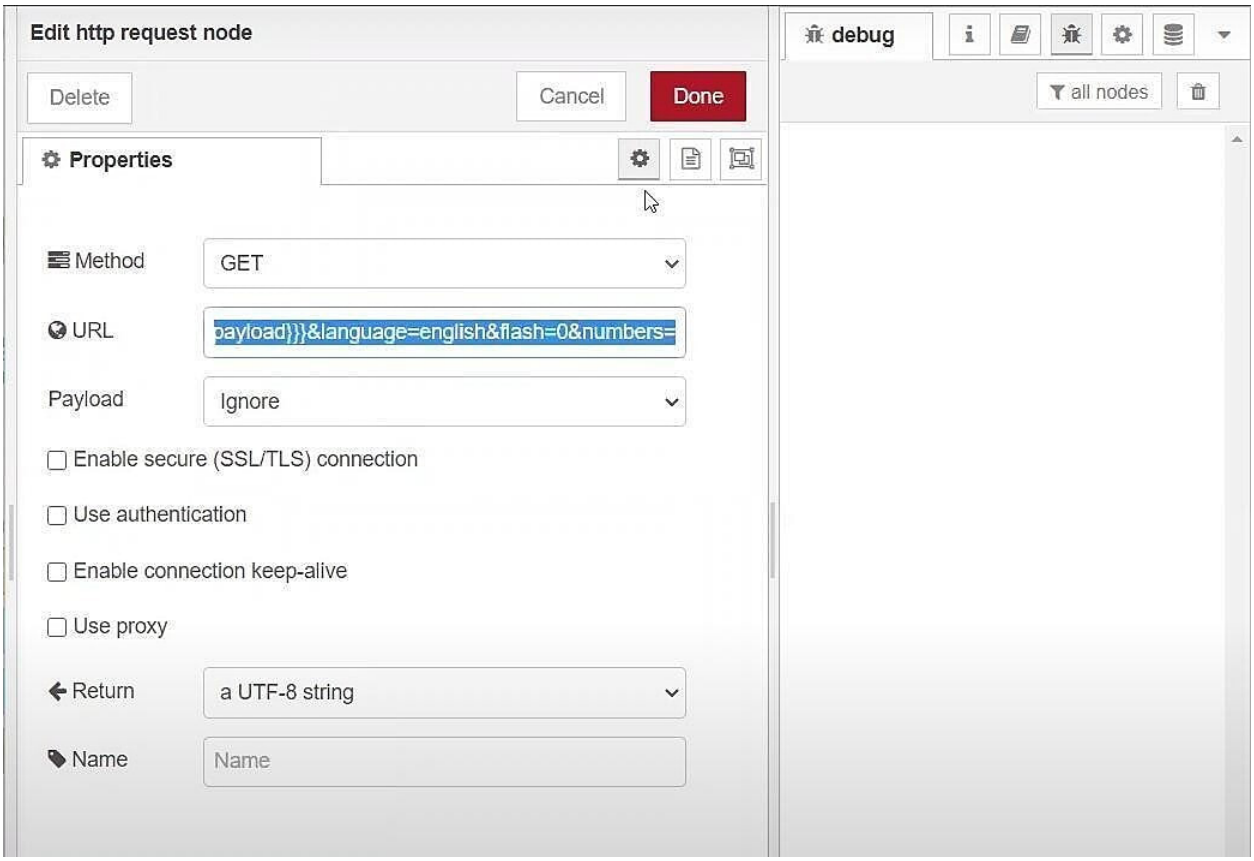
Addcodetogetchildlocationinpython:

```
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()
```

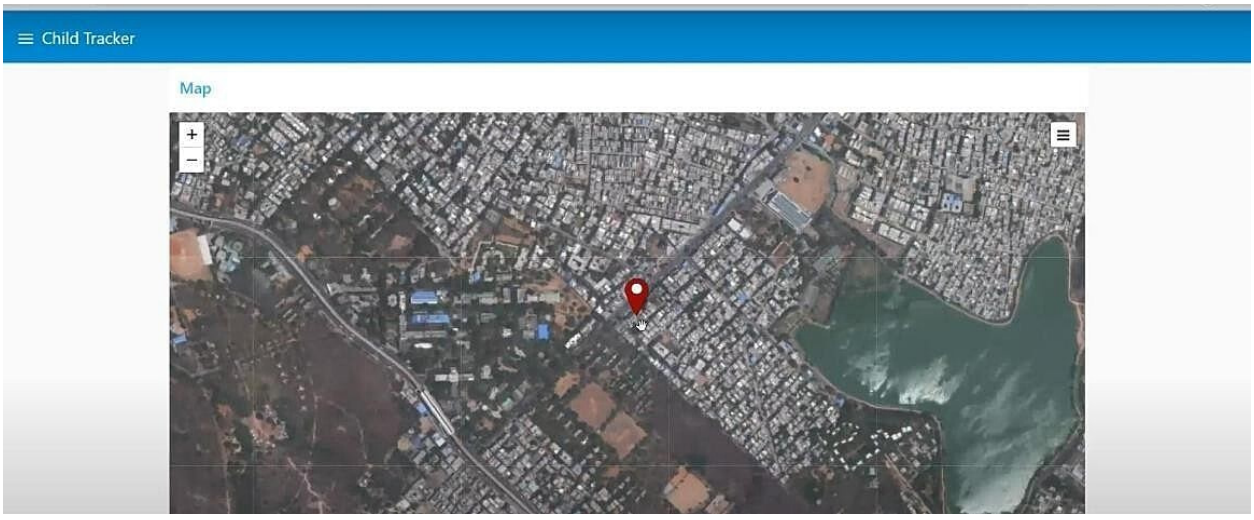
CreatetheGeo-Fence:



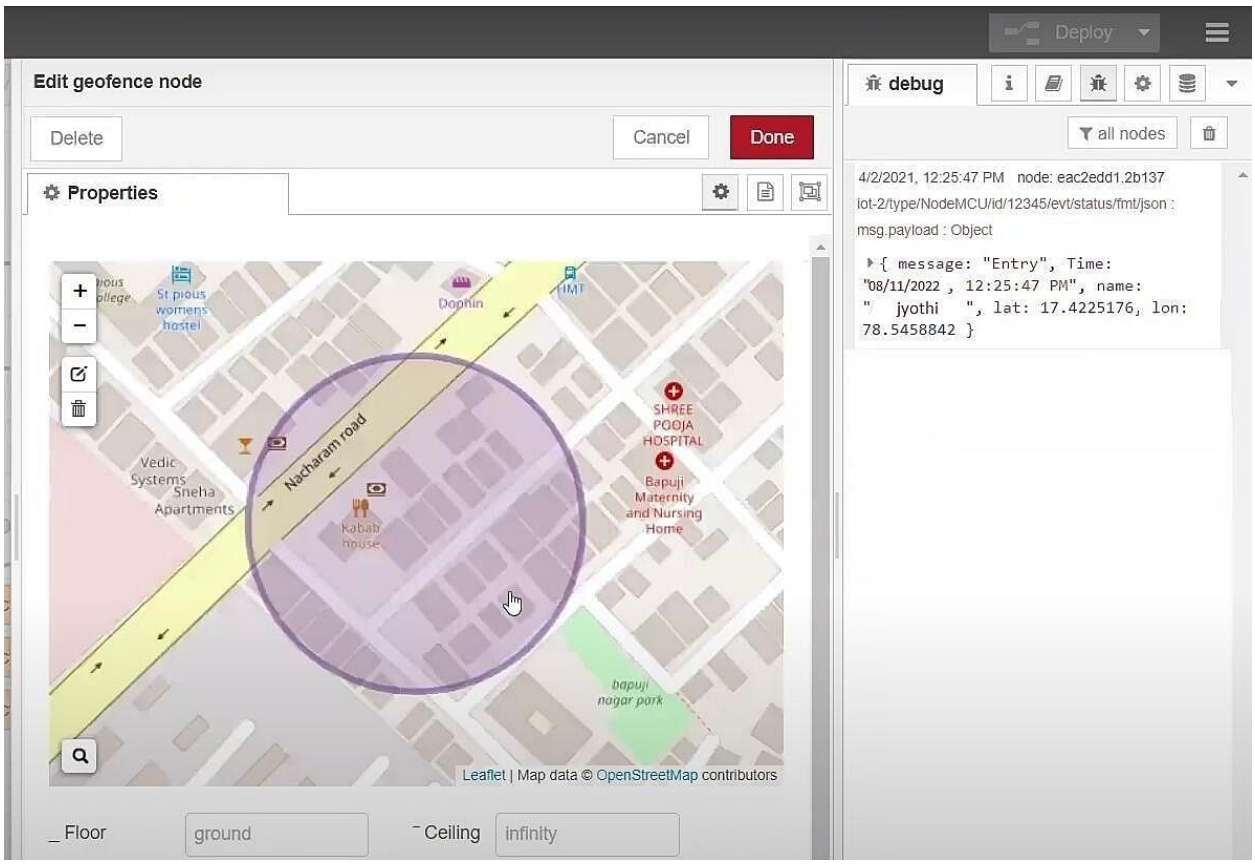
EdittheHTTPRequestURL:



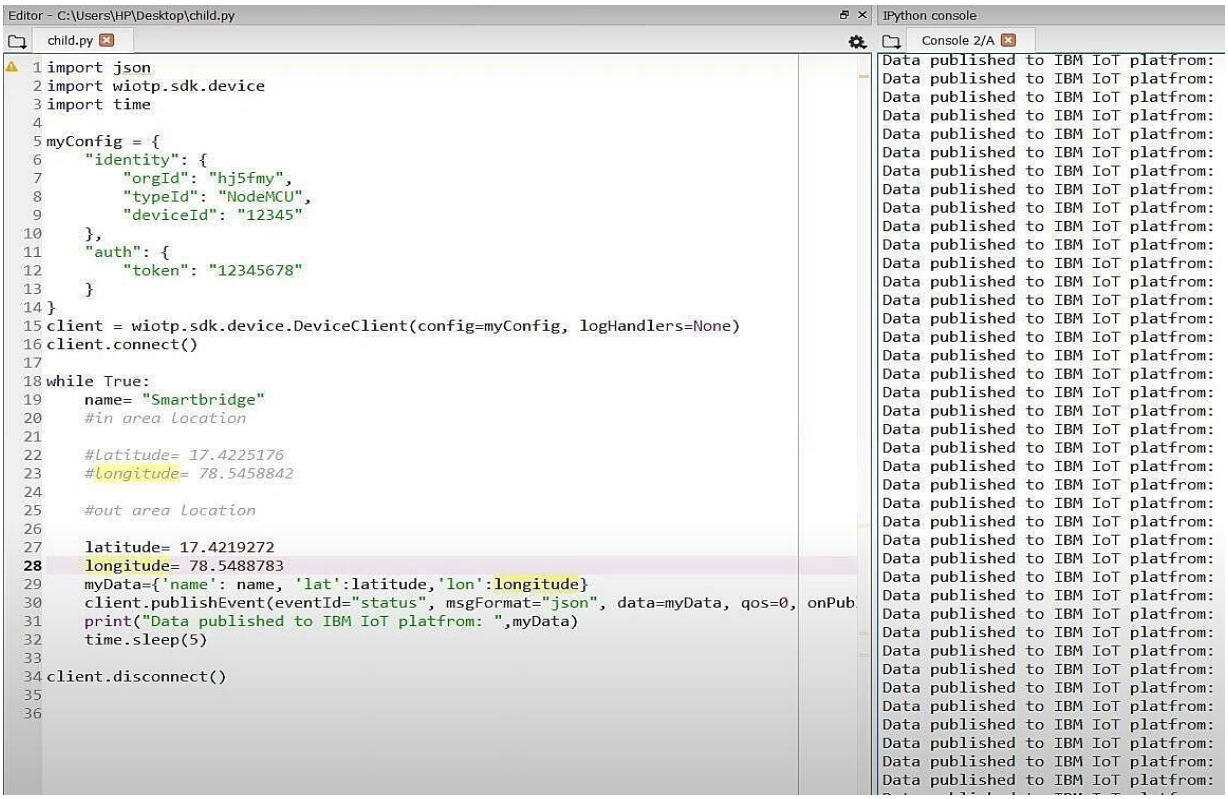
Locatethechild:



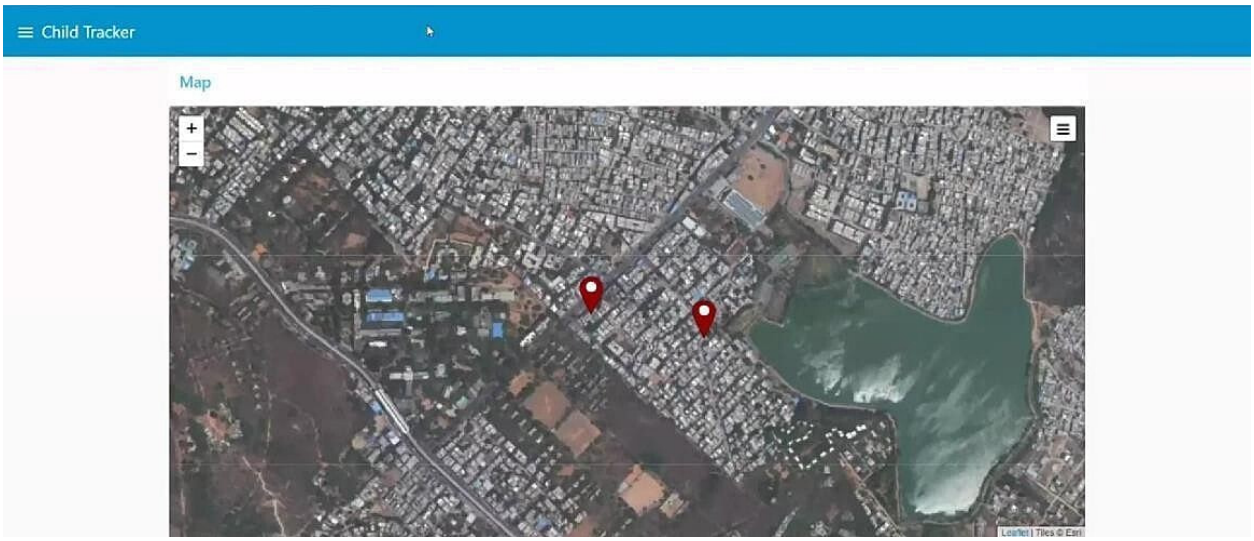
CreatetheGeo-fencenode:



PythonscriptsendrequeststoIBMCloud:



Afterrunningthescript,the webUIshows“Personisnotintheparticulararea”:



The Project developedusingNode-REDSuccessfully.

13.2.GitHub& Project Demo Link:

GitHub link:

https://github.com/IBM-EPBL/IBM-Project-15682-1659603024