

# **FINAL**

# **PROJECT REPORT**

## **IOT BASED SAFETY GADGET FOR CHILD SAFETY**

## **MONITORING ANDNOTIFICATION**

|           |  |
|-----------|--|
| Team ID   | PNT2022TMID09836   |
| Members   | M.Pushpaveni.<br>G.Sakthi Sowndarya.<br>K.Sowmiyadevi.<br>M.Prabha |
| Team Size | 4  |

## **CHAPTERS**

### **1. INTRODUCTION**

#### **1.1 Project Overview**

#### **1.2 Purpose**

### **2. LITERATURE SURVEY**

#### **2.1 Existing problem**

#### **2.2 References**

#### **2.3 Problem Statement Definition**

### **3. IDEATION & PROPOSED SOLUTION**

#### **3.1 Empathy Map Canvas**

#### **3.2 Ideation & Brainstorming**

#### **3.3 Proposed Solution**

#### **3.4 Problem Solution fit**

### **4. REQUIREMENT ANALYSIS**

#### **4.1 Functional requirement**

#### **4.2 Non-Functional requirements**

### **5. PROJECT DESIGN**

#### **5.1 Data Flow Diagrams**

#### **5.2 Solution & Technical Architecture**

#### **5.3 User Stories**

### **6. PROJECT PLANNING & SCHEDULING**

#### **6.1 Sprint Planning & Estimation**

#### **6.2 Sprint Delivery Schedule**

#### **6.3 Reports from JIRA**

### **7. CODING & SOLUTIONING (Explain the features added in the project along with code)**

#### **7.1 Feature 1**

## **7.2 Feature 2**

## **7.3 Database Schema (if Applicable)**

## **8. TESTING**

### **8.1 Test Cases**

### **8.2 User Acceptance Testing**

## **9. RESULTS**

### **9.1 Performance Metrics**

## **10. ADVANTAGES & DISADVANTAGES**

## **11. CONCLUSION**

## **12. FUTURE SCOPE**

## **13. APPENDI**

### **XSource Code**

### **GitHub & Project Demo Link**

## **1.INTRODUCTION:**

**Internet of Things (IoT) plays a major role in every day to day life. The major difference between IoT and embedded system is that a dedicated protocol/software is embedded in the chip in case of embedded system, whereas, IoT devices are smart devices, which are able to take decisions by sensing the environment around the device. The development of sensors technology, availability of internet connected devices; data analysis algorithms make IoT devices to act smart in emergency situations without human interventions. So, IoT devices are applied in different fields such as agriculture, medical, industrial, security and communication applications. IoT systems are useful within a system to do deeper automation, analysis, and integration. IoT contributes to technology by advances in software, hardware and modern tools. It even uses existing and upcoming technology in the fields of sensing, networking and robotics. IoT brings**

global changes by its advanced elements in the social, economic, and political impact of the users.

### ***1.1 PROJECT OVERVIEW:***

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. The system is developed using LinkIt ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency. The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. The above system ensures the safety and tracking of children.

### ***1.2 PURPOSE:***

During years' Child safety is under threat and it is very important to provide a technology-based solution which will help them under panic situations and monitor them using a smart gadget. The proposed system is equipped with GSM and GPS modules for sending and receiving call and SMS between safety gadget and parental phone, the proposed system also consists of W-Fi module used to implement IoT and send all the monitoring parameters to the cloud for android app monitoring on parental phone. Android application can be used to track the current location of safety gadget using its location coordinates on parental phone android app and also via SMS request from parent phone to safety gadget. Panic alert system is used during panic situations and automatic SMS alert and phone call is triggered from safety gadget to the parental 4gadget is unplugged from hand a SMS is triggered to parental phone and the alert parameter is also updated to the cloud.

Heart-beats, temperature is monitored and the values are updated to cloud continuously for parent app monitoring. 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 binding gadget an alert is provided to parent on binding gadget. the system is used to monitor the health parameters and also used for location tracking during necessary situations in safety concern.

## **2. LITERATURE SURVEY:**

### ***2.1 Existing problem:***

Child tracker helps the parents in continuously monitoring the child's location. They can simply leave their children in school or parks and create a geo fence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geo fence. Notifications will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in the database.

## 2.2 References:

[https://www.ijresm.com/Vol.3\\_2020/Vol3\\_Iss6\\_June20/IJRESM\\_V3\\_I6\\_79.pdf](https://www.ijresm.com/Vol.3_2020/Vol3_Iss6_June20/IJRESM_V3_I6_79.pdf)  
[https://www.academia.edu/37353956/IOT\\_Based\\_Child\\_Safety\\_Device](https://www.academia.edu/37353956/IOT_Based_Child_Safety_Device)  
<https://www.ijitee.org/wp-content/uploads/papers/v8i8/H6836068819.pdf>

## 2.3 Problem Statement Definition:

Around the world, many children disappear each year and are not found. Runaways, parental abductions or kidnappings by others, these acts are difficult to prevent and have dire consequences on the children involved. Nowadays, crime rate associated with children keeps increasing due to which draws people attention regarding child safety.



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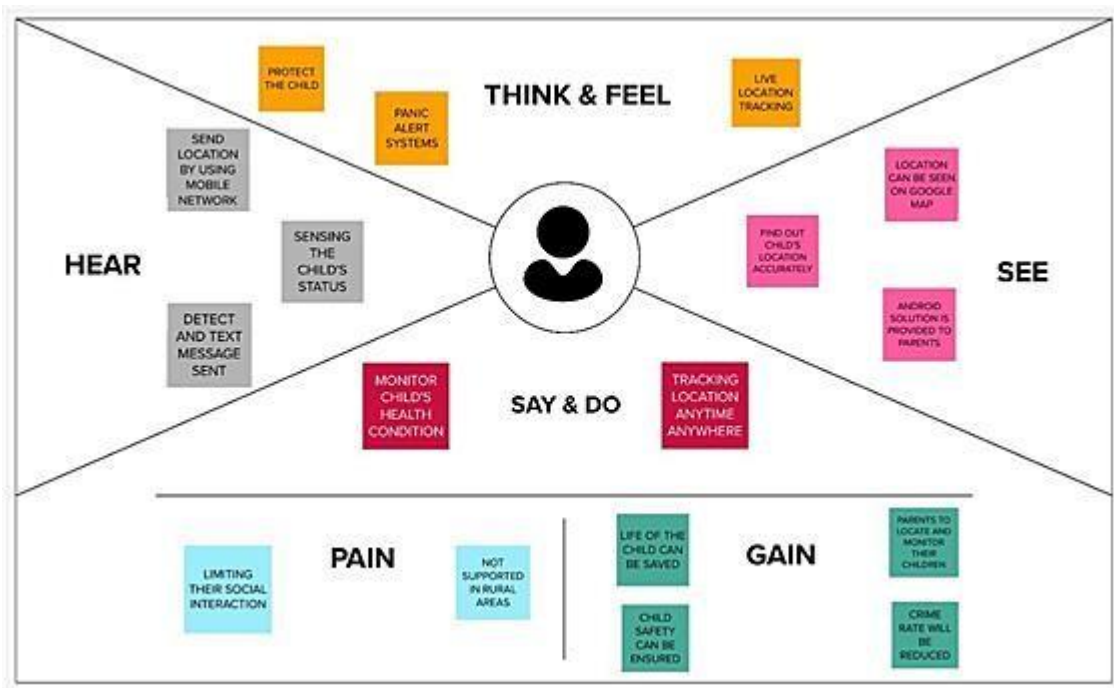
## 3. IDEATION & PROPOSED SOLUTION:

### 3.1 Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes.

It is a useful tool to help teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



### 3.2 Ideation & Brainstorming:

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.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

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



## Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕒 10 minutes to prepare
- 🕒 1 hour to collaborate
- 👤 2-8 people recommended

💬 Share template feedback



### Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes



#### Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.



#### Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.



#### Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

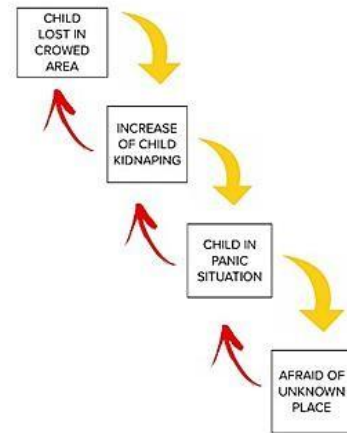
[Open article](#) →



### Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes



## Step-2: Brainstorm, Idea Listing and Grouping

2

### Brainstorm

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

🕒 10 minutes

#### TIP

You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

### Nivetha P

|   |                         |
|---|-------------------------|
| Monitoring child activity                           | Tracking child location |
| Gathering information about child physical behavior | Communicate with child  |

### Keerthick Vasa M

|                     |   |
|---------------------|---|
| Inform to childcare | Information Shared to parents or caretakers |
| Monitoring location | Gather information about child situation    |

### Vijayasarathi I

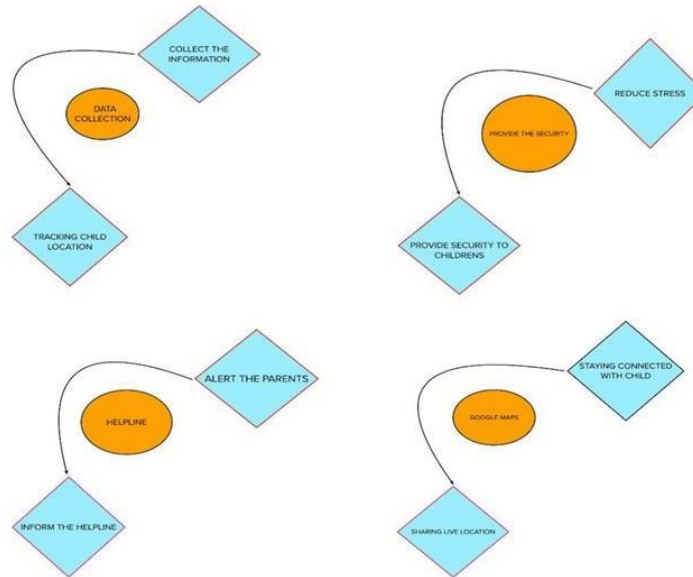
|  |                                      |
|--|--------------------------------------|
| Monitorint the current activity of child | Monitoring health condition of child |
| Track the location and movement of child | Providing instruction to the child   |

### Sujitha R

|                                 |                              |
|---------------------------------|------------------------------|
| Track the daily activity        | Staying connected with child |
| Parents with real-time location | Send information to police   |



### Step 3 – Group ideas



### 3.3 Proposed Solution:

| S.No. | Parameter                                | Description   |
|-------|--|---|
| 1     | Problem Statement (Problem to be solved) | <p>Around the world, many children disappear each year and are not found. Runaways, parental abductions or kidnappings by others, these acts are difficult to prevent and have dire consequences on the children involved.</p> <p>Nowadays, crime rate associated with children keeps increasing due to which draws people attention regarding child safety.</p>  |
| 2     | Idea / Solution description              | <p>The users are required to register using their credentials to use the application. The device will be given to the children for monitoring them regularly. We will feed the boundary value while writing code for the system and we control it using GPS for that device which is also known as Geo Fencing. These data are stored in the server.</p>  |
| 3     | Novelty / Uniqueness                     | <p>The aim of this work is to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analyzed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer.</p> |
| 4     | Social Impact/ Customer Satisfaction     | <ul style="list-style-type: none"><li>• <b>A tracking device can be useful in the</b></li></ul>   |

|   |                               |   |
|---|-------------------------------|---|
|   |                               | <p><b>case when the parent feels that his or her child is in danger.</b></p> <p>This device provides real-time location.</p> <ul style="list-style-type: none"> <li>• <b>These kinds of devices also help parents to set a parameter for their children when they leave the house. Whenever the child steps beyond a defined area, the tracking system will alert the parent.</b></li> </ul> <p>The idea of the system is to restrict the child's freedom but to know how far the child has gone.</p> |
| 5 | Business Model(Revenue Model) | <p>The innovative business model involves sponsors and partners who share their commitment to edutainment to kids. The two key factors are architectural design and business concept development by involving edutainment activities.</p>   |
| 6 | Scalability of the Solution   | <p>In our system, we automatically monitor the child in real time using Internet of Things.</p> <p>Hence in the future, these issues can be overcome by using Zambezi concept or accessing the system without internet and using high-speed server transmission.</p>  |

### 3.4 Problem Solution fit:

|                         |  |  |  |                                   |
|-------------------------|--|--|--|-----------------------------------|
| Define CS, fit into CC  | <b>CUSTOMER SEGMENTS</b> <b>CS</b><br>This helps the parents to track the daily activity of children and helps to find the child using GPS location.       | <b>CUSTOMER LIMITATION</b> <b>CC</b><br>It is fully about safety and secured electronic system for child . Less tension to Parents.  | <b>AVAILABLE SOLUTION</b> <b>AS</b><br>In Previous method, the model created which can be capable of handling the battery for long time. Nowadays, the system proposes a location tracking facilities and speeding monitoring using GPS, GSM with IOT technology for child safety at low cost which can be affordable by the people. | Explore AS                        |
|                         | <b>PROBLEMS/PAINS</b> <b>PR</b><br>The child safety is a complex far reaching health priority, which requires holistics ways of identifying safety issues. | <b>PROBLEM ROOT/CAUSE</b> <b>RC</b><br>It fears frustration obstacles and understanding the working of the system. Due to this solution, the kidnapping rate will be decreased.                    | <b>BEHAVIOUR</b> <b>BE</b><br>It mainly focus on improving parent-child interactions, home safety and child health care as well as monitoring.   |                                   |
|                         | <b>TRIGGERS TO ACT</b> <b>TR</b><br>The parents are working with new and various technology. So, they should monitor their child's activity daily.         | <b>YOUR SOLUTION</b> <b>SL</b><br>The parents can monitor their child each and every second. If the child is in danger, they notified by SMS through their device and their parents can save them. | <b>CHANNELS OF BEHAVIOUR</b> <b>CH</b><br>Children and their parents are turning to digital solutions more than ever to support children's learning.   | Extract online & offline CH of BE |
| Identify strong TR & EM | <b>EMOTIONS</b> <b>EM</b><br>Due to this, the emotional and mental stability of the children gets affected which in turn ruins their career and future.    |  | While digital solutions provide huge opportunities for sustaining and promoting children's right   |                                   |

#### 4. REQUIREMENT ANALYSIS:

##### 4.1 Functional requirement:

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task)   |
|--------|-------------------------------|--|
| FR-1   | User Registration             | <ul style="list-style-type: none"> <li>● <b>Registration through Gmail</b></li> <li>● Registration through phone number</li> </ul> |
| FR-2   | User Confirmation             | <ul style="list-style-type: none"> <li>● <b>Confirmation via Email</b></li> <li>● Confirmation via OTP</li> </ul>                  |
| FR-3   | App installation              | <ul style="list-style-type: none"> <li>● <b>Installation through link</b></li> <li>● Installation through play store</li> </ul>    |
| FR-4   | Settings geo fence            | <ul style="list-style-type: none"> <li>● Setting by user to find child location</li> </ul>   |

|       |                          |  |
|-------|--------------------------|--|
| FR-5  | Detecting child location | <ul style="list-style-type: none"> <li>• <b>Detecting location via app</b></li> <li>• Detecting location via SMS</li> </ul>  |
| FR-6  | User Interface           | <ul style="list-style-type: none"> <li>• <b>User Login Form.</b></li> <li>• Admin Login Form.</li> </ul>   |
| FR-7  | Database                 | <ul style="list-style-type: none"> <li>• <b>Stored in cloud for seamless connectivity</b></li> <li>• .</li> <li>• <b>Parents and kids link with the distance and the location values obtained from the mobile devices are stored here.</b></li> <li>• The values include parent id, kidded, distance, longitude, latitude etc.</li> </ul>                  |
| FR-8  | Server                   | <ul style="list-style-type: none"> <li>• <b>It connects the database and the frontend application.</b></li> <li>• <b>The backend server has been implemented to run as a service and is deployed in an IBM cloud instance.</b></li> <li>• The backend server has been implemented to run as a service and is deployed in an IBM cloud instance.</li> </ul> |
| FR-9  | GPS tracking             | <ul style="list-style-type: none"> <li>• The system is implemented with a GPS module, which acquires the location information of the user and stores it to the database.</li> </ul>  |
| FR-10 | API                      | <ul style="list-style-type: none"> <li>• The value collected is sent to the database using an API.</li> </ul>  |
| FR-11 | React JS                 | <ul style="list-style-type: none"> <li>• <b>We are using react as front end for us project.</b></li> <li>• Node JS for the back end we are using node .</li> </ul>   |
| FR-12 | GPS modules              | <ul style="list-style-type: none"> <li>• It receives data directly from satellites</li> </ul>  |

|       |                  |   |
|-------|------------------|---|
| FR-13 | Battery Life     | <ul style="list-style-type: none"> <li>• 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.</li> <li>• It should be long-lasting.</li> </ul>   |
| FR-14 | Location History | <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> |

#### ***4.2 Non-Functional requirements:***

| <b>NFR NO</b> | <b>Non-functional Requirements</b> | <b>DESCRIPTION</b>  |
|---------------|------------------------------------|---|
| NFR-1         | Usability                          | <ul style="list-style-type: none"> <li>• Device have GSM can help to inform the parents or relatives about the current situations of the child by deliver the message immediately to save the child.</li> </ul> |
| NFR-2         | Security                           | <ul style="list-style-type: none"> <li>• <b>Make children parents more assure about their kid's security, we have a feature in</b></li> </ul>   |

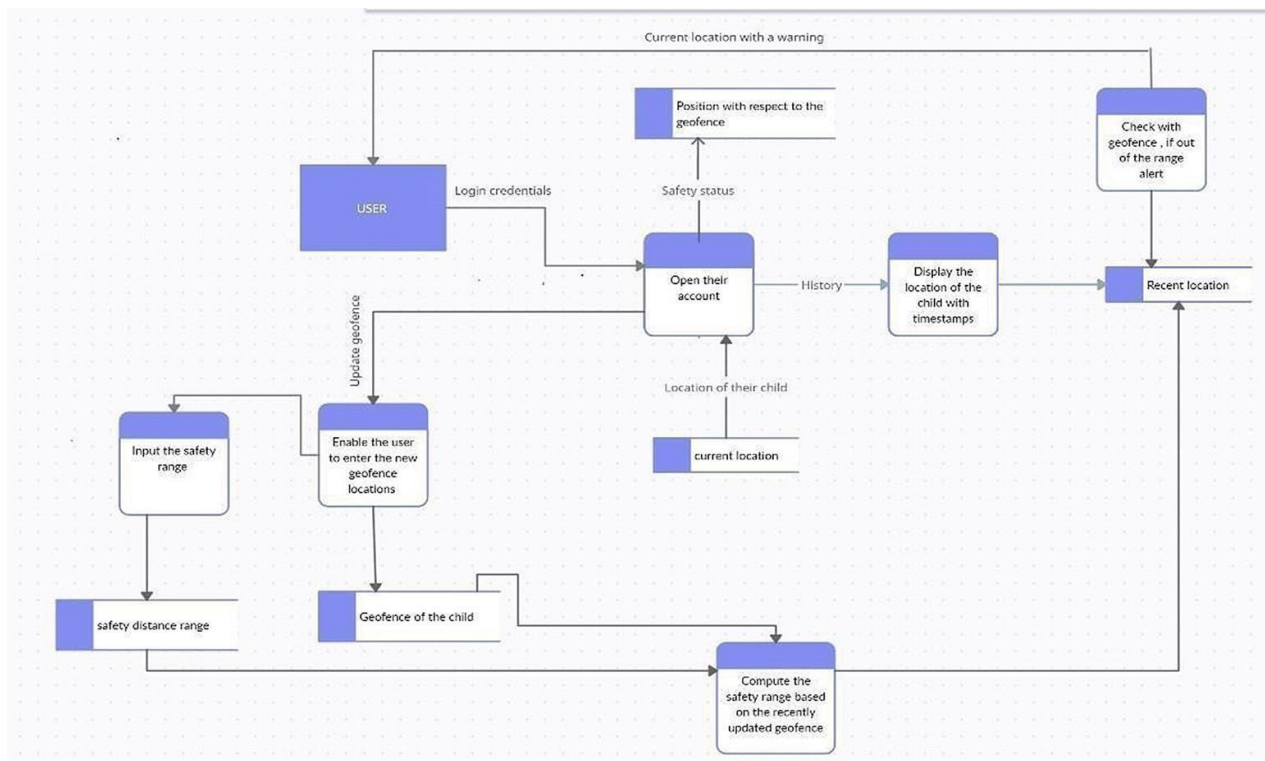
|       |              |   |
|-------|--------------|---|
|       |              | <p><b>our device called Geo- Fence.</b></p> <ul style="list-style-type: none"> <li>• Whenever your child crosses that specific area, you will get an instant notification on your phone.</li> </ul>   |
| NFR-3 | Reliability  | <ul style="list-style-type: none"> <li>• <b>Portable</b></li> <li>• <b>Easy to use</b></li> <li>• Flexibility</li> </ul>  |
| NFR-4 | Performance  | <ul style="list-style-type: none"> <li>• <b>Create a Child tracker which helpsthe parents with continuously monitoring thetranslocation.</b></li> <li>• The notification will be sent according to the child's location to theirparents or caretakers.</li> <li>• The entire location data will be stored in the database.</li> </ul> |
| NFR-5 | Availability | <ul style="list-style-type: none"> <li>• <b>Track your child even in a crowd</b></li> <li>• <b>Get travel details ofkids at any time</b></li> </ul> <p>Know the current location</p>  |
| NFR-6 | Scalability  | <ul style="list-style-type: none"> <li>• <b>Gadget ensures thesafety and tracking of the children.</b></li> <li>• Parents need not worry about their children.</li> </ul>   |

|       |              |  |
|-------|--------------|--|
| NFR-7 | Availability | <ul style="list-style-type: none"> <li>• <b>The system should be able to deliver promptly to the financing authority.</b></li> <li>• In the case of non-profit organizations, the solution should be 'advancing the mission'.</li> </ul> |
| NFR-8 | Dynamic      | <ul style="list-style-type: none"> <li>• IoT devices may have the capability to adapt dynamically and change based on their conditions</li> </ul>  |
| NFR-9 | Desirability | <ul style="list-style-type: none"> <li>• <b>Navigation should be made easy.</b></li> <li>• The user should be able to search and find the information he needs without much hassle.</li> </ul>   |

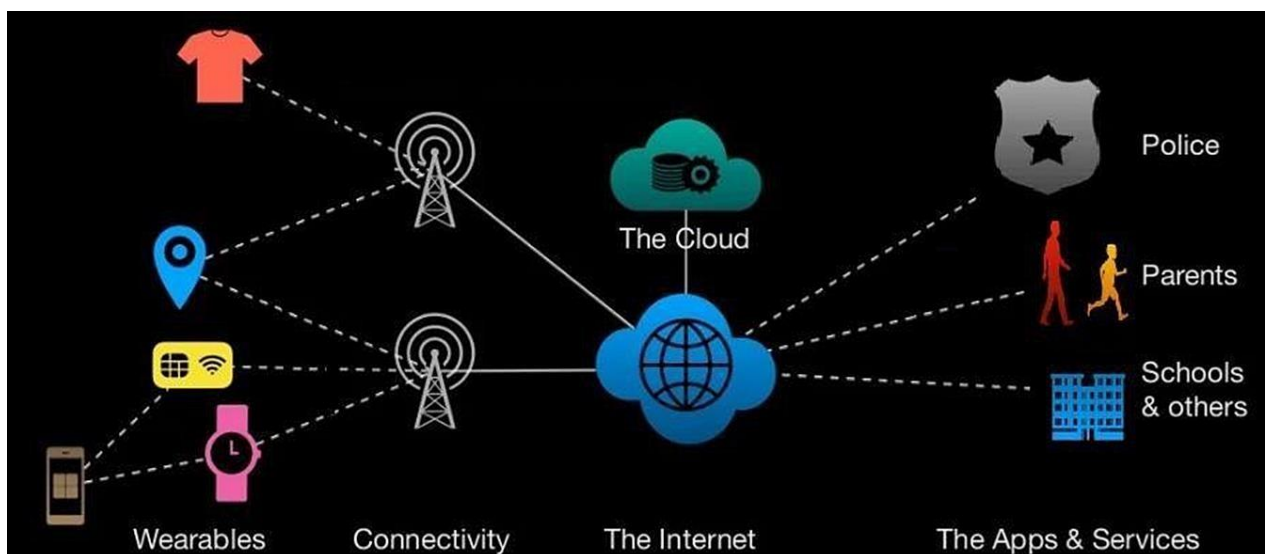
## 5. PROJECT DESIGN:

### 5.1 Data Flow Diagram:





## 5.2 Solution & Technical Architecture:



**Table-1 : Components & Technologies:**

| <b>Component</b>               | <b>Description</b>                     | <b>Technology</b>     |
|--------------------------------|--|-----------------------|
| User Interface                 | Web UI, Mobile App.                    | HTML, CSS, JavaScript |
| Application Logic-1            | Code Development Phase                 | Python                |
| Application Logic-2            | Interfacing purposes                   | IBM Watson Assistant  |
| Browser-based flow editor      | Visual Programming                     | Node Red              |
| Cloud Database                 | Database Service on Cloud              | IBM Cloud             |
| File Storage                   | Usage of IBM Cloud Storage             | IBM Block Storage     |
| Infrastructure (Server/ Cloud) | Application Deployment on Local Server | Cloud Platform        |

**Table-2: Application Characteristics:**

| <b>Characteristics</b>   | <b>Description</b>  | <b>Technology</b>             |
|--------------------------|---|-------------------------------|
| Open-Source Frameworks   | A template for software development that is designed by social network.   | IBM Watson Platform, NodeRed. |
| Security Implementations | Each and every parent should take Care of their own children, without letting them to fall into the dark world of abuses, which Entirely ruin them physically, mentally and emotionally destroying our future. Hence, | Notifications and Alerts      |

|                       |   |   |
|-----------------------|---|---|
|                       | <p>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.</p>                                  |   |
| Scalable Architecture | <p>If any abnormal values are read by the sensor, then an SMS is sent to the Parents mobile and an MMS indicating an image captured by the serial camera is also sent. The future scope of the work is to implement the IoT device which ensures the complete solution for child safety problems.</p> | Implementation using Software.                    |
| Availability          | <p>The solution represented takes advantages of Open-source platforms.</p>  | <p>NODE RED, IBM cloud,<br/>IBM IoT platform.</p> |

|             |  |     |
|-------------|--|-----|
| Performance | <p>GPS is useful for tracking child and also provides the information where the child is currently located as well as it also informs the parents how long his child is far away from his parents. SMS services used when smart phones do not support internet connectivity in this case child is able to send a text message or exact location in the parents. This system is going to help the parents to track the location of their children without informing them because their movement is displayed on the parent's phone.</p> | GPS |
|-------------|--|-----|

### 5.3 User Stories:

| User Type | Functional Requirement | User Story Number | User Story / Task | Acceptance criteria | Priority | Release |
|-----------|------------------------|-------------------|-------------------|---------------------|----------|---------|
|           |                        |                   |                   |                     |          |         |

|                                       |              |              |  |  |             |                 |
|---------------------------------------|--------------|--------------|--|--|-------------|-----------------|
| Customer (Mobile user) and (Web user) | Registration | <b>USN-1</b> | 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        |
|                                       |              | <b>USN-3</b> | As a user, I can register for the application through google account   | I can register& access the dashboard with google account Login | High        | Sprint-2        |
|                                       | <b>Login</b> | USN-4        | As a user, I can log into the application by entering user id & password   |  | High        | Sprint-1        |
|                                       | Dashboard    |              |  |  |             |                 |
| 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  | I can login only with my provided credentials                  | <b>High</b> | <b>sprint-3</b> |

|  |  |  |                     |  |  |  |
|--|--|--|---------------------|--|--|--|
|  |  |  | updated constantly. |  |  |  |
|--|--|--|---------------------|--|--|--|

## 6. PROJECT PLANNING & SCHEDULING:

### 6.1 Sprint Planning & Estimation:

| <b>Sprint</b>   | <b>Functional Requirement (Epic)</b> | <b>User Story Number</b> | <b>User Story / Task</b>   | <b>Story Points</b> | <b>Priority</b> | <b>Team Members</b>     |
|-----------------|--------------------------------------|--------------------------|--|---------------------|-----------------|-------------------------|
| Sprint-1        | Registration                         | USN-1                    | As a Parent/Guardian, I can register for the application by entering my email, password, and confirming my password. | 2                   | High            | <b>Sakthi Sowndarya</b> |
| Sprint-2        |                                      | USN-2                    | As a Parent/Guardian, I can register for the application through Gmail   | 1                   | Medium          | <b>pushpaveni</b>       |
| <b>Sprint-3</b> | User Confirmation                    | <b>USN-3</b>             | As a parent I will receive connection , location in SMS /mail once I have entered this application                   | 1                   | High            | <b>Sowmiyadevi</b>      |
| <b>Sprint-4</b> | <b>Login, Dashboard</b>              | <b>USN-4</b>             | As a parent/ guardian , I can log into the application by  | 2                   | High            | <b>prabha</b>           |

|  |  |  |                            |  |  |  |
|--|--|--|----------------------------|--|--|--|
|  |  |  | entering mail and password |  |  |  |
|--|--|--|----------------------------|--|--|--|

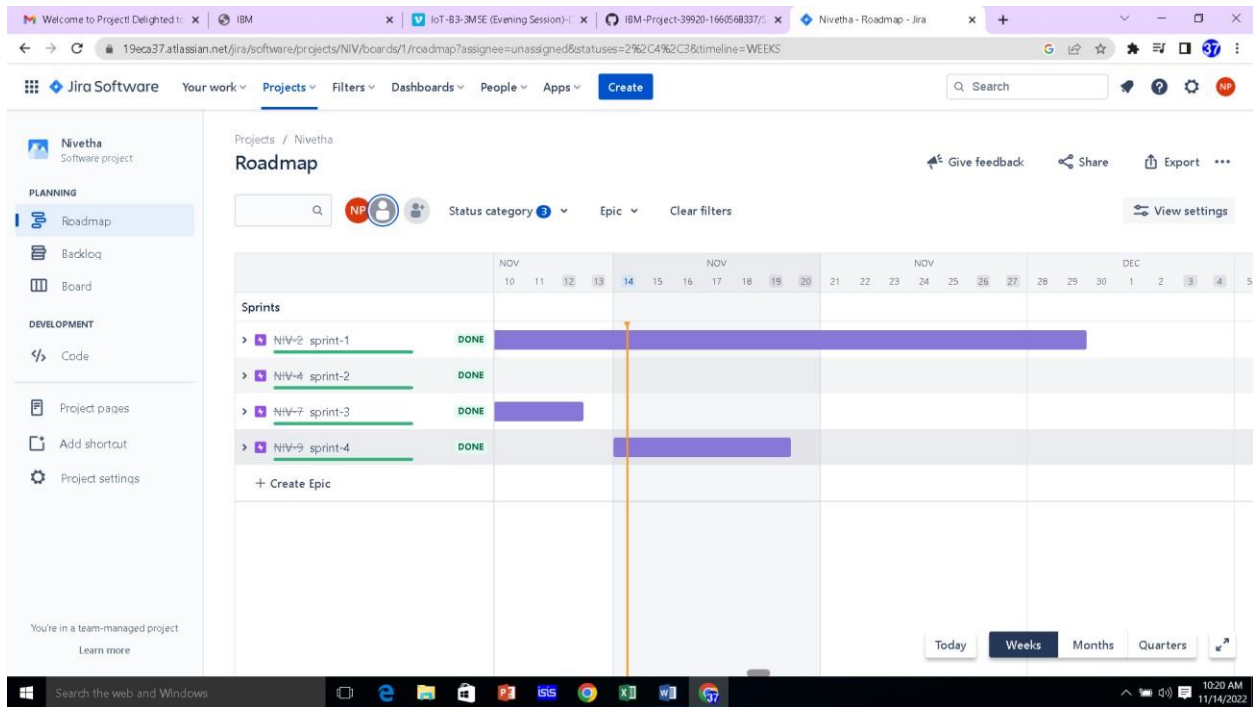
## 6.2 Sprint Delivery Schedule:

### Project Tracker, Velocity &Burndown Chart:

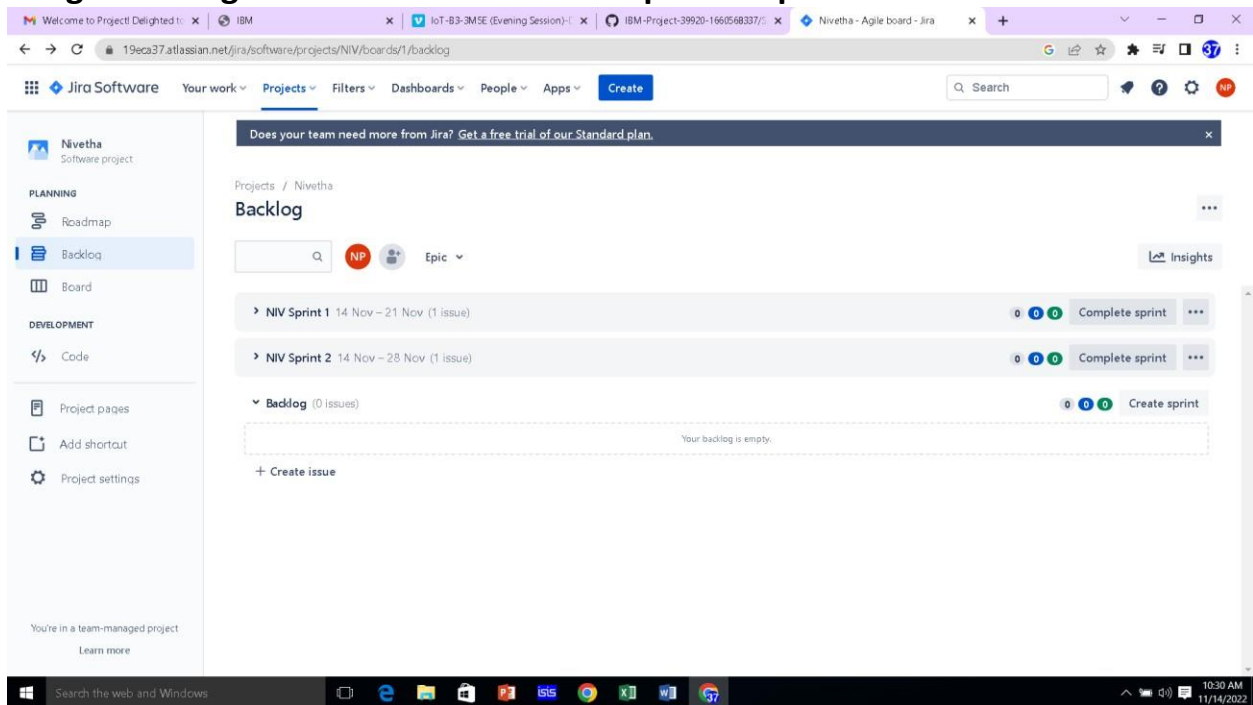
| Sprint   | Total Story Points | Duration | Sprint StartDate | Sprint End Date (Planned) | Story Points Completed(as on PlannedEnd Date) | Sprint Release Date (Actual) |
|----------|--------------------|----------|------------------|---------------------------|---|------------------------------|
| Sprint-1 | <b>4</b>           | 6 Days   | 24 Oct 2022      | 29 Oct 2022               | 4   | 29 Oct 2022                  |
| Sprint-2 | <b>7</b>           | 6 Days   | 31 Oct 2022      | 05 Nov 2022               | <b>7</b>                                      | 05 Nov 2022                  |
| Sprint-3 | <b>6</b>           | 6 Days   | 07 Nov 2022      | 12 Nov 2022               | <b>6</b>                                      | 12 Nov 2022                  |
| Sprint-4 | <b>3</b>           | 6 Days   | 14 Nov 2022      | 19 Nov 2022               | <b>3</b>                                      |                              |

## 6.3 Reports from JIRA:

1. Image showing the Backlogs created in the Jira Software(PETASprint1,PETASprint2, PETA Sprint3,PETA Sprint4):



## Image showing the User Stories in the respective sprints:





The top screenshot displays the Jira Software interface for the 'Nivetha' project. The left sidebar shows the 'Backlog' view selected. The main content area shows a list of issues under 'NIV Sprint 3' (7 Nov - 14 Nov, 2 issues). The issues are 'NIV-15: gadget registration' and 'NIV-16: gadget login', both marked as 'DONE'. Below the sprint list is a 'Backlog' section with 0 issues and a 'Create issue' button. The bottom screenshot shows the 'All sprints' view. The main content area displays a Kanban board with three columns: 'TO DO', 'IN PROGRESS' (1 issue), and 'DONE' (3 issues). The 'IN PROGRESS' column contains 'gadget login' (NIV-16). The 'DONE' column contains 'NIV-11', 'NIV-12', and 'gadget registration' (NIV-15), all marked as 'DONE'.

## 7. CODING & SOLUTIONING:

### 7.1 Feature 1:

```
#include <TinyGPSPlus.h>
```

```

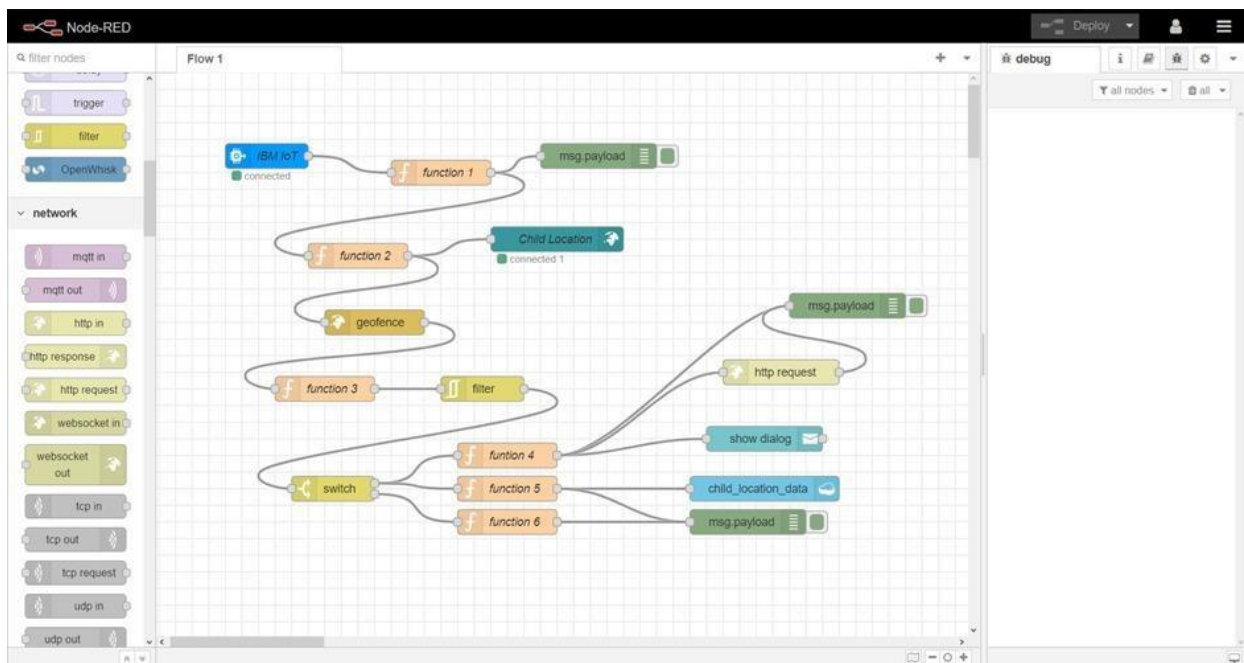
TinyGPSPlus GPS;
void setup()
{
    Serial.begin(9600);
    Serial2.begin(9600);
    delay(3000);
}
void loop()
{
    while (Serial2.available() > 0)
    if (gps.encode(Serial2.read()))
        displayInfo();
    if (millis() > 5000 && gps.charsProcessed() < 10)
    {
        Serial.println(F("No GPS detected: check wiring."));
        while (true);
    }
}
void displayInfo()
{
    Serial.print(F("Location: "));
    if (gps.location.isValid())
    {
        Serial.print("Lat: ");
        Serial.print(gps.location.lat(), 6);
        Serial.print(F(", "));
        Serial.print("Lng: ");
        Serial.print(gps.location.lng(), 6);
        Serial.println();
    }
    else
    {
        Serial.print(F("INVALID"));
    }
}
void updateSerial()
{
    delay(500);
    while (Serial.available())
    {
        Serial2.write(Serial.read()); //Forward what Serial received to Software Serial Port
    }
    while (Serial2.available())
    {
        Serial.write(Serial2.read()); //Forward what Software Serial received to Serial Port
    }
}

```

## 7.2 Feature 2:

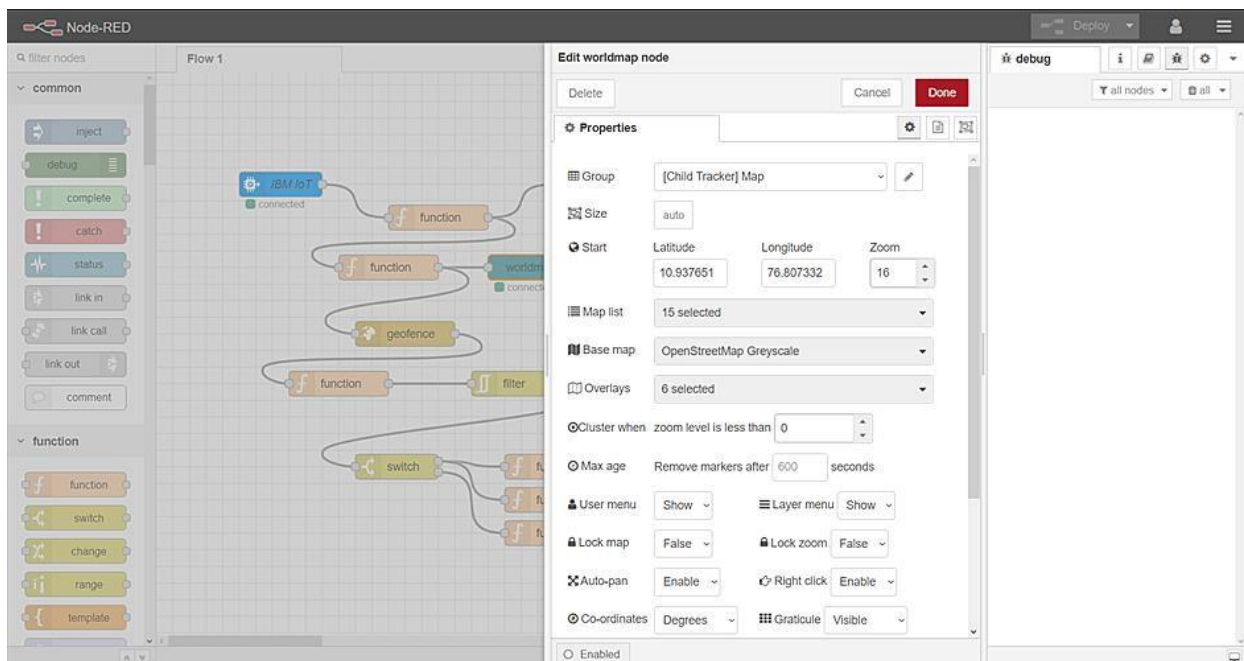
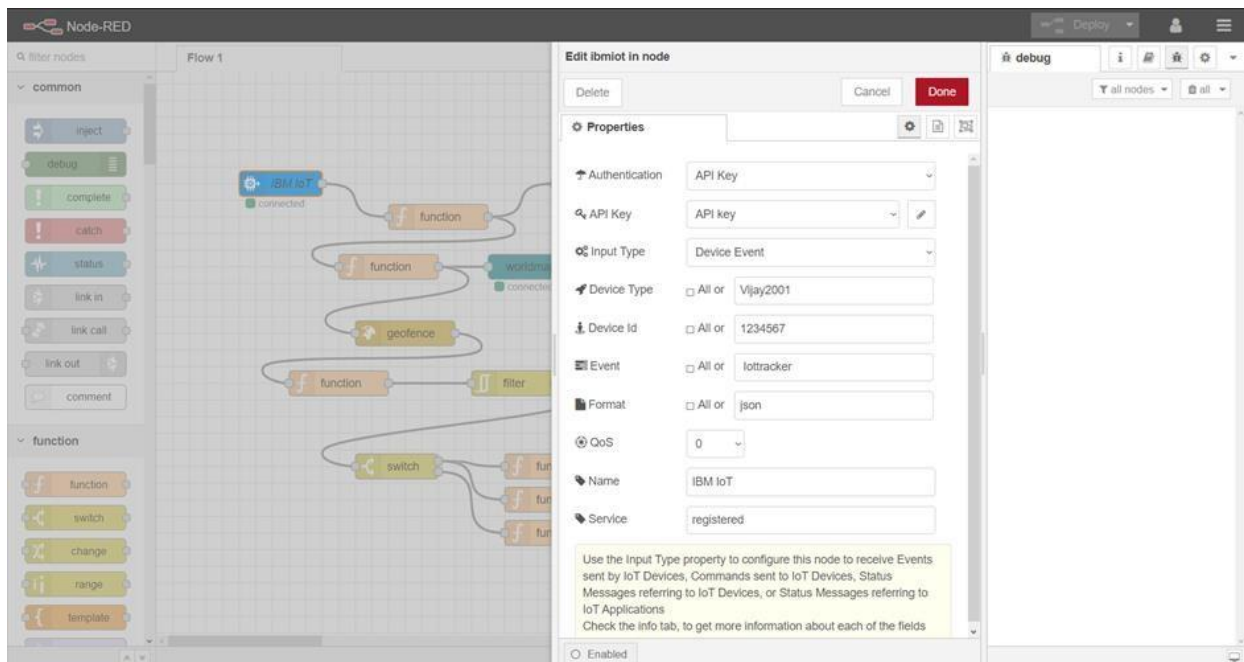
### Step 1:

- Created node-red flow using worldmap, geofence, cloudant, and http request to locate the child.

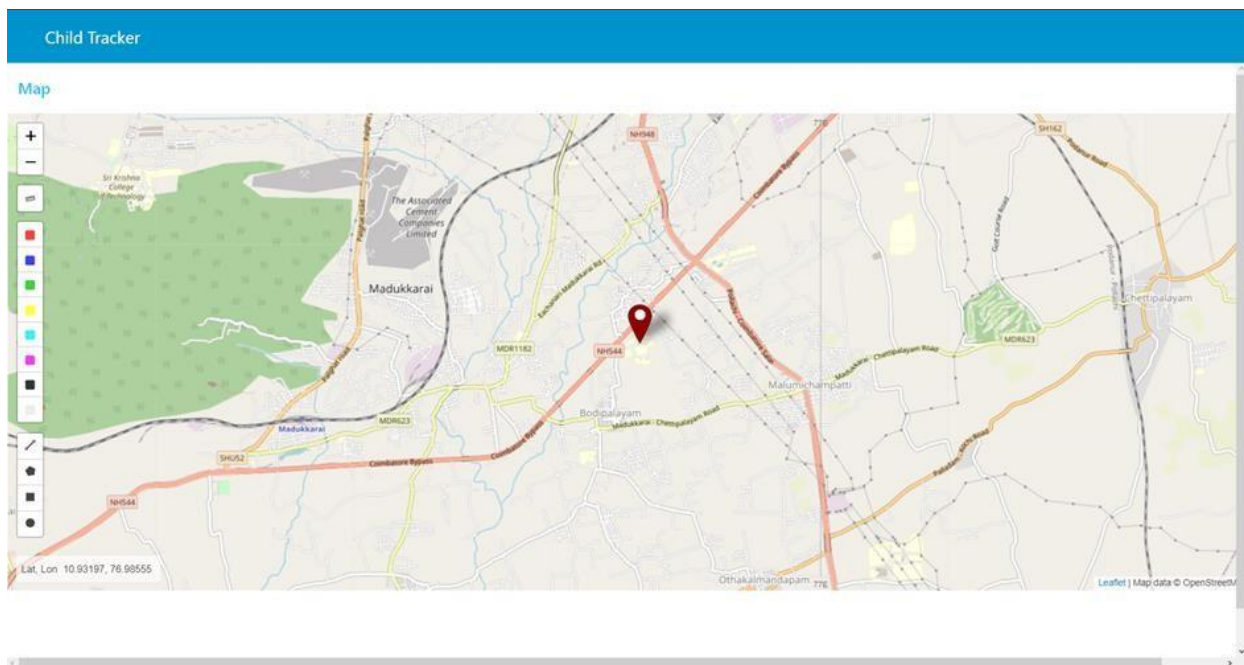
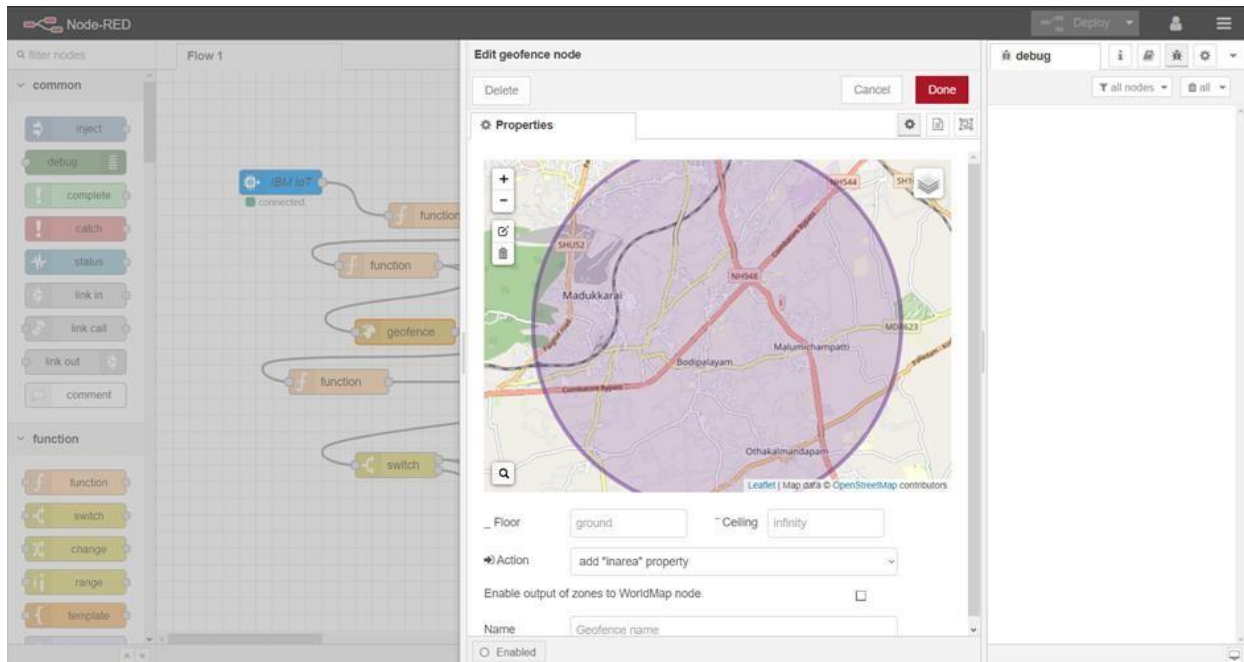


### Step 2:

- Connected IBM IoT node in node-red to IBM Watson IoT using device credentials.



- Connected geofence to keep the child safe inside the parent or caretaker's monitoring



## 8. TESTING:

### 8.1 Test Cases:

#### 8.1.1 Functional test cases:

- To verify the performance to create a Child tracker which helps the parents with continuously monitoring the translocation.
- To verify scalability testing.
- To verify security testing.
- To verify usability testing.

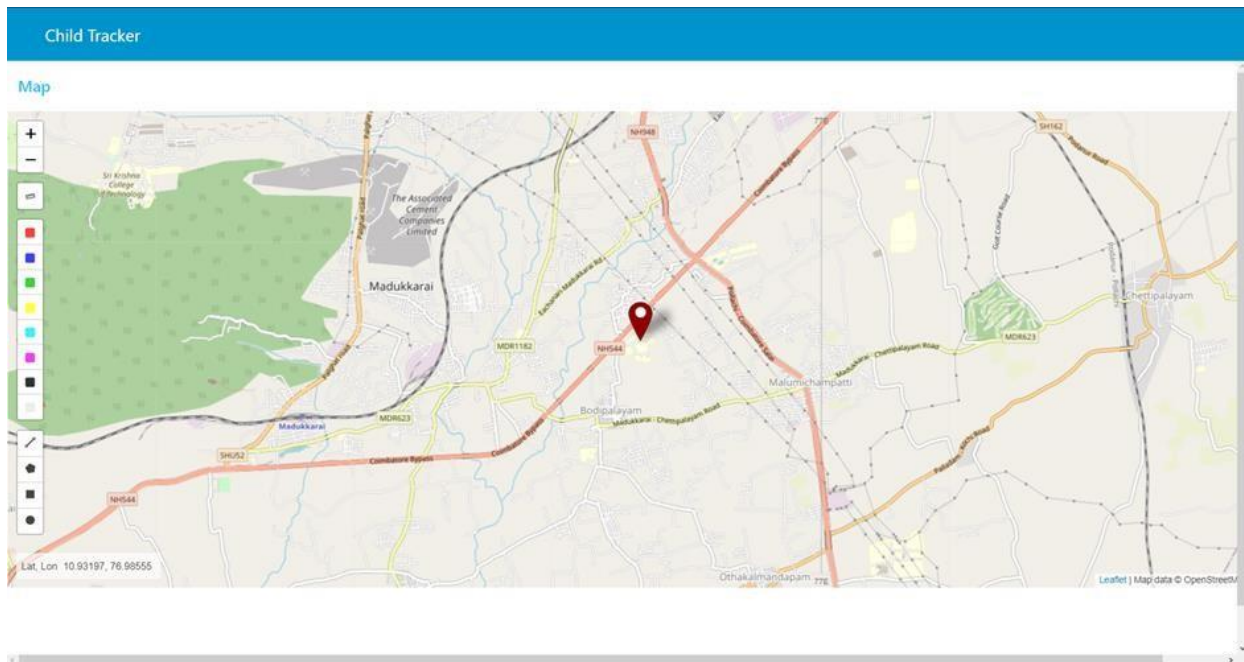
## 8.2 User Acceptance Testing:

### 8.2.1 Performance Testing:

- To verify the settings for geo fence.
- To verify the user interface.
- To verify detecting child location.
- To verify API key is correct or not.

## 9. RESULTS:

### 9.1 Performance Metrics:



- Store the location coordinates in database



child\_location\_data

Document ID

Options

{ } JSON

All Documents

Query

Permissions

Changes

Design Documents

Log Out

Table

Metadata

{ } JSON

Create Document

|                          | _id                     | deviceId | deviceType | eventType  | format |
|--------------------------|-------------------------|----------|------------|------------|--------|
| <input type="checkbox"/> | 0868d74e98d7df1304e...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 0e969041ae8c8270d3e...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 157ac8402bfb1ac164e...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 3adc73c6976026de939...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 409f267391f2effd2c49... | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 614090b2566fce401c...   | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 6a2704e478a02b6d7ca...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 6a80894819b94d31a94...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 85eb9cafd6373bd0670...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | 9ed31bd378c7e01a9c8...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | bd327c90bb303f02890...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | bf8d0ec61d74dc3f53a7... | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | c327345e7901f08e441...  | 1234567  | Vijay2001  | Iottracker | json   |
| <input type="checkbox"/> | d6483b57ff8aaf6c7a17... | 1234567  | Vijay2001  | Iottracker | json   |

Showing 5 of 9 columns.

Show all columns.

Showing document 1 - 15.

Documents per page: 20

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>

child\_location\_data

Document ID

Options

{ } JSON

All Documents

Query

Permissions

Changes

Design Documents

Log Out

Table

Metadata

{ } JSON

Create Document

id "0868d74e98d7df1304efe9d5eda8e5cb"

```

{
  "id": "0868d74e98d7df1304efe9d5eda8e5cb",
  "key": "0868d74e98d7df1304efe9d5eda8e5cb",
  "value": {
    "rev": "1-296b426c3354c72acfb368261fb331ff"
  },
  "doc": {
    "_id": "0868d74e98d7df1304efe9d5eda8e5cb",
    "_rev": "1-296b426c3354c72acfb368261fb331ff",
    "topic": "iot-2/type/Vijay2001/id/1234567/evt/Iottracker/fmt/json",
    "payload": {
      "message": "Exit",
      "Time": "11/17/2022, 8:28:49 PM",
      "name": "Child Location",
      "lat": 19.952114,
      "lon": 76.956643
    },
    "deviceId": "1234567",
    "deviceType": "Vijay2001",
    "eventType": "Iottracker",
    "format": "json",
    "location": {
      "inarea": false
    }
  }
}

```

id "0e969041ae8c8270d3e7d4b08a725e2c"

Showing document 1 - 15.

Documents per page: 20

<

>

- Child tracking
- Location history

## 10. ADVANTAGES & DISADVANTAGES:

#### **ADVANTAGES:**

- The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same.
- The advantages of smart phones which offers rich features like Google maps, GPS, SMS etc.

#### **DISADVANTAGES:**

- This system is unable to sense human behavior of child.
- To implement the IoT device which ensures the complete solution for child safety problems.

### **11. CONCLUSION:**

The 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 minicamera 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 random as
randimport time
import ibmiotf.application
import ibmiotf.device
import sys
import imdb

#defining credentials of
deviceorganization =
"aa13kc" deviceType =
"Vijay2001" deviceId =
"1234567" authMethod =
"token"
authToken = "Yd-6ozY-S6BLhM0vkw"
```



```

def myCommandCallback(cmd):
    print("Command received: %s" %
cmd.data['command'])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:
    name= "Child
    Location"#latitude=
    10.908532
    #longitude= 76.979312

    latitude= 10.952114
    longitude= 76.956643

    data = {'name':name,'lat' : latitude,
        'lon': longitude}
    def myOnPublishCallback():
        print("Published all data to IBM Watson :",latitude,"
        ",longitude)success =
deviceCli.publishEvent("lottracker","json",data,qos=0,on_publish=myOnPublishCallb
ack) if not success:
        print("Not connected to IoT
        Device")time.sleep(10)

    deviceCli.commandCallback =
myCommandCallbackdeviceCli.disconnect()

```

GitHub & Project Demo Link:

GitHub Link :

[IBM-Project-5577-1658810191](#)

Project Demo Link:

[https://drive.google.com/file/d/1qWxVIQY7caC6WE\\_uUEfCFdd-T\\_Lk8fgt/view?usp=drivesdk](https://drive.google.com/file/d/1qWxVIQY7caC6WE_uUEfCFdd-T_Lk8fgt/view?usp=drivesdk)

