# TABLE OF CONTENTS

# CHAPTER - 1

# INTRODUCTION

## 1.1 PROJECT OVERVIEW

Approximately 80% of all reports of child abuse are made in recent times, with 74% of the victims being girls and the remaining 20% being males. In this world, a child goes missing every 40 seconds. Children are the foundation of a country, if their future was threatened, it would have an effect on the development of the whole country. The emotional and mental stability of the children is compromised as a result of the abuse, ruining their futures and careers. The things that happen to these defenseless children are not their fault. Therefore, parents are in charge of raising their own children. However, parents are compelled to seek money because of the state of the economy and their desire to concentrate on their child's future and job. Consequently, it becomes challenging for them to cling to their children constantly. We have created a setting in our system where this issue can be effectively solved. It enables parents to keep a close eye on their children in real time while concentrating on their own careers without having to take any physical action. children cannot tell their parents about the abuse they experience on a regular basis. They are too young to really comprehend what truly occurs to them. Parents find it challenging to recognize when their children are being abused. So, the main objective of this module is to help working parents to be free from worry about their children by tracking their

movements at any time. An autonomous real-time monitoring system is required for every child worldwide in order to stop attacks on children.

## 1.2 PURPOSE

Creating a device that can be followed using GPS locations and has a panic button to in form the parent via a GSM module, this invention is primarily focused on improving child safety. An Android app for parents is created to control and monitor the device at any time. Smart gadget devices are always connected to parents' phones, which can receive and make phone calls as well as SMS gadget via a GSM module. Additionally, wireless technology is implemented on the device, which is useful to bind the device within a region of monitoring range; if the device is moving out of monitoring range, an alert will be triggered on a binding gadget, helping you maintain a virtual watch over the child. An alert will be sent to a bound device if the device moves outside the monitoring range, allowing you to keep a virtual check on the child. Devices come with a health monitoring system that checks for factors including heart rate, pulse, and temperature. The parental app allow for the monitoring of these indicators. Using a contact switch, the device also keeps track of whether or not it is plugged in and notifies the parent the moment it is unplugged.

# CHAPTER - 2

## LITERATURE SURVEY

### 2.1 EXISTING PROBLEM

Nowadays due to the digital world, In most houses, both parents will be going to work. So, they can't monitor their child in every minute of the activity continuously.so, we plan to create a website that shows the current location of the child through the GPS module. By creating a Geo-fence around the location of the child to continuously check whether the child is within the range of the Geo-fence. If the child crosses the range of the Geo-fence a notification will be automatically generated and will be sent to the parents/caretaker.

| Author and Year | Technique/ Methodology | Limitations/ Drawback | Advantages | Applications |
|---|---|---|---|---|
| Lai Yi Heng, 2019 | IoT | Use more internet | Capture real-time video | Home, School |
| Firoz Khan,2020 | IoT | Cannot capture video | Low Cost | Home, School |
| Prakriti Agarwal, 2020 | IoT & Cloud Computing | Cloud is a subscription method | Easy to access | Home, School |
| Yashas S, 2019 | IoT | expensive | Using a solar panel for battery backup | Home, School |
| M Nandini Priyanka , 2019 | IoT | Need stable internet | Automatically alerts the parents | Home, School |
| Senthamilarasi N, 2019 | IoT | Costly | Notified in abnormal cases | Home, School |

## 2.2 REFERENCES

1. Arun Francis G, Janani I, Kavya S and REMICADE K. Child Safety Wearable Device Using Raspberry Pi. Waffen-UND Coatimundis Journal. 11/2020. pp.135-137.

2. D. Ezhilarasi, N. Senthamilarasi Bharathi and R.B Sangavi. Child Safety Monitoring System Based on IoT. Journal of Physics: Conference Series. 1362(1). 2019. pp.1742-6596

3 . E Kusuma Kumari, K N H Srinivas, M Nandini Priyanka, S Murugan and T D S Sarveswararao. Smart IOT Device for Child Safety and Tracking. International Journal of Innovative Technology and Exploring Engineering (IJITEE). 8(8). 2019. pp.2278-307

4 . Helen, Kalaiselvi V.K.G, M. Fathima Fathila and R. Rijwana. A smart watch for child safety based on iot concept ‘watch me’, International Conference on Computing and Communications Technologies (ICCCT). 2017

## 2.3 PROBLEM STATEMENT DEFINITION

Creating a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.


**Figure 2.1**. Problem Statement

# CHAPTER - 3

## IDEATION AND 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.

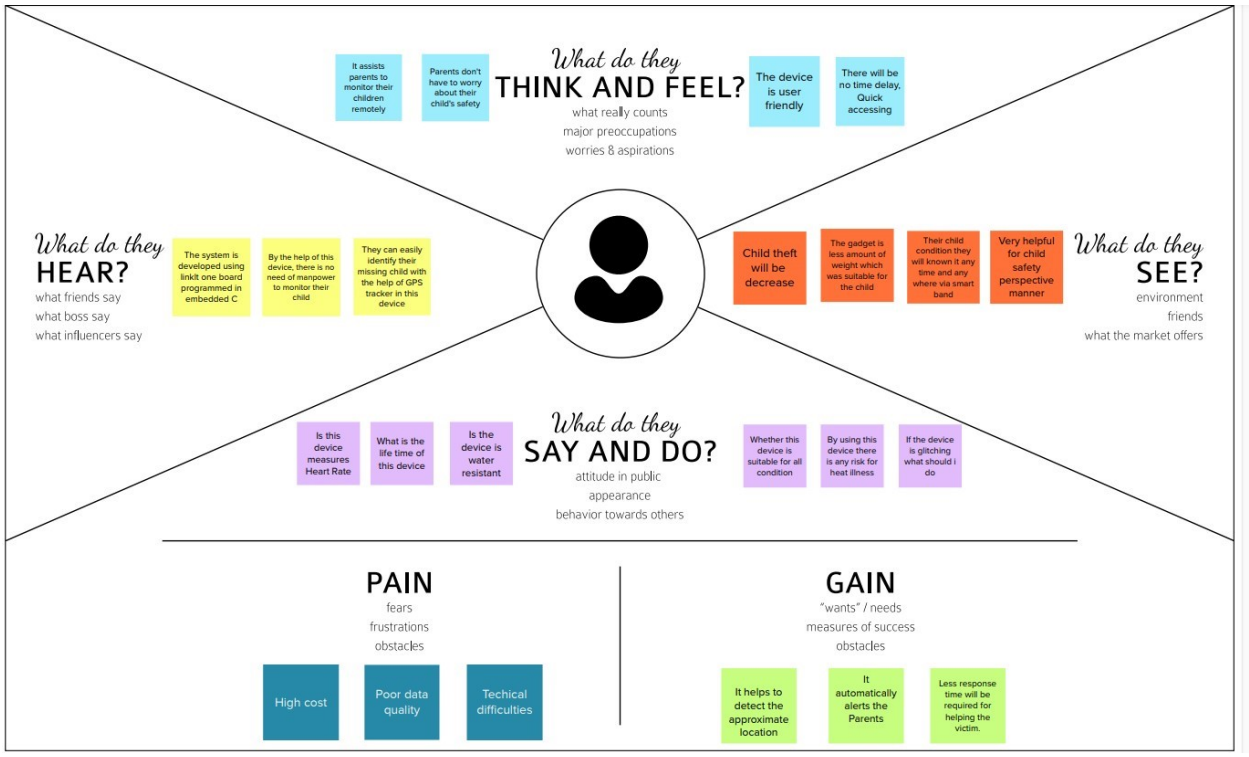



**Figure 3.1**. Empathy Map

## 3.2 IDEATION AND 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 number of creative solutions.

## STEP-1 TEAM GATHERING, COLLABORATION AND SELECTING THE PROBLEM STATEMENT

This step includes the formation of a team, collaborating with the team by collecting the problems of the domain we have taken and consolidating the collected information into a single problem statement.

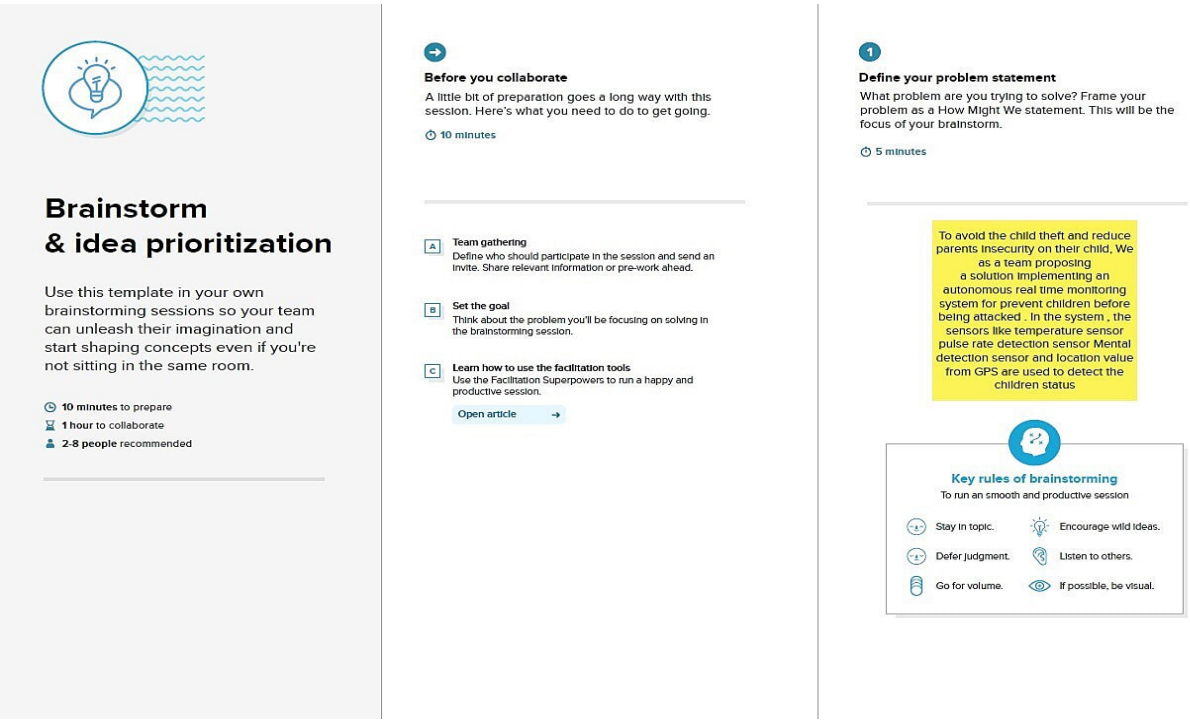



**Figure 3.2.** Ideation And Brainstorming

## STEP-2 BRAINSTORM, IDEA LISTING AND GROUPING

This step of ideation includes the listing of individual ideas by teammates to help with the problem statement framed. All the individual ideas have been valued and made individual clusters.

Then discussed as a team and finally made an ideation Cluster A and concluded with the most voted ideas from all the clusters together and Cluster B with the least needed ideas.

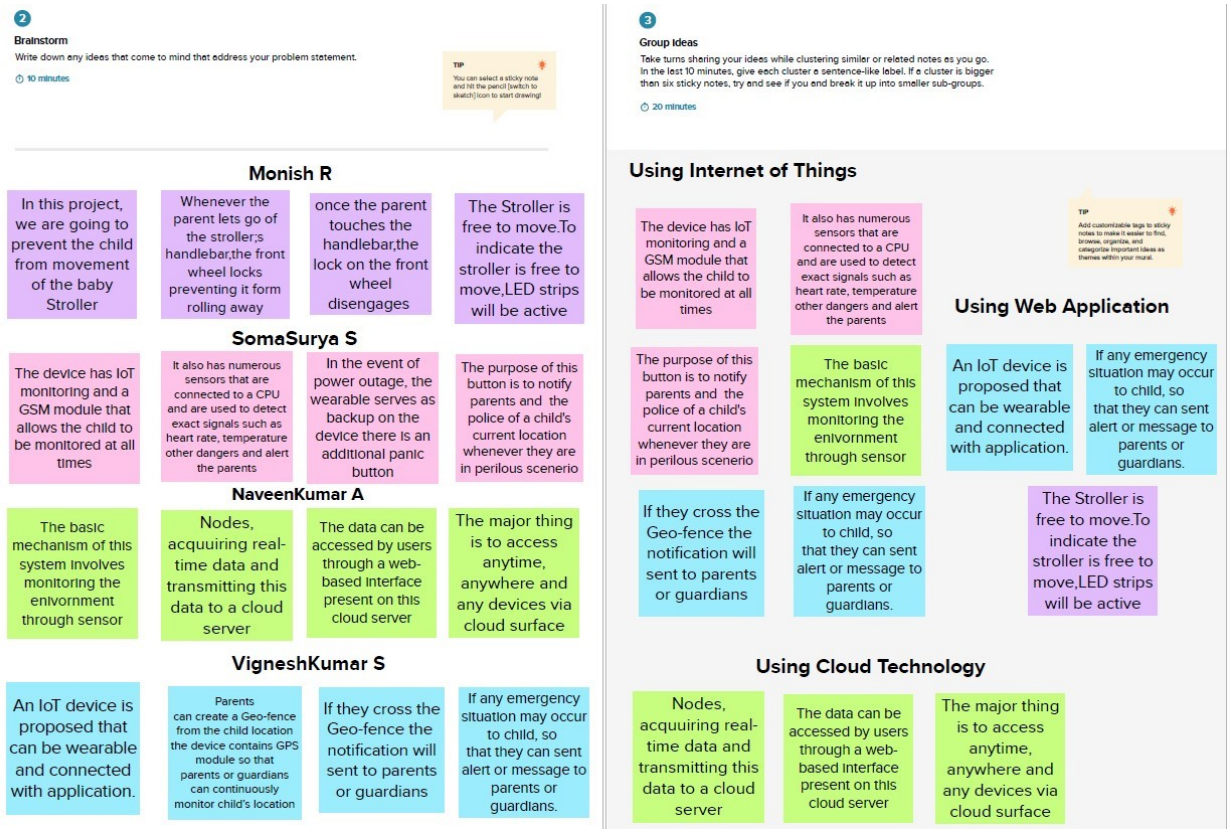



**Figure 3.3.** Brainstorm, Idea Listing and Grouping

## STEP-3 IDEA PRIORITIZATION

This step includes the process of listing necessary components to come up with the working solution and making a hierarchy chart by prioritizing the components based on importance, say from the higher being backend and lower being the user interfacing components.

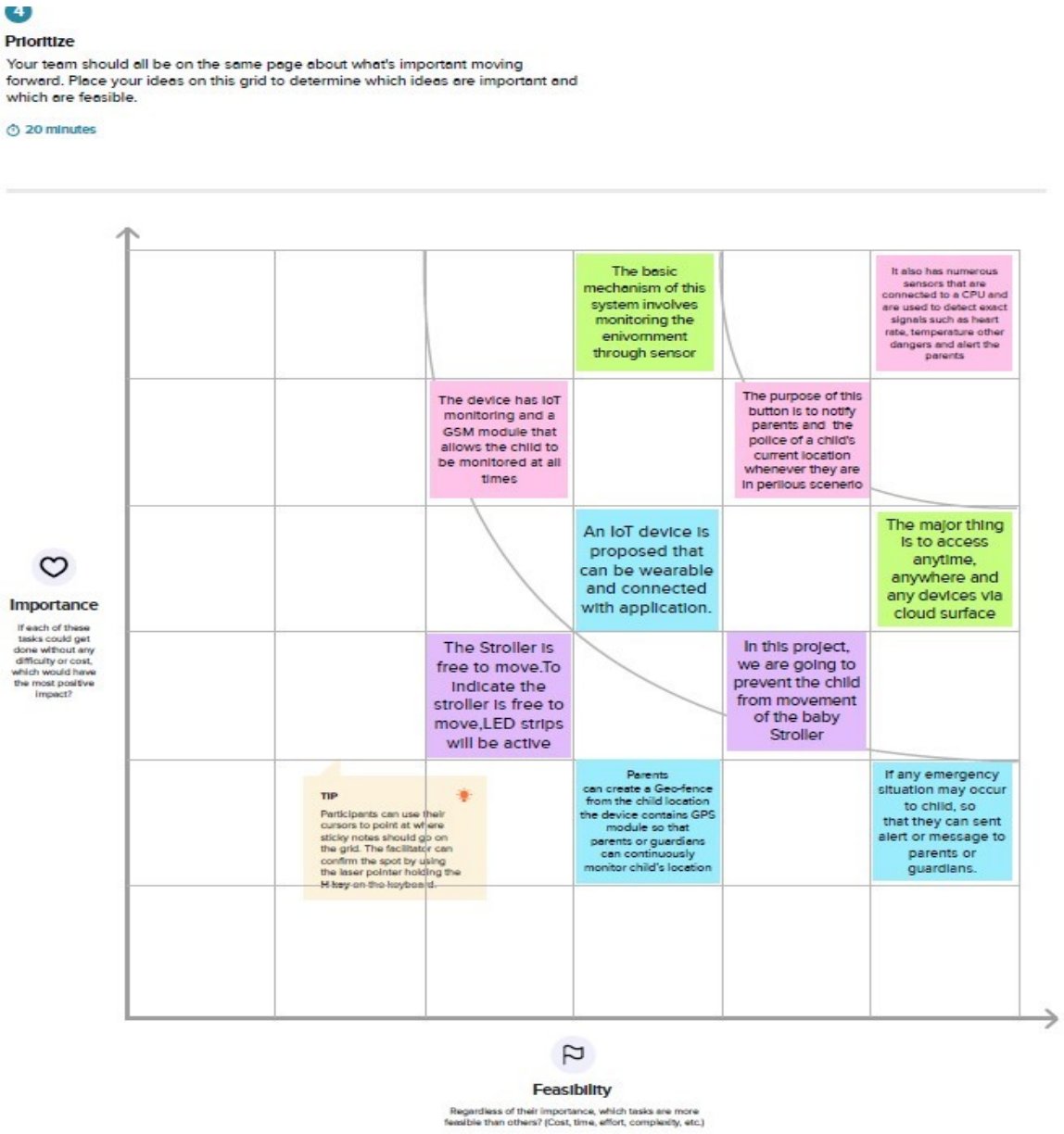



**Figure 3.4.** Idea Prioritization

## 3.3 PROPOSED SOLUTION

**Problem statement (problem to be solved)**

Nowadays due to the digital world, In most of the houses both the parents will be going to work. So, they can’t monitor their child in every minute of the activity continuously. In crowded area there is possibility of losing the child it becomes difficult to track the location of the child which makes the parents nervous.

**Idea / Solution description**

For this problem we are plan to create an app which shows the current location of the child through the GPS module. By create a Geo-fence around the location of the child to continuously check whether the child is within the range of the Geo-fence. If the child crosses the range of the Geo-fence a notification will be automatically generated and will be sent to the parents/caretaker. The notification of the location of the child will be sent to the parents once every fixed amount of time duration.

**Novelty / Uniqueness**

We will implement the different alarm system for the different type of situations. Instead of giving the notification it will alert the parents by giving the huge sound so that parents can easily identify. We also implement the sensor which will indicate the good touch and bad touch. .

**Social Impact / Customer Satisfaction**

This will create a safe and peaceful environment for both the parents and the children by making the parents relaxed by knowing the child's location and

providing the freedom for children. This device makes the parents to feel at ease about their child's location as they can monitor the location of the child anytime from anywhere.

## 3.4 PROBLEM-SOLUTION FIT

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why?

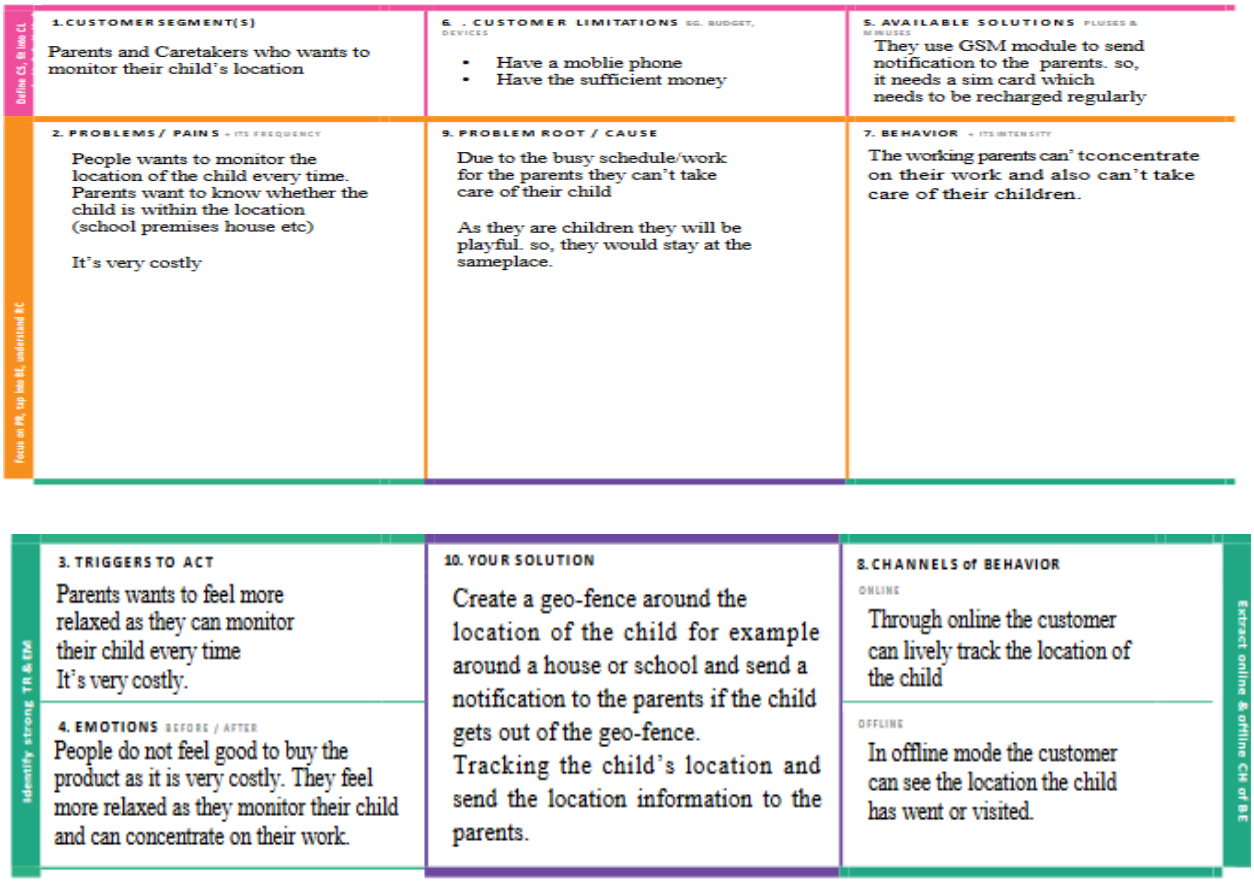



**Figure 3.5.** Solution Fit

# CHAPTER - 4

## REQUIREMENT ANALYSIS

### 4.1 Functional Requirements

| 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 of geofence |

### 4.2 Non-Functional Requirements

| 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** | Once logged in ,webpage is available until logging out of the app |
| NFR-4 | **Performance** | Each page must load few seconds |
| NFR-5 | **Availability** | The Gadget for Child Safety is availability over all the conditions of weather and atmosphere pressure and child can be carried with all time. |
| NFR-6 | **Scalability** | The process must finish within three hours so data is available by forenoon. local time after an overnight update |

# CHAPTER – 5

## PROJECT DESIGN

### 5.1 DATA FLOW DIAGRAMS

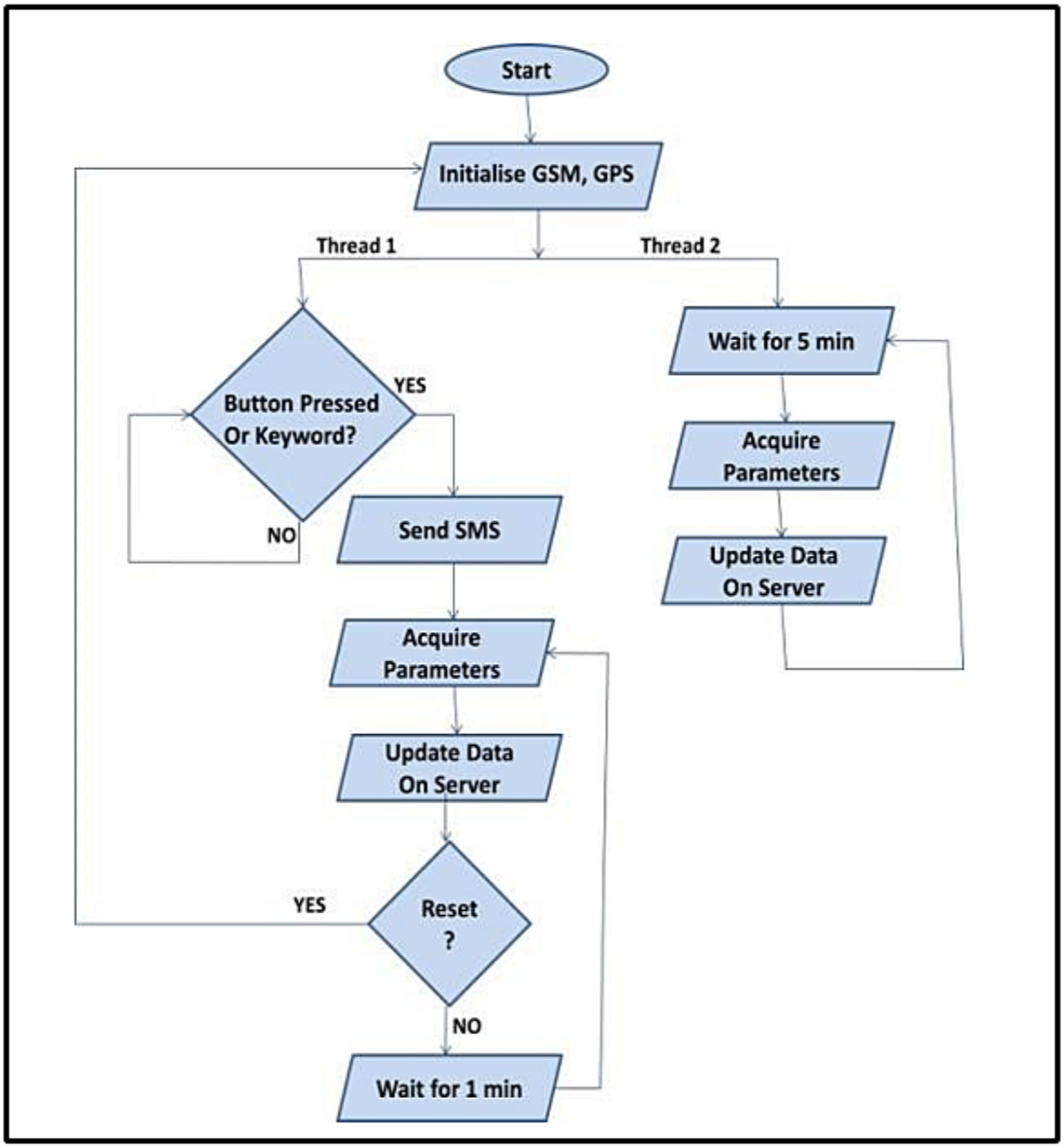



**Figure 5.1**. Data flow Diagram

## 5.2 SOLUTION AND TECHNICAL ARCHITECTURE

The solution architecture includes the components and the flow we have designed to deliver the solution.

Here, the application is planned to be designed, where the caretaker of the patients can feed the medicinal details to the database connected with the help of python and API calls. By monitoring that information by the program, timely message alerts are given to the patients to intake the medicine.

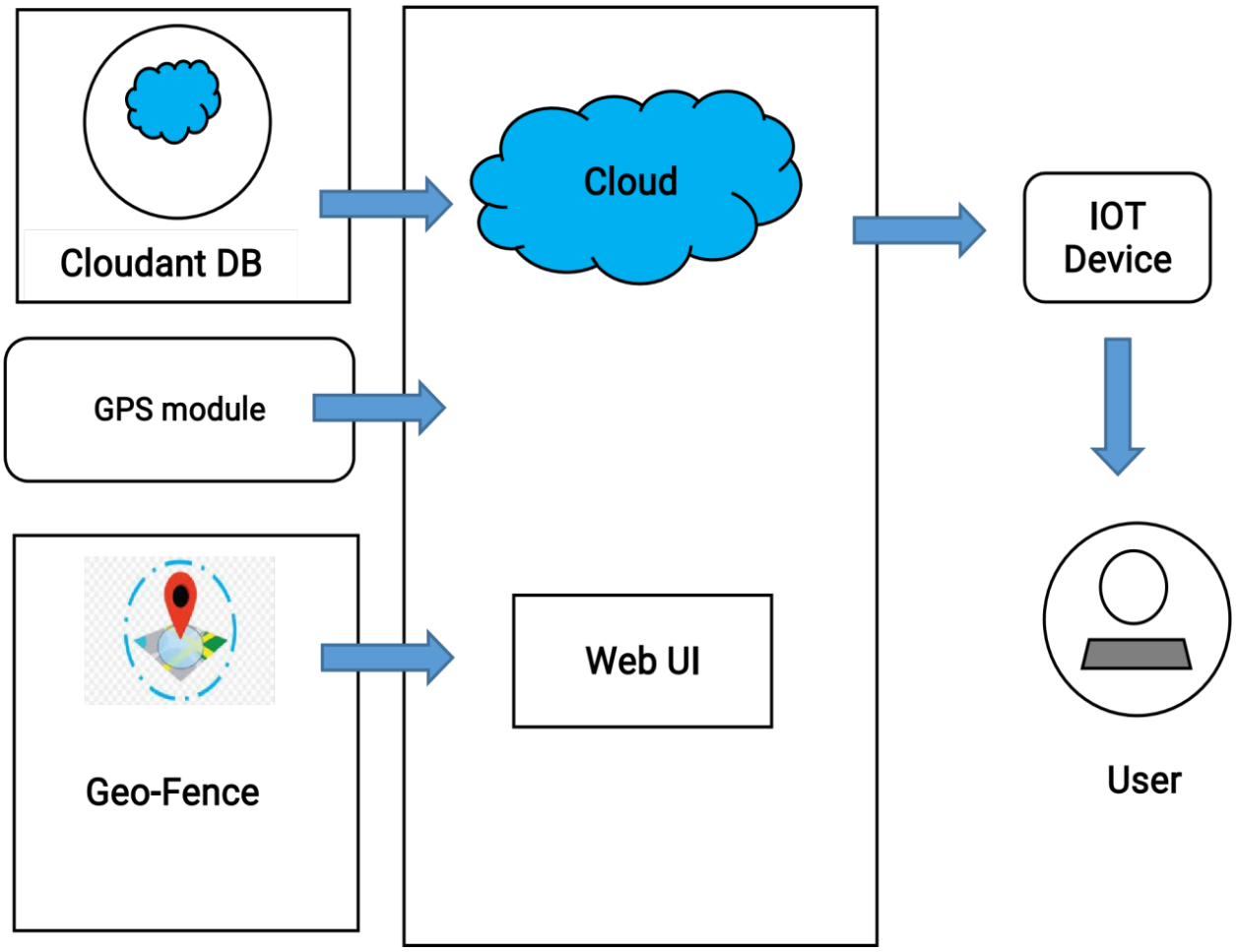



**Figure 5.2.** Technology Architecture

## 5.3 USER STORIES

| Sprint | Functional Requirement (Epic) | UserStory Number | User Story / Task | Story Points | Priority |
|---|---|---|---|---|---|
| Sprint-1 | Registration | USN-1 | As a user, I can register for the application by entering my email, password, and confirming my password. | 2 | High |
| Sprint-1 | Login | USN-2 | As a user, I can log into the application by entering email and password | 2 | High |
| Sprint-2 | Geo fencing | USN-3 | The geo fencing of the child should be done based on the geographical coordinates | 4 | Medium |

| | | | | | |
|---|---|---|---|---|---|
| Sprint-3 | Node RED - Cloudant DB Communication | USN-4 | The data stored in IBM Cloud should be properly integrated with Cloudant DB | 6 | Medium |
| Sprint-4 | User – WebUI Interface | USN-5 | The Web User Interface should get inputs from the user consists of the features by which a user interacts | 6 | High |

**Table 5.1.** User Stories

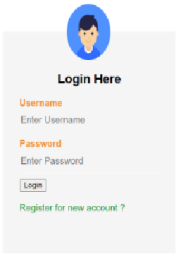
# CHAPTER - 6

## PROJECT PLANNING AND SCHEDULING

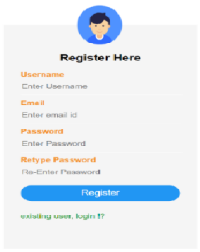
### 6.1 SPRINT PLANNING & ESTIMATION

### SPRINT 1

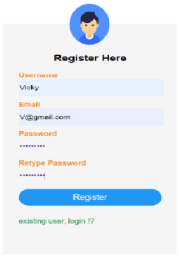
Screen Shot 1



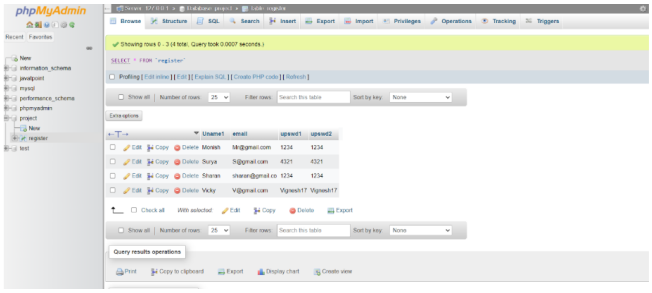

Screen Shot 2




Screen Shot 3




Screen Shot 4

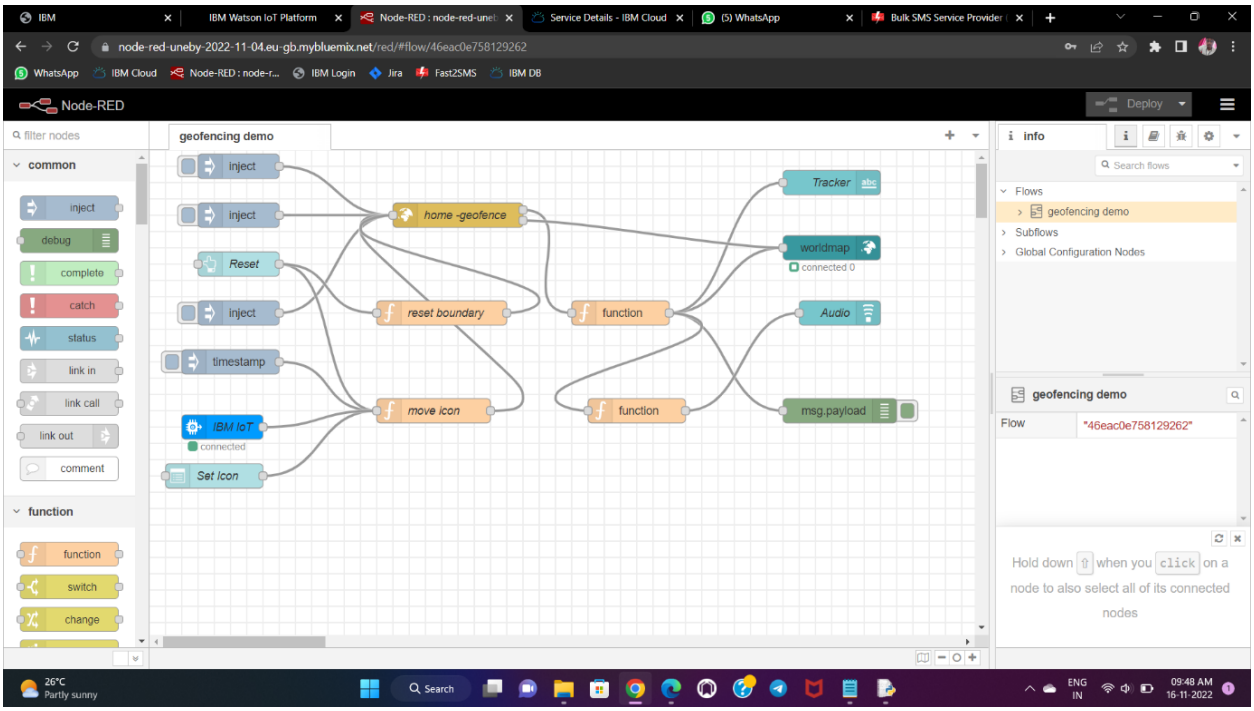



The First Sprint involves the making of a register page and login page using programming language like HTML , CSS and PhP.The data base of the user are stored in the xamp PhP My admin shown in the above test case figure.

First of all, A new user have to register their details in register page is mandatory and that database are stored in the xamp and then enter the user name and password which was entered in the register page is redirected to the login page successfully.

## SPRINT 2

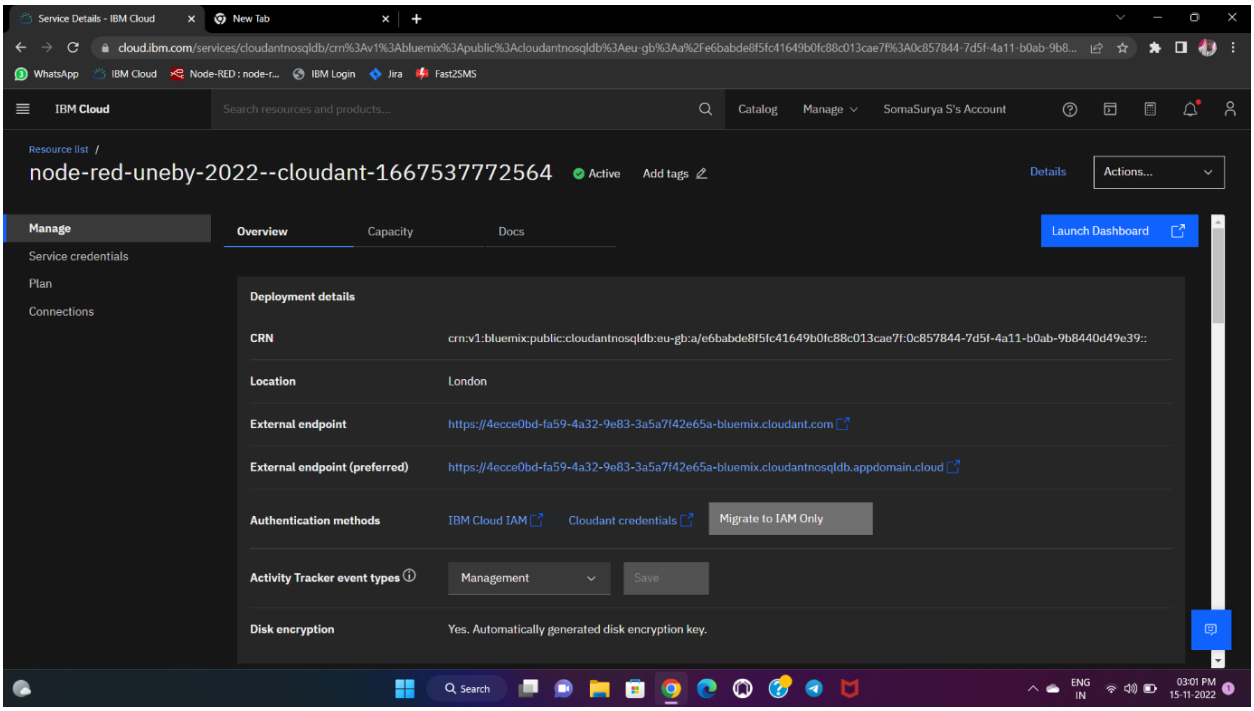
The Second Sprint consist of to set the geo fencing of the child location which the function are connected with world map via node-red . After triggering the location , if the child cross over the border line it will alert the notification through the email and it also display in the User Interface page.




## SPRINT 3

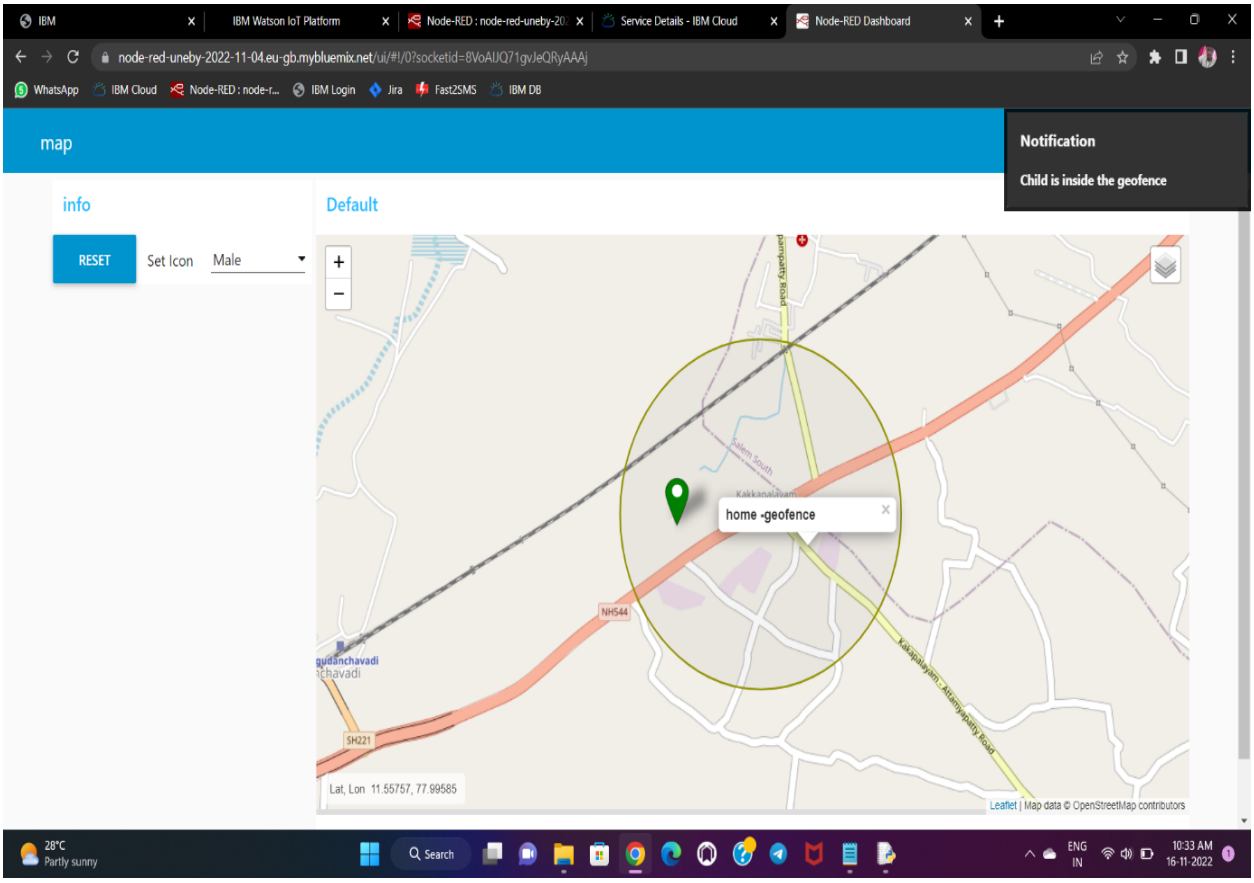
In the Third Sprint Involves a Cloudant DB in Which it connects to IOT Watson Platform directly by Node RED and the data are instructed at main function in which the nodes flows randomly while we generate in the Python Script.It seems the points in between the child location make weather the child is safe are not in the geofence.Cloudant documentation contains info on all aspects of

using Cloudant, including provisioning, pricing, connecting, using the API, and querying.It stores data as documents in JSON format.The JSON Format is Implemented in the Node RED Flows.It is built with scalability, high availability,and durability in mind.It comes with a wide variety of indexing options that include MapReduce, IBM Cloudant Query,full-text indexing,and geospatial indexing. The replication capabilities make it easy to keep the data in sync between database clusters, desktop PCs, and mobile devices.The database Store Every single value once the Python Script is Runed .Then it store the values to IOT Watson Platform and the device are connected with the API key in Node RED.



## SPRINT 4

In the Third Sprint Involves User Interface Dashboard of the geofence in the child location.In that some features are available it includes some additional benefits to parents and guardians.The features are they track their child using web User Interface there is any restriction to use their mobile app or any other gadgets.using mobile Internet it is very easy to find their children.Additionally we includes the Login and Registration of their Personal usage of their parents.in the login page we enter correct email and password only means it's redirect into the dashboard. it's completely safe for parent point of view



## 6.2 SPRINT DELIVERY SCHEDULE

| Sprint | Functional Requirement (Epic) | Sprint Start Date | Sprint End Date | Story Points | Team Members |
|---|---|---|---|---|---|
| Sprint- 1 | Login and Registration | 31 Oct 2022 | 03 Nov 2022 | 4 | Monish R |
| Sprint- 2 | Geo fencing | 4 Nov 2022 | 07 Nov 2022 | 4 | Vigneshkumar S |
| Sprint- 3 | Node- Red , Cloudant DB Communication | 08 Nov 2022 | 12 Nov 2022 | 6 | Naveen Kumar A |
| Sprint- 4 | User- Web UI Interface | 13 Nov 2022 | 18 Nov 2022 | 6 | SomaSurya S |

**Table 6.1.** Sprint Delivery Schedule

## 6.3 REPORTS FROM JIRA

### Burndown chart

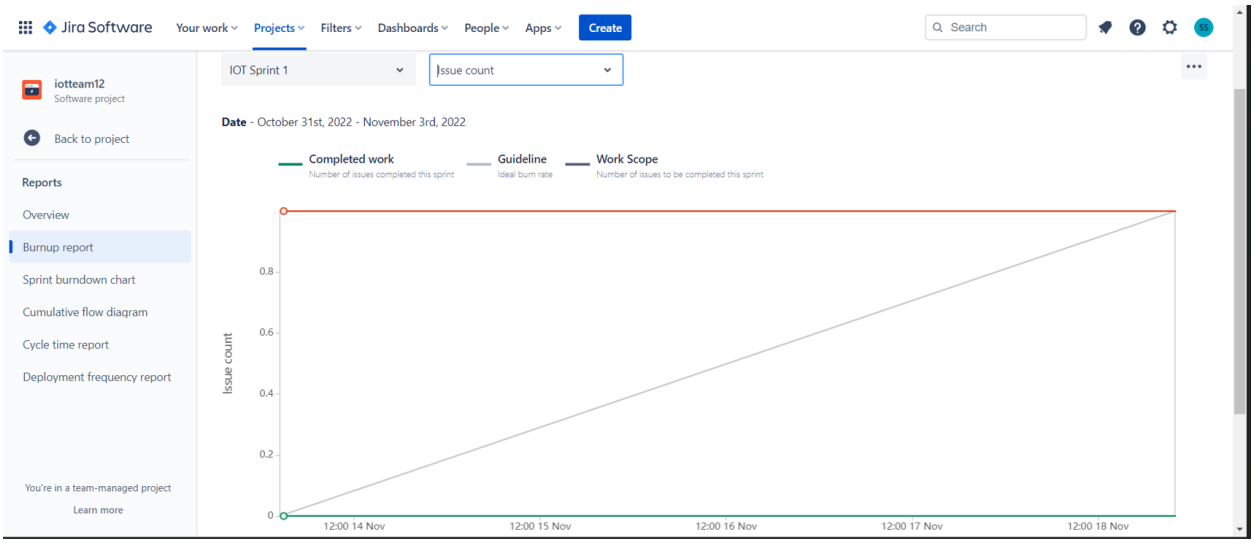



**Figure 6.1.** Burndown Chart

### Road map

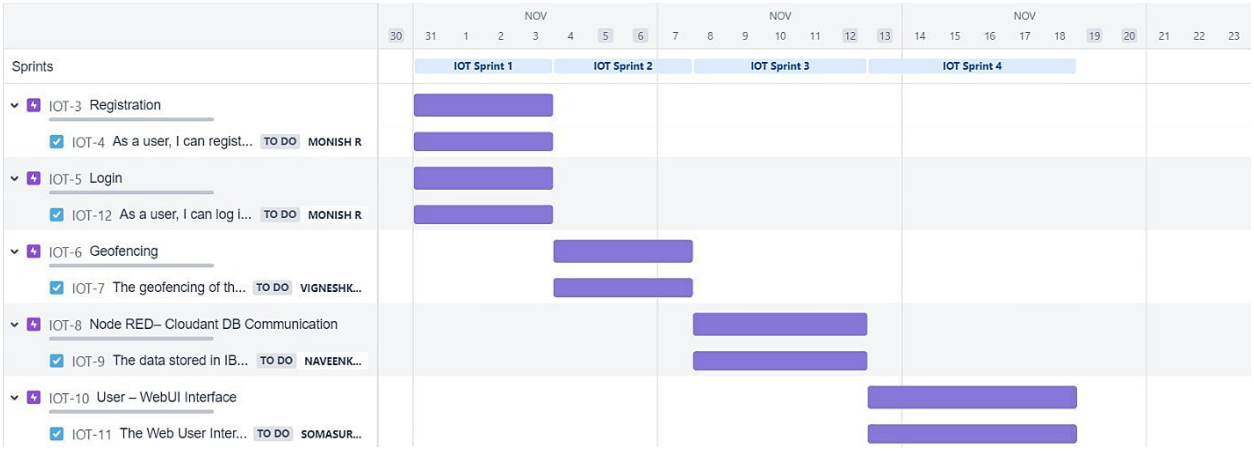



**Figure 6.2**. Road Map

# CHAPTER - 7

## CODING AND SOLUTIONS

### 7.1 FEATURE 1

Geofence node for Node-RED messages can be filtered depending on if they fall inside or outside the given region or the node can append the node name to a list of areas the message falls in (to allow the chaining of geofence nodes.

### Code

```
let inarea_flag=flow.get("inarea_flag");
let count_flag =true;
if (typeof inarea_flag=="undefined")
  inarea_flag=false;
let count=context.get("count");
if (typeof count=="undefined" || msg.topic=="reset")
   count=0;
var icon=context.get("icon");
if (typeof icon=="undefined")
icon="";
if (msg.topic=="icon")
{
icon=msg.payload;
```

```
count_flag=false;
}
let s_lat=11.562659;
let s_long=78.00202;
let end_lat=11.53752;
let end_long=78.01313;
let inc_lat=(end_lat-s_lat)/12;
let inc_long=(end_long-s_long)/12;
let i_color="red";
if(inarea_flag)
i_color="green";
if(count_flag && msg.topic!="reset")
{
   count+=1;
node.log("colour="+i_color);
}
if(msg.topic=="reverse" && count>2)
count=count-2;
let lat=msg.payload.Latitude;
let long=msg.payload.Longitude;
msg.payload = { "name":"Vigneskumar", "lat":lat,
```

```
"lon":long,"iconColor":i_color,"icon":icon}
if (count <=12)
context.set("count",count);
context.set("icon",icon);
return msg;
```

### 7.2 FEATURE 2

Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

**Features of Node**

Collects data from IOT platform.

Data in the database is added, deleted, and changed.

Renders dynamic content for web pages.

Files on the server are created, read, written, deleted, and closed.

**Code**

```
//reset boundary
msg.payload={};
msg.payload.action="send";
return msg;
// Notification function
```

```
let payload=msg.payload;
let location=msg.location;
let inarea_flag=false;
if (location.inarea)
    inarea_flag=true;
flow.set("inarea_flag",inarea_flag);
let i_color="red";
msg.Tracker="Child is outside the geofence";
if(inarea_flag)
{
i_color="green";
msg.Tracker="Child is inside the geofence";
}
msg.payload.iconColor=i_color;
return msg;
//Audio function
msg.payload = msg.Tracker;

if(message.payload == "Child is inside the geofence") {
    message.payload = "Child is inside the geofence";
}
```

# CHAPTER - 8

## TESTING

### 8.1 TEST CASES

A test case might be created as an automated script to verify the functionality per the original acceptance criteria. After doing manual exploratory testing, QA testers might suggest other functionality be added to the application as well as updated test cases be incorporated in the automated test suite.

**Table 8.1.** Test Case

| Test case ID | Feature Type | Component | Test Scenario |
|---|---|---|---|
| Notification TC | Web UI Notification | Node-RED (Server) | Verify the user is able to Receive a notification when the User cross the geofence limit. |
| Backend TC | Web UI Configuration | Node-Red (Server) | It should get the data from the frontend and process data for notification and DB store. |
| Frontend TC | Dashboard UI | Home page (Client) | It should get the data from the frontend and process data for notification and DB store. |
| Database TC | Cloudant Database | DB (Server) | Verify that it can store the child location in the cloudant DB. |

## 8.2 USER ACCEPTANCE TESTING

The purpose of this document is to briefly explain the test coverage and open issues of the child safety tracker project at the time of the release to User Acceptance Testing (UAT).

### Defect Analysis

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| **By Design** | 11 | 4 | 2 | 2 | 19 |
| **Duplicate** | 1 | 1 | 2 | 0 | 4 |
| **External** | 2 | 3 | 0 | 1 | 6 |
| **Fixed** | 10 | 2 | 2 | 20 | 34 |
| **Not Reproduced** | 0 | 0 | 2 | 0 | 2 |
| **Skipped** | 0 | 0 | 2 | 1 | 3 |
| **Won't Fix** | 0 | 5 | 2 | 1 | 8 |
| **Totals** | 24 | 15 | 12 | 25 | 76 |

**Table 8.1**. Defect Analysis

## Test Case Analysis

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| **User Application** | 5 | 0 | 1 | 4 |
| **Caretaker Application** | 47 | 0 | 2 | 45 |
| **Security** | 3 | 0 | 0 | 3 |
| **Outsource Shipping** | 2 | 0 | 0 | 2 |
| **Exception Reporting** | 11 | 0 | 2 | 9 |
| **Final Report Output** | 5 | 0 | 0 | 5 |
| **Version Control** | 3 | 0 | 0 | 3 |

**Table 8.2.** Test Case Analysis

# CHAPTER - 9

## RESULTS

One of the module in our project is child safety gadgets which is used to detect the child location.The emotional and mental stability of the children is compromised as a result of the abuse, ruining their futures and careers. The things that happen to these defenseless children are not their fault. Therefore, parents are in charge of raising their own children. However, parents are compelled to seek money because of the state of the economy and their desire to concentrate on their child's future and job. Consequently, it becomes challenging for them to cling to their children constantly. We have created a setting in our system where this issue can be effectively solved. It enables parents to keep a close eye on their children in real time while concentrating on their own careers without having to take any physical action. , children cannot tell their parents about the abuse they experience on a regular basis. They are too young to really comprehend what truly occurs to them. Parents find it challenging to recognize when their children are being abused. So, the main objective of this module is to help working parents to be free from worry about their children by tracking their movements at any time. An autonomous real-time monitoring system is required for every child worldwide in order to stop attacks on children.

# CHAPTER - 10

## ADVANTAGES AND DISADVANTAGES

### ADVANTAGES

- The parent can monitor their child from anywhere at any time, and also receive a notification when the child goes away from the permitted radius.
- It allows the parent to know if their child is in any cause of danger situation.
- The User can see the exact location of the child for every particular seconds (as per the user need, they also modify the duration of the time )

### DISADVANTAGES

- We have been developed the application on website only not in mobile App
- The user want to see the child location they need Internet connection mandatory
- This device cannot be used in rural areas.
- This system is unable to sense human behaviour of child.

# CHAPTER – 11

## CONCLUSION

Future is similar to the word children. Young people are the future pillars of one's nation, as Dr. A.P.J.Abdul Kalam once said, thus it is important to protect today's children's dreams and lives in order to give them a better future. Therefore, every parent should take good care of their own children to prevent them from being victims of abuse that will completely harm them on a physical, mental, and emotional level, wrecking our future. Due to the significance of our future, our product makes it simple for parents to track their children and regularly visually monitor them, enabling them to assure their safety and lowering the incidence of child abuse.

# CHAPTER - 12

## FUTURE SCOPE

The project can be enhanced with many other features that can protect the child even better. The product currently is a simple basic version which can only send alerts on time. Some other additional features that are planned to be incorporated with this existing product are listed below:

- 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.
- Emergency calling feature can be incorporated wherein women or child under panic circumstances can contact police for assistance

# CHAPTER - 13

## APPENDIX

### 13.1 SOURCE CODE

```
#importing Random function to generate the value and required IoT and System Libraries

import random as rand

import time

import ibmiotf.application

import ibmiotf.device

import sys

#defining credentials of device

organization = "0sqd61"

deviceType = "Surya"

deviceId = "surya7"

authMethod = "token"

authToken = "TGq7dDQl6)lI9CXx6!"

# Initialize GPIO

# code to activate the motor comes here in Sprint 4
```

```
def myCommandCallback(cmd):
    # Command Call back
    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()
```

### 13.2 GitHub & Project Demo Link

| Content | Link |
|---|---|
| GitHub | https://github.com/IBM-EPBL/IBM-Project-41207-1660640175 |
| Project Demonstration Video | https://youtu.be/ctQ5mvYxoUA |

**Table 13.1.** GitHub & Project Demo Link