IOT based Safety Gadget for Child Safety Monitoring and Notification

IBM-Project-25277-1659956957

NALAIYA THIRAN PROJECT BASED LEARNING ON PROFESSIONAL READLINESS FOR INNOVATION, EMPLOYNMENT AND ENTERPRENEURSHIP

A PROJECT REPORT

BY

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1. INTRODUCTION

1. Project Overview

TEAM ID	**PNT2022TMID09639**
INDUSTRY MENTOR	Baradwaj 2
FACULTY MENTOR	Dr. K Johny Elma

2. Purpose

Today, parents are working hard and looking after their kids at the same time. Due to the increasing security risks faced by children, both the parents need to monitor their child's activities. It is also difficult for parents to identify their children are being abused. Since to prevent children before being attacked, an autonomous real-time monitoring system is necessary for every child out there.

This system provides the parents with the necessary information about their child's safety using sensors such as their location from GPS, temperature sensor, humidity sensor, pulse rate detection sensor etc. These collected values are used to detect the status of the child and alerts the respective guardians using GSM technology.

2. LITERATURE SURVEY

1. Existing problem

It has been a major threat to children from or in opposition to any perceived real danger/risk. Most of the kids have been abducted by strangers, which is a more frequent event nowadays. Child abduction continues to be a major issue and it has an utmost impact on the affected families. Child abductors often kidnap children from legally appointed guardians to get the ransom and for their personal benefit. The out-turn of abduction can be seriously pessimistic and enduring, more actions must be taken to protect children against abduction and its effects. Child abduction is a scorching subject all over the world. It is a complex crime that can impair a child's future. Parents should ensure that their little ones are secure and are been protected from the menace of injury.

The application aside from conceding you to track down your children when they're within Bluetooth range, it also functions when your kids go farther afield. Its competence as a tracker is outstanding and if you live in densely populated areas like cities or big towns. This means you will be able to see the identity of the participating devices and It helps to diminish their vulnerability in harmful situations and also protects the children in emergency situations. Parents take measures both at home and outdoors to safeguard their kids from hurting themselves. But sometimes, it's impossible to pre-empt what can cause a treacherous encounter. However, it's possible to prevent such hazards with some forethought and simple measures.

2. References

S.NO	TITLE	AUTHOR NAME	YEAR	PROPOSED WORK
1	Employing an efficient Child Tracking System using the Internet of Things	Kumar A, Shankar KM. Reddy	2022	The main concept of this paper talks about the idea of Child Tracking (CT) System for the safety of kids by tracking via SMS with GSM module wired to Arduino Mega Board. The proposed CT system combines technologies and sensors to easily monitor the child and get the information.
2	Design and development of an IOT based wearable device for the safety and security of women and girl children	A. Jatti, M. Kannan, R. M. Alisha, P. Vijayalakshmi and S. Sinha	2016	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.
3	Smart Intelligent System for Women and Child Security	S. K. Punjabi, S. Chaure, U. Ravale and D. Reddy	2018	This paper surveys about the security system for women and children which allows immediate responses in any harassment in public places, societies etc... The main feature of our system is less response time will be required for helping the victim.
4	RFID-based System for School Children Transportation Safety Enhancement	Anwaar Al-Lawati	2015	This paper presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during daily transportation from and to school. The system has a developed web-based database-driven application that facilities its management and provides useful information about the children to authorized personnel.

3. Problem Statement Definition

Create 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.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

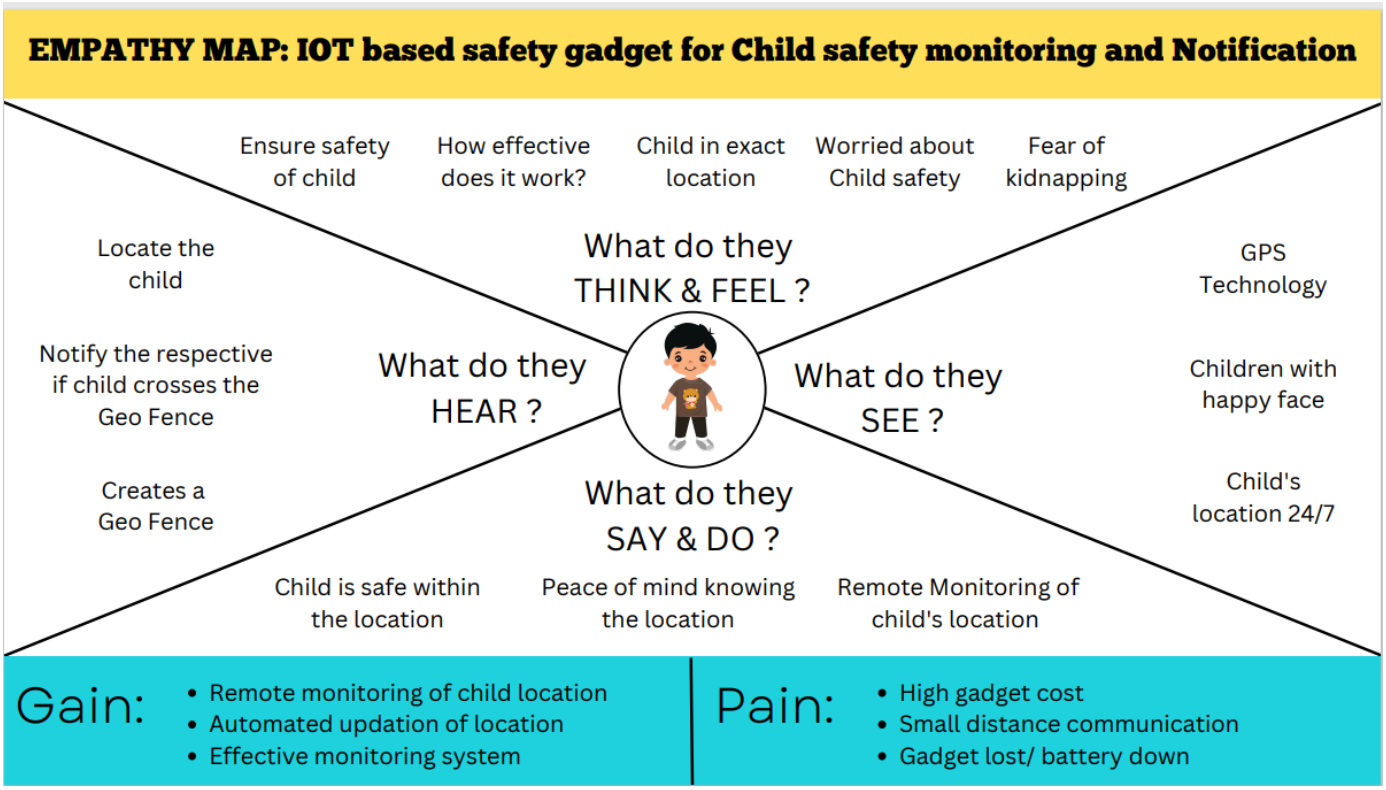
The problem statement defines about the necessity of the project. As the parent nowadays are working and cannot monitor their child physically from the threats/issues/attacks, the project gives a solution for them. Using which the Parent can monitor their child remotely and ensure child's safety

3. IDEATION & PROPOSED SOLUTION

1. Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users.

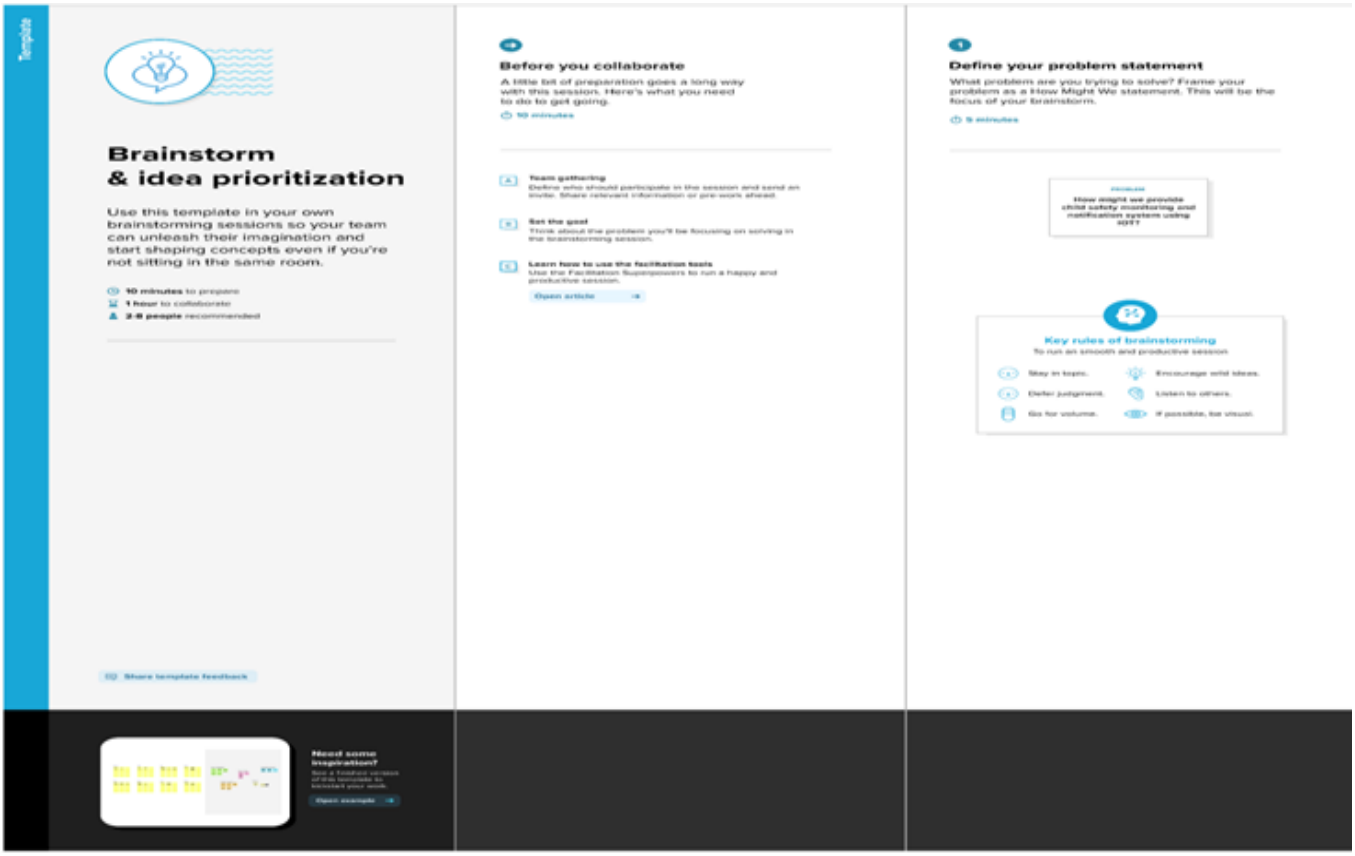
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



4. 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 solution.



2 Brainstorm

Write down any ideas that come to mind for child safety monitoring system

10 minutes

TIP

You can select a sticky note and hit the pencil [switch] to sketch instead.

Loghapriya

- Create a mobile application
- Sends the exact location of child in case of emergency
- Measures temperature, pulse rate, heart beat rate of child and notify during emergency
- Continuous tracking and updating child's location
- Water & sweat Proof
- Alerts if the given range is exceeded

Aishwarya

- Create Mobile application
- GPS integrated watch to keep track of their child's movements
- Use the Child locator gadget
- Geofencing the child's movement
- Accurate sensors to detect Temperature, Heart rate.
- Low levels of radiation

Deepa Harshini

- Create web Application
- Brilliant UI/UX design for Application
- Creating Geo Fence
- Integration with Parent's mobile
- Integration with Cloud Services
- Comfortable & easily wearable

Deepak

- Parental control features
- Use satellite calling in case of emergency
- Intimating the child's location through GPS
- User friendly application
- Better battery life
- Secure database

3 Group ideas

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

20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Tracking Location

- GPS integrated watch to keep track of their child's movements
- Sends the exact location of child in case of emergency
- Alerts if the given range is exceeded
- Use satellite calling in case of emergency

UI

- Create a mobile application
- Brilliant UI/UX design for Application
- User friendly application

Physical Features

- Low levels of radiation
- Better battery life
- Comfortable & easily wearable
- Water & sweat Proof

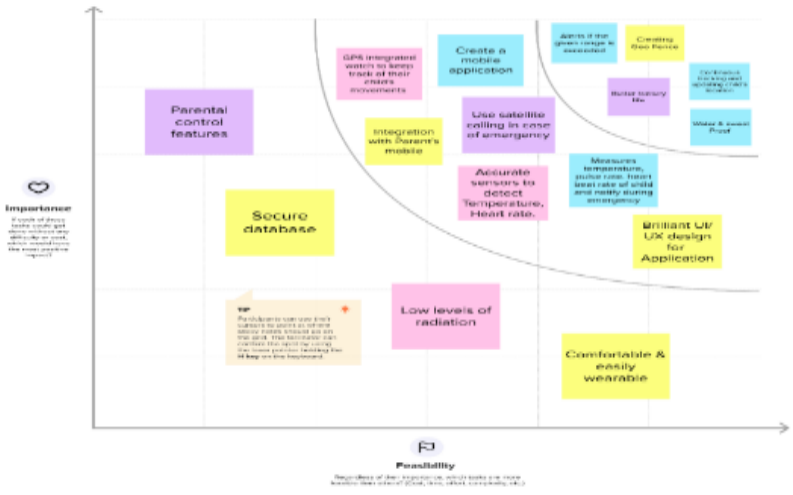
Database

- Secure database
- Integration with Cloud Services
- Geofencing the child's movement
- Measures temperature, pulse rate, heart beat rate of child and notify during emergency

4 Prioritize

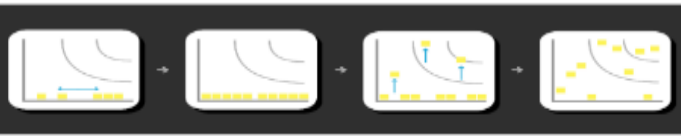
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



TIP

Participants can use their cursors to zoom in on the grid. The facilitator can control the grid by using the zoom controls beside the grid or by using the keyboard.



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

Share the mural

Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

Export the mural

Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint

Define the components of a new idea or strategy.

Open the template →

Customer experience journey map

Understand customer needs, motivations, and obstacles for an experience.

Open the template →

Strengths, weaknesses, opportunities & threats

Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

Open the template →

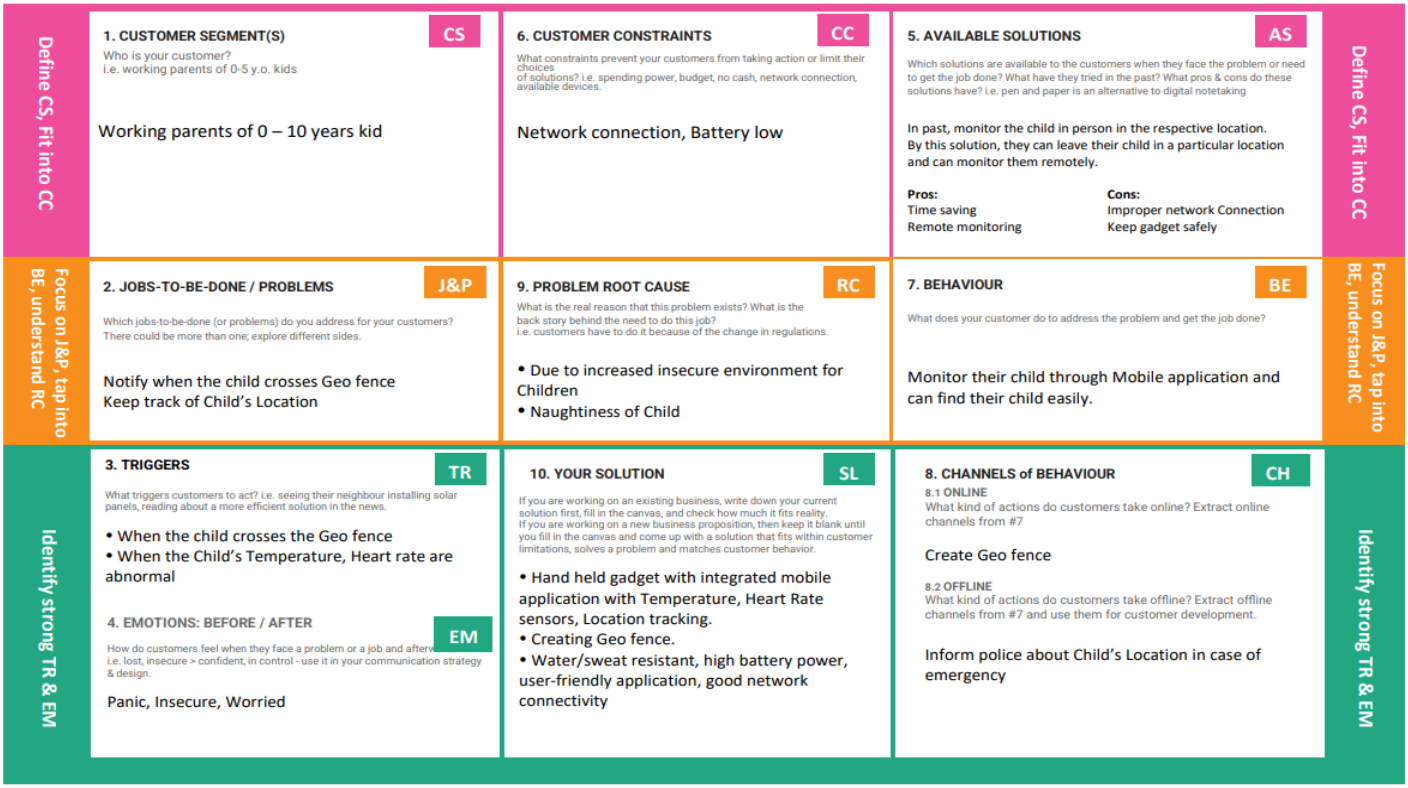
Share template feedback

4. Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problemto be solved)	• Child tracker helps the parents in continuously monitoring the child's location. • By continuously checking the child's location notifications will be generated if the child crosses the geofence.
2.	Idea / Solution description	Develop a prototype of IoT wearable smart band connectedto parents' mobile apps so that they can monitor the actual condition of children at anytime and anyplace
3.	Novelty / Uniqueness	• Monitored by Sensors Such as temperature sensor, proximity sensor, optical sensor, humidity sensor and micro sensor. • Quality parameter will track continuously with standard measurements.
4.	Social Impact / Customer Satisfaction	Child safety and tracking is a major concern as the more number of crimes on children are reported nowadays.
5.	Business Model (RevenueModel)	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.
6.	Scalability of the Solution	• Child monitoring remotely • Child safety • Create Geo fence • Notify in case of emergency • High battery life, water resistant • Monitor using mobile app

5. Problem Solution fit

Project Title: IOT based Safety Gadget for Child Safety Monitoring and Notification | **Project Design Phase-I – Solution Fit** | **Team ID:** PNT2022TMID09639



5. REQUIREMENT ANALYSIS

1. Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Mobile number/ Email
FR-2	User Confirmation	Confirmation via Email / SMS Confirmation via OTP
FR-3	Children information	Child Name, address, Emergency number
FR-4	Location	GPS module, Wi-Fi module
	Sensors	Temperature, Heart Rate
	Notification	Crossing Geo fence

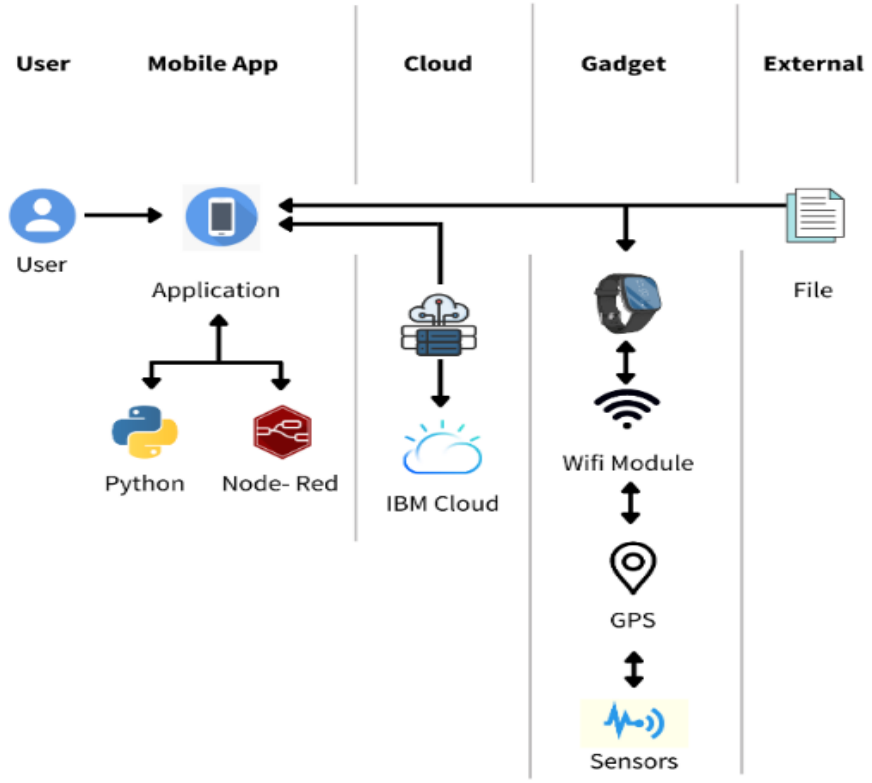
2. Non-functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	User-friendly mobile application
NFR-2	**Security**	Secure cloud data base
NFR-3	**Reliability**	Water/sweat resistant
NFR-4	**Performance**	High accuracy and battery life
NFR-5	**Availability**	Low cost
NFR-6	**Scalability**	Proper network connection

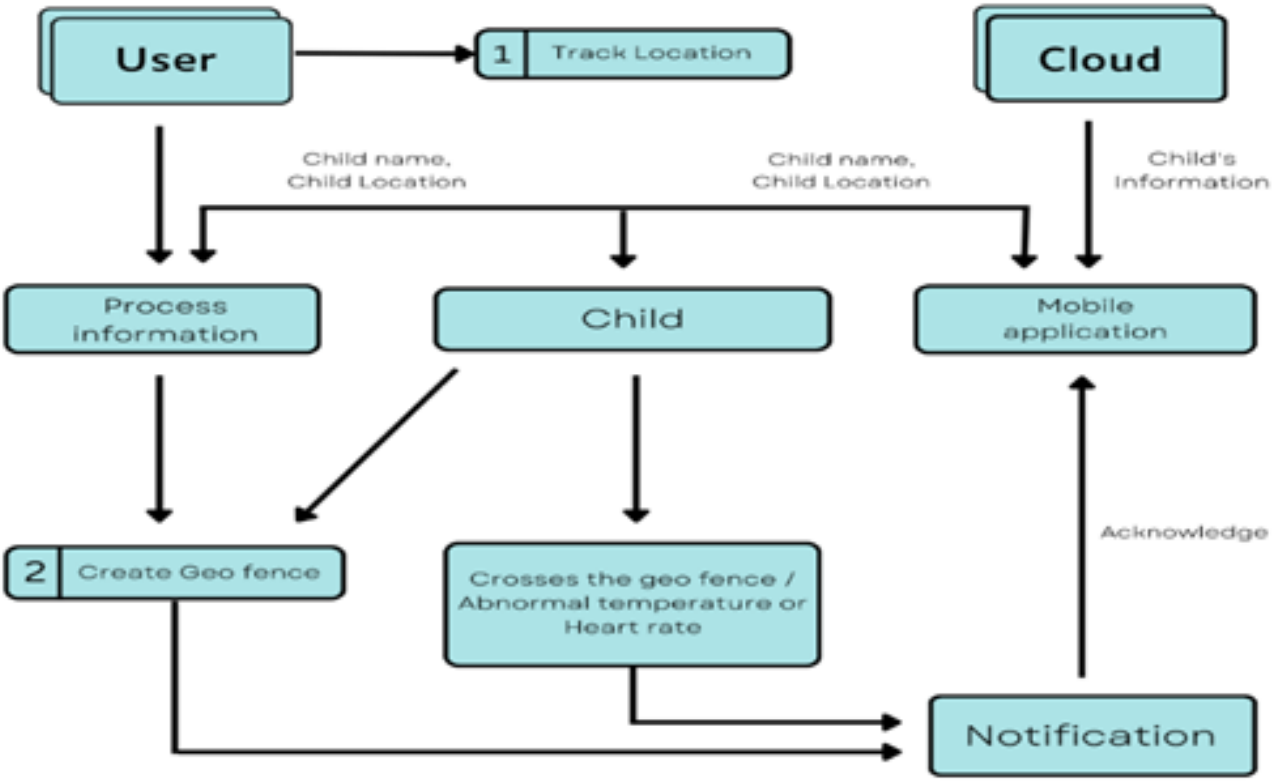
6. PROJECT DESIGN

1. Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



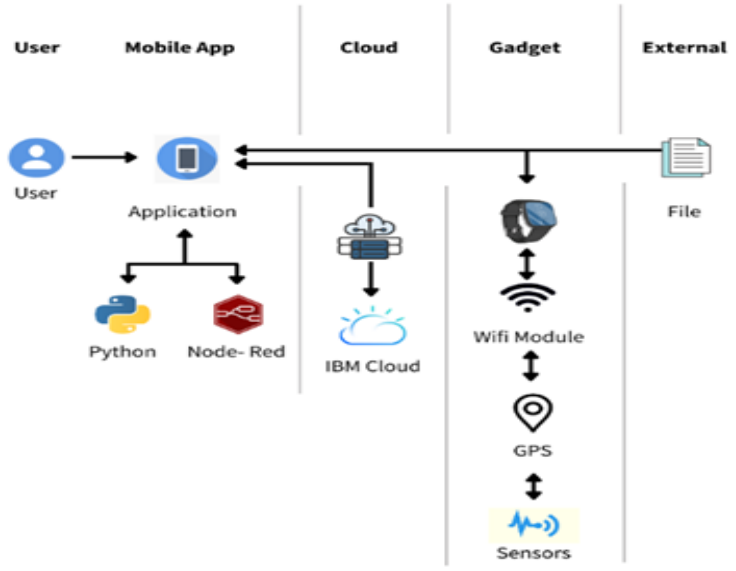
- User can create an account using their mobile number and email ID.
- Storing default information about the Child i.e., location, temperature, Heart Rate in Cloud
- User can create a Geo fence for respective location of the Child
- Integrate the application with Cloud & Gadget
- Notify in case of emergency
- Enriched data is visualized in the UI.



From the Data Flow Diagram (DFD) above, User will register into the application by entering the user credentials such as username and password. Then, these details will be stored into the user database. Authentication happens when user want to login to the system, where the application validates if the username and password entered are valid or not.

After login, the user can view the dashboard where user can add child details which will also be stored into the Child Database. Moreover, user can also view child location on the application by selecting which child user wants to view. The user can view the temperature, Heart rate, and location of the child. And in case of emergency conditions, a notification alert is given to the Parent's mobile application.

2. Solution & Technical Architecture



In the technical architecture, it shows that the user can access the mobile application. This mobile application is connected to both python code and Node-red application. The IBM IoT platform is interconnected with the Python code, Node-red and the MIT app inventor.

The gadget includes the modules such as WIFI, GPS and other sensors like temperature and heartbeat monitor. All these data are being stored in an external file and then processed to view in the mobile application.

3. User stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my mobile, password, email and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation message once I have registered for the application	I can receive confirmation message & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through mobile number and Email		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering mobile number & password		High	Sprint-1
	Dashboard	USN -5	Can monitor up to 5 children			Sprint -2
		USN -6	For each child, the Parent can monitor his/her child's Temperature, Heart rate, Location	Notify during emergency situations	Medium	Sprint -2
		USN -7	They can create Geo Fence and alter accordingly with their respective location		High	Sprint -4
		USN -8	ON/OFF notification	Notification is sent 1 minute once till the Parent acknowledges	Medium	Sprint -3
		USN -9	Bookmark their geo fence for further use		Low	Sprint -3
		USN - 10	Adding alternate mobile number	Verify alternate mobile number	Medium	Sprint -2
Gadget	Integrating with application	USN - 11	Integrating gadget with mobile application using WIFI module	Verify connection with device	High	Sprint -3
		USN -12	User friendly mobile application		Low	Sprint -1
		USN -13	Proper network Connection	Ensure proper network	High	Sprint -1
	Features	USN -14	Calling features		Medium	Sprint -4
		USN -15	Accurate sensors for Temperature, Heart rate		Medium	Sprint -3
		USN 16	Water/sweat resistant, High battery power		Low	Sprint -3

7. PROJECT PLANNING & SCHEDULING

1. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	4	High	LOGHAPRIYA, AISHWARYA
Sprint-1	Confirmation Email	USN-2	As a user, I will receive confirmation email and SMS once I have registered for the application	3	High	DEEPAHARSINI
Sprint-2	Authentication	USN-3	As a user, I can register for the application through Email ID and Mobile App.	2	Low	DEEPAK
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password.	2	Medium	AISHWARYA
Sprint-1	Dashboard	USN-5	As a user, I can monitor, measure, analyze relevant data in key areas.	8	High	LOGHAPRIYA
Sprint-2	Notification	USN-1	As a user, I should be able to receive notification when the child is in emergency situations.	9	High	DEEPAHARSHINI
Sprint-2	Store data	USN-2	As a user, I need to store the location data and child information into the database.	10	High	DEEPAK
Sprint-2	Communication	USN-3,1	The child and the parent should be able to communicate.	7	Medium	AISHWARYA, DEEPAHARSHINI
Sprint-3	IoT Device	USN-1,4	We automatically monitor the child in real time using Internet of Things, with the help ofGPS, GSM, and Raspberry Pi.	6	Medium	LOGHAPRIYA, DEEPAK
Sprint-3	Node RED	USN-5,2	The data stored in IBM Cloud should be integrated properly.	8	High	AISHWARYA, DEEPAHARSHINI, LOGHAPRIYA
Sprint-4	User Interface	USN-1,4	The point of human-computer interaction andcommunication in a device.	7	Medium	DEEPAHARSHINI, DEEPAK
Sprint-4	Geofencing	USN-2,3,5	Based on the geographical coordinates, thegeofence of the child can be done.	8	High	AISHWARYA, DEEPAHARSHINI, LOGHAPRIYA

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	30	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	40	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	50	17 Nov 2022

2. Sprint Delivery Schedule

S.NO	MILESTONES	ACTIVITIES	DATE
1.	**Preparation Phase**	Pre-requisites	24 Aug 2022
		Prior Knowledge	25 Aug 2022
		Project Structure	23 Aug 2022
		Project Flow	23 Aug 2022
		Project Objectives	22 Aug 2022
		Registrations	26 Aug 2022
		Environment Set-up	27 Aug 2022
2.	**Ideation Phase**	Literature Survey	29 Aug 2022 – 03 Sept 2022
		Empathy Map	5 Sept 2022 - 7 Sept 2022
		Problem Statement	8 Sept 2022 - 10 Sept 2022
		Ideation	12 Sept 2022 – 16 Sept 2022
3.	**Project Design Phase - 1**	Proposed Solution	19 Sept 2022 – 23 Sept 2022
		Problem Solution Fit	24 Sept 2022 – 26 Sept 2022
		Solution Architecture	27 Sept 2022 – 30 Sept 2022

4.	**Project Design Phase - 2**	Customer Journey Map	03 Oct 2022 – 08 Oct 2022
		Requirement Analysis	09 Oct 2022 – 11 Oct 2022
		Data Flow Diagrams	11 Oct 2022 – 14 Oct 2022
		Technology Architecture	15 Oct 2022 - 16 Oct 2022
5.	**Project Planning Phase**	Milestones & Tasks	17 Oct 2022 – 18 Oct 2022
		Sprint Schedules	19 Oct 2022 – 22 Oct 2022
6.	**Project Development Phase**	Sprint - 1	24 Oct 2022 – 29 Oct 2022
		Sprint – 2	31 Oct 2022 – 05 Nov 2022
		Sprint – 3	07 Nov 2022 – 12 Nov 2022
		Sprint – 4	14 Nov 2022 – 19 Nov 2022

8. CODING & SOLUTIONING

Child_Monitor.py

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
#Provide your IBM Watson Device Credentials
organization = "lnpwqo"
deviceType = "abcd"
deviceId = "12"
authMethod = "use-token-auth"
authToken = "12345678"
#api key {a-lnpwqo-623qb5z8ny}
#api token {tJZoLa3sq5judZGuaw}

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

# Connect and send a datapoint "hello" with value "world"
into the cloud as an event of type "greeting" 10 times
print("power on ")
print("checking connection to waston iot...")
time.sleep(2)
deviceCli.connect()
print("dear user ... welcome to IBM-IOT ")
```

```
print("i can provide your children live location and temperature ")
print()
name=str(input("enter your child name:"))

while True:

    temperature=random.randint(20,50)#random temperature for your child
    latitude=random.uniform(10.781377,10.78643)#random latitude for your child
    longitude=random.uniform(79.129113,79.134014)#random longitude for your child
    a="Child inside the geofence"
    b=" Child outside the geofence"
    c="High temperature"
    d="Low temperature"
    x={'your_child_Zone':a}
    y={'your_child_Zone':b}
    z={'temp_condition':c}
    w={'temp_condition':d}


    data = { 'temp' : temperature, 'lat': latitude,'lon':longitude,'name':name }
    #print data
    def myOnPublishCallback():
         print ("Published Temperature = %s C" % temperature, "latitude = %s %%" % latitude,"longitude = %s %%" % longitude, "to IBM Watson")
         print("\n")
     success = deviceCli.publishEvent("IoTSensorgpsdata", "json", data, qos=0, on_publish=myOnPublishCallback)
     if latitude>=10.78200 and latitude<=10.786000 and longitude >=79.130000 and longitude <=79.133000:
```

```
deviceCli.publishEvent("IoTSensorgpsdata","json",data=x,qos=0
,on_publish=myOnPublishCallback)
        print(x)
        print("\n")
     else:


deviceCli.publishEvent("IoTSensorgpsdata","json",data=y,qos=0
,on_publish=myOnPublishCallback)
        print(y)
        print("\n")

     if (temperature>35):


deviceCli.publishEvent("IoTSensorgpsdata","json",data=z,qos=0
,on_publish=myOnPublishCallback)
        print(c)
        print("\n")
     else:


deviceCli.publishEvent("IoTSensorgpsdata","json",data=w,qos=0
,on_publish=myOnPublishCallback)
        print(d)
        print("\n")


     if not success:
         print("Not connected to IoTF")
         print("\n")
     time.sleep(3)
# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

9. TESTING

1. Testcases

				03-Nov-22							
				PNT2022TMID09639							
				child safety gadget for child safety monitoring and notification							
				4 marks							
Test case ID	**Feature Type**	**Component**	**Test Scenario**	**Steps To Execute**	**Test Data**	**Expected Result**	**Actual Result**	**Status**	**Comments**	**BUG ID**	**Executed By**
LoginPage_TC_OO1	Functional	Home Page	Verify user is able to see the Login/Signup popup when user opens the application	1.Click on the application 2.Verify login/Singup popup displayed or not	Username: abcd password: 1234	Login/Signup popup should display	Working as expected	Pass	_		Aishwarya
LoginPage_TC_OO1	Functional	Home Page	Verify that error message is displayed when the user enters wrong credentials	1.Open the App 2. Enter invalid username and password.	Username: xyzw password: 8765	Error message should be displayed	Working as expected	Pass	_		Deepaharshini
LoginPage_TC_OO2	UI	Home Page	Verify the UI elements in Login/Signup popup	1.Click on the Application 2.Verify login/Signup popup with below UI elements: a.Username text box	Username: abcd password: 1234	Application should show below UI elements: a.Username text box b.password text box	Working as expected	Pass	_		Loghapriya
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials	1.Click on the Application 2.Enter Valid username in username text box 3.Enter valid password in password text box 4.Click on submit button	Username: abcd password: 1234	User should navigate to screen 2	Working as expected	Pass	_		Deepaharshini

Test case ID	**Feature Type**	**Component**	**Test Scenario**	**Steps To Execute**	**Test Data**	**Expected Result**	**Actual Result**	**Status**	**Comments**	**BUG ID**	**Executed By**
LoginPage_TC_OO5	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Click on the Application 2.Enter Valid username in username text box 3.Enter valid password in password text box 4.Click on submit button	Username: abcd password: 1234	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	_		Deepak
LoginPage_TC_OO6	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Click on the Application 2.Enter Valid username in username text box 3.Enter valid password in password text box 4.Click on submit button	Username: abcd password: 1234	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	_		Aishwarya
LoginPage_TC_OO7	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Click on the Application 2.Enter Valid username in username text box 3.Enter valid password in password text box 4.Click on submit button	Username: abcd password: 1234	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass	_		Loghapriya
LoginPage_TC_OO8	Functional	Add child information page	Verify user is able to add child information	1. Open the Application 2. enter the username and password. 3. click child 1 and add information i.e.,	Username: abcd password: 1234	Application should show the child information with its	Working as expected	Pass	_		Deepak
LoginPage_TC_OO9	Functional	Check Location	Track the location of the Child	1. Click on Location 2. Enable location for the app 3 .Click on track location	Username: abcd Password: 1234	Show the current location of the Child	Working as expected	Pass	_		Loghapriya
LoginPage_TC_O10	Functional	Get Temperature	TO obtain the temperature of the Child	1. Click on Temperature 2. CLick ENABLE	Username: abcd Password: 1234	To know the temperature	Working as expected	Pass	_		Aishwarya
LoginPage_TC_O11	Functional	Create Geo Fence	Create a geo fence for the Child	1. Click on Create Geo fence 2. Set the radius	Username: abcd Password: 1234	To create geo fence for the respective location	Working as expected	Pass	_		Loghapriya

2. User Acceptance Testing

1. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By design	10	4	2	8	15
Duplicate	1	0	3	0	4
External	1	3	0	1	5
Fixed	9	2	4	11	20
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't fix	0	5	0	1	8
Totals	21	14	11	22	51

2. Test Case Analysis

This report shows the number of test cases that have passed, failed and untested

Section	Total Cases	Not tested	Fail	Pass
Interface	7	0	0	7
Login	35	0	0	35
Temperature	10	0	0	2
Location	15	0	0	3
Geo Fence	10	0	0	8
Final Report Output	4	0	0	4

10. RESULTS

Performance metrics

i. Login: Using the username and password, the Parent logins into the App. If the Login credentials are incorrect, the user cannot login.

ii. Child selection: Up to 3 children can be tracked using the application. The user/parent can select the respective child to be monitored. Pre-registration of Child with their information is necessary.

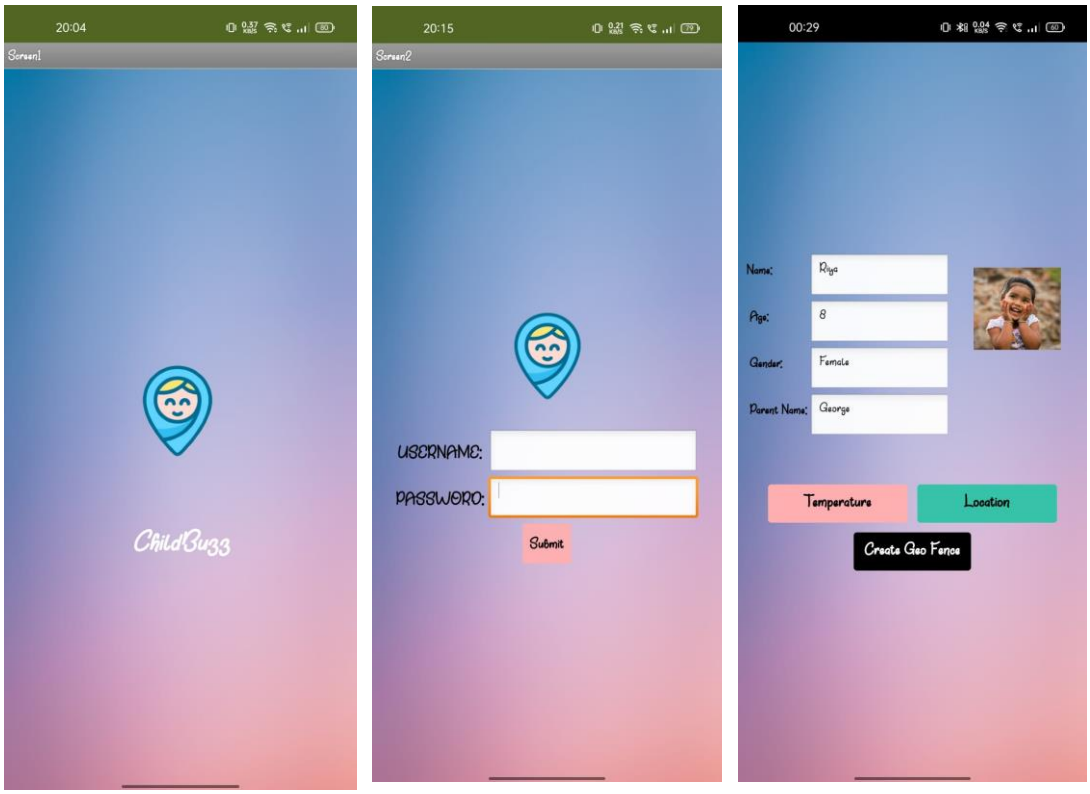
iii. User Dashboard: The dashboard contains the information of child including their Name, age, gender, parent's name and their photograph.

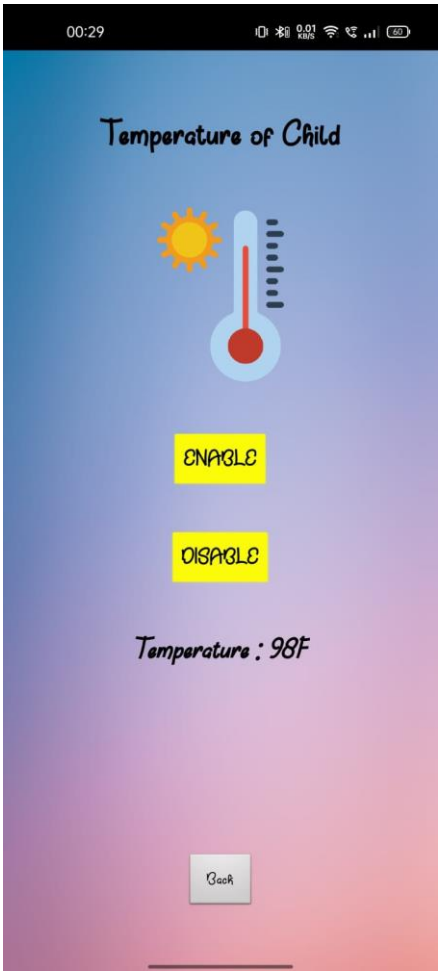
iv. Navigation content in dashboard: In the dashboard, by clicking the given buttons the user can navigate to view the temperature of the child, their current location and to create a Geo fence with their respective location.

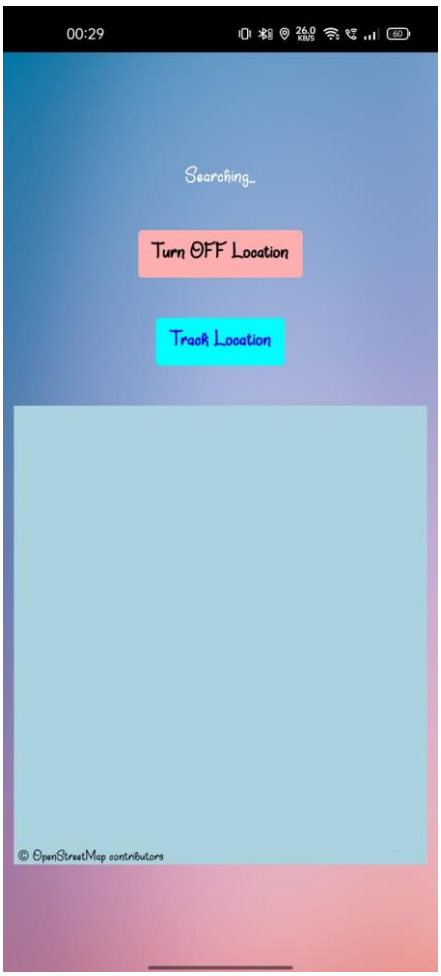
v. Location: The application shows the current location of the child

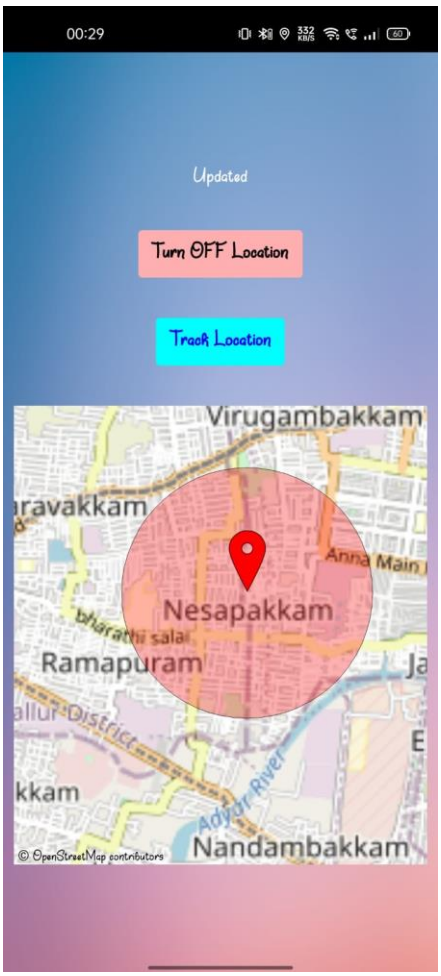
vi. Temperature: The body temperature of the child is remotely monitored and in-case of emergency conditions notification are generated to the Parent mobile number through messages.

vii. Geo Fence: The parent will be enabled to create a geo fence with respect to the child location and if the child crosses the given radius of fence, an emergency alert is given to the parents.









11. Advantages & Disadvantages:

Advantages:

- Parent could be able to track child using their separate android application provided for the parent.
- Parent could track the location and also could get all the call logs, messages and contact list from the child mobile phone.
- Parent can locate and retrieve details anywhere and anytime.
- Application automatically operates location requests without user interaction because at that time child not have knowledge to update his location at map. The system requires location and telephony services. Third advantage is it can be used at indoors where GPS satellites connectivity is not available. At that time, it can use network provides for location services.
- Network provider service uses cellular ID such as IMEI number for location tracking. Lastly all the controls are in parent side. The child side has less control access.

Disadvantages:

- The application is not worked well when there is no network available. In that case the application fails the exact location. But the application stores the last location which can be stored at the database server. When mobile is switched off then we consider this as a one of the drawbacks of system.
- Requires active internet connection.
- Child need to login once into the application.
- System will provide inaccurate results if data not entered correctly.

12. CONCLUSION

This paper reviewed the smart child safety wearable devices. Firstly, various systems and devices available are defined. Basic child safety device comprises of a GPS, GSM, Arduino or any other Microcontroller, Panic button and the sensors to keep the track of child's movement, position, temperature etc. Design of the child wearable device is key factor for making the child wear the device happily. There are some important things to be considered like the limited range of devices, wearable or not, Battery life and the most important the cost.

13. FUTURE ASPECTS

The problems with the already existing system reviewed are limited range as they are either Wi-Fi or Bluetooth based. Many available devices are not wearable and are too costly for a common man to afford. Battery life of the devices is major concern for the devices. The child safety devices must be non-removable in order to track child activity without child interventions. So, all these points should be considered in future devices.

14. APPENDIX

Source Code Git Hub Link: **https://github.com/IBM-EPBL/IBM-Project-25277-1659956957.git**

Project Demo Link: **https://youtu.be/k7WjXjQX704**