

# **IoT - Based Safety Gadget for Child Safety Monitoring and Notification**

## **A PROJECT REPORT**

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## **ABSTRACT**

This paper is mainly streamed towards child safety solutions by developing a gadget which can be tracked via its GPS locations and also a panic button on gadget is provided to alert the parent via GSM module calling for help. Parental android app is developed to manage and track the device anytime. Smart gadget device is always connected to parental phone which can receive and make phone calls and also receive SMS on gadget via GSM module, also a wireless technology is implemented on device which is useful to bound the device within a region of monitoring range, if device is moving out of monitoring range then an alert will be triggered on binding gadget, this helps you keep a virtual eye on child. Health monitoring system on gadget checking for parameters like heart beat/pulse rate and temperature is included which can be monitored on parental app. Gadget also monitors whether it is plugged on hand or not using contact switch and alert the parent as soon as it is unplugged.

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## **LIST OF ABBREVIATIONS**

IoT	: INTERNET OF THINGS
GPS	: GLOBAL POSITIONING SYSTEM
FR	: FUNCTIONAL REQUIREMENTS
NFR	: NON-FUNCTIONAL REQUIREMENTS
DFD	: DATA FLOW DIAGRAM
SQL	: STRUCTURED QUERY LANGUAGES
STT	: SECURITY TRANSACTIONS TAX
DB	: DATABASE
UAT	: USER ACCEPTANCE TESTING
WIFI	: WIRELESS FIDELITY

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Project Overview**

A tracker that helps parents track a child's location so that the child does not get into dangerous situations.

The inspiration for this wearable comes mainly from the ever-increasing need of safety for small children in present times because there may be a chance of child lost in the major crowded areas.

This main script mainly focuses on the key features of missing child can be helped by the individuals present around the child and plays an important role in the child's safety until reunite the parent to that location.

### **1.2 Purpose**

Now a day's Parents have more responsibility than older about their children's. Because Crimes rates are increasing day by day in our country, Crimes such as Child Amusement, Rapes, Murders, Illegal Relationship to avoid these kinds of crimes parents must watch their children every step. Eventually mobile phones cause major allegations on our society. Many teens must be noticed by their own parents; it is our duty. But sometimes children are arguing with their parents for watching their steps, to overcome these issues, we need to watch them through online.

## CHAPTER 2

### LITERATURE SURVEY

#### 2.1 Existing Problem

Authors: M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari. Title: Smart IoT Device for Child Safety and Tracking. Published in: 2019 IEEE. The system is developed using Link-It 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.

Merits: The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same.

**Demerits:** To implement the IoT device this ensures the complete solution for child safety problems.

Authors: Akash Moodbidri, Hamid Shahnasser Title: Child safety wearable device. Published in: 2017 IEEE. The purpose of this device is to help the parents to locate their children with ease. At the moment there are many wearables' in the market which helps to track the daily activity of children and also helps to find the child using Wi-Fi and Bluetooth services present on the device.

Merits: This wearable over other wearable is that it can be used in any phone and it is not necessary that an expensive smartphone is required and doesn't want to be very tech savvy individual to operate.

**Demerits:** As, this device's battery gives short life-time.

Authors: Aditi Gupta, Vibhor Harit. Published in: 2016 IEEE. Title: Child Safety & Tracking Management System by using GPS. This paper proposed a model for child safety through smart phones that provides the option to track the location of their children as well as in case of emergency children is able to send a quick message and its current location via Short Message services.

Authors: Dheeraj Sunehera, Pottabhatini Laxmi Priya. Title: Children Location Monitoring on Google Maps Using GPS and GSM. Published in: 2016 IEEE. This paper provides an Android based solution for the parents to track their children in real time. Different devices relate to a single device through channels of internet. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the location services provided by GSM module. It allows the parents to get their child's current-location via SMS. Merits: A child tracking system using android terminal and hoc networks.

**Demerits:** This device cannot be used in rural areas.

## **2.2 REFERENCES**

M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari, 'Smart IoT Device for Child Safety and Tracking' International Journal of Innovative Technology and Exploring Engineering, Volume 8, Issue 8, June 2019. Akash Moodbidri, Hamid Shahnasser (Jan. 2017) 'Child safety wearable device', International Journal for Research in Applied Science & Engineering Technology, Vol. 6 Issue 2, pp. 438-444. Aditi Gupta, Vibhor Harit, 'Child Safety & Tracking Management System by using GPS, GeoFencing & Android Application: An Analysis,' 2016 Second International Conference on Computational Intelligence & Communication Technology.

## **2.3 PROBLEM STATEMENT DEFINITION**

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 geofence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geofence. Notifications will be sent according to the child's location to their parents or caretakers.

## CHAPTER 3

### IDEATION & PROPOSED SOLUTION

#### 3.1 EMPATHY MAP CANVAS

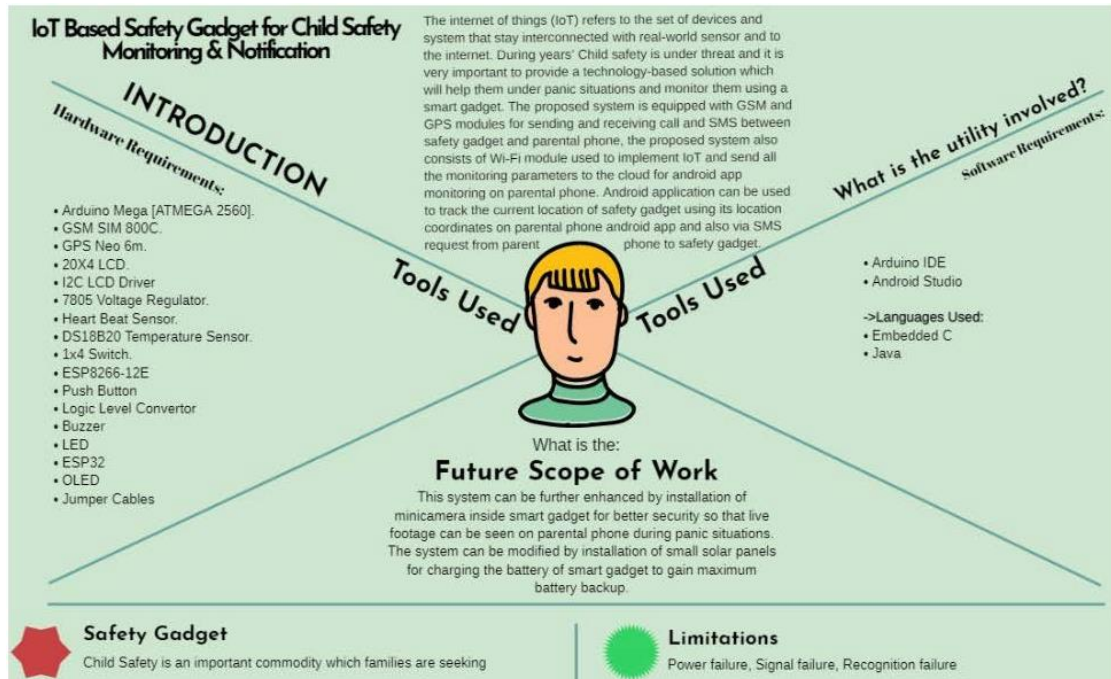


Fig 3.1.1 Empathy Map

This project was created to help parents keep track of their children's whereabouts. Children are more readily influenced by their peers these days, and they may be duped or abducted by strangers. This method may be developed to track a child's current position. After a specific period, the Web application on the device will update the location of the kid to the application. By pushing the distinct button that has been introduced, parents may even take action if their kid is unstable or in an inappropriate area. WFPS, a WIFI positioning system that doesn't connect to the internet but connects to Wi-Fi access points, will be used to track the child's whereabouts

### 3.1 IDEATION & BRAINSTORMING

#### BRAINSTORMING



Fig 3.2.1 Ideation & Brainstorming

## IDEATION PRIORITIZATION

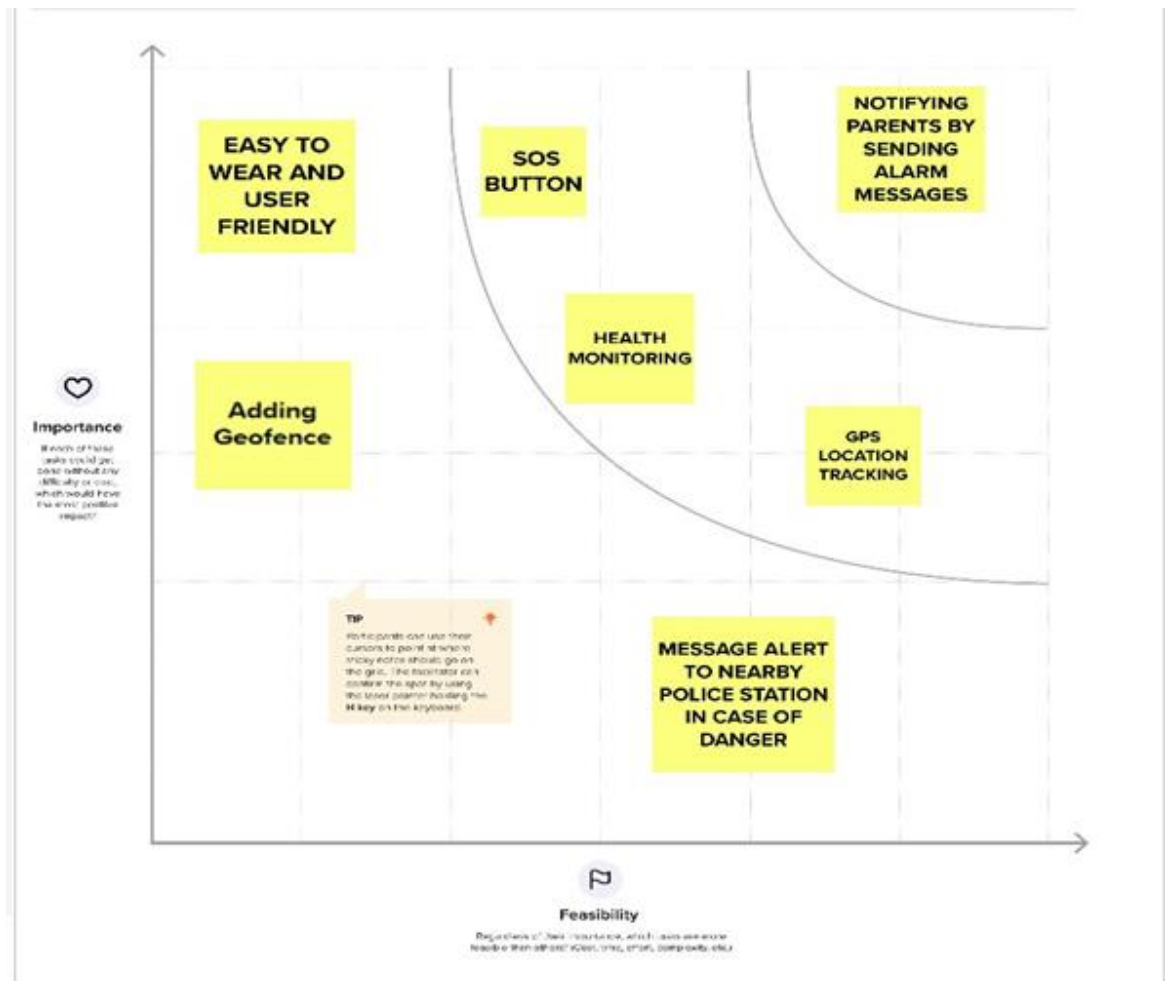


Fig 3.2.1 Ideation Prioritization

### 3.3 PROPOSED SOLUTION

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Risks and hazards involving infants and children while alone at home
2.	Idea / Solution description	Use IoT enabled devices to check and ensure the safety of toddlers and kids
3.	Novelty / Uniqueness	Hassle-free operation mode. Efficient functioning with user friendly interface
4.	Social Impact / Customer Satisfaction	Safety and well-being of children can be made sure of by their parents who may go for work or be busy in work
5.	Business Model (Revenue Model)	Currently, there are no devices in the market that can carry out the function of providing child safety in an easy manner
6.	Scalability of the Solution	It can be further extended to provide safety for aged persons as well

Table 3.3.1 Proposed Solution



### 3.4 PROBLEM SOLUTION FIT

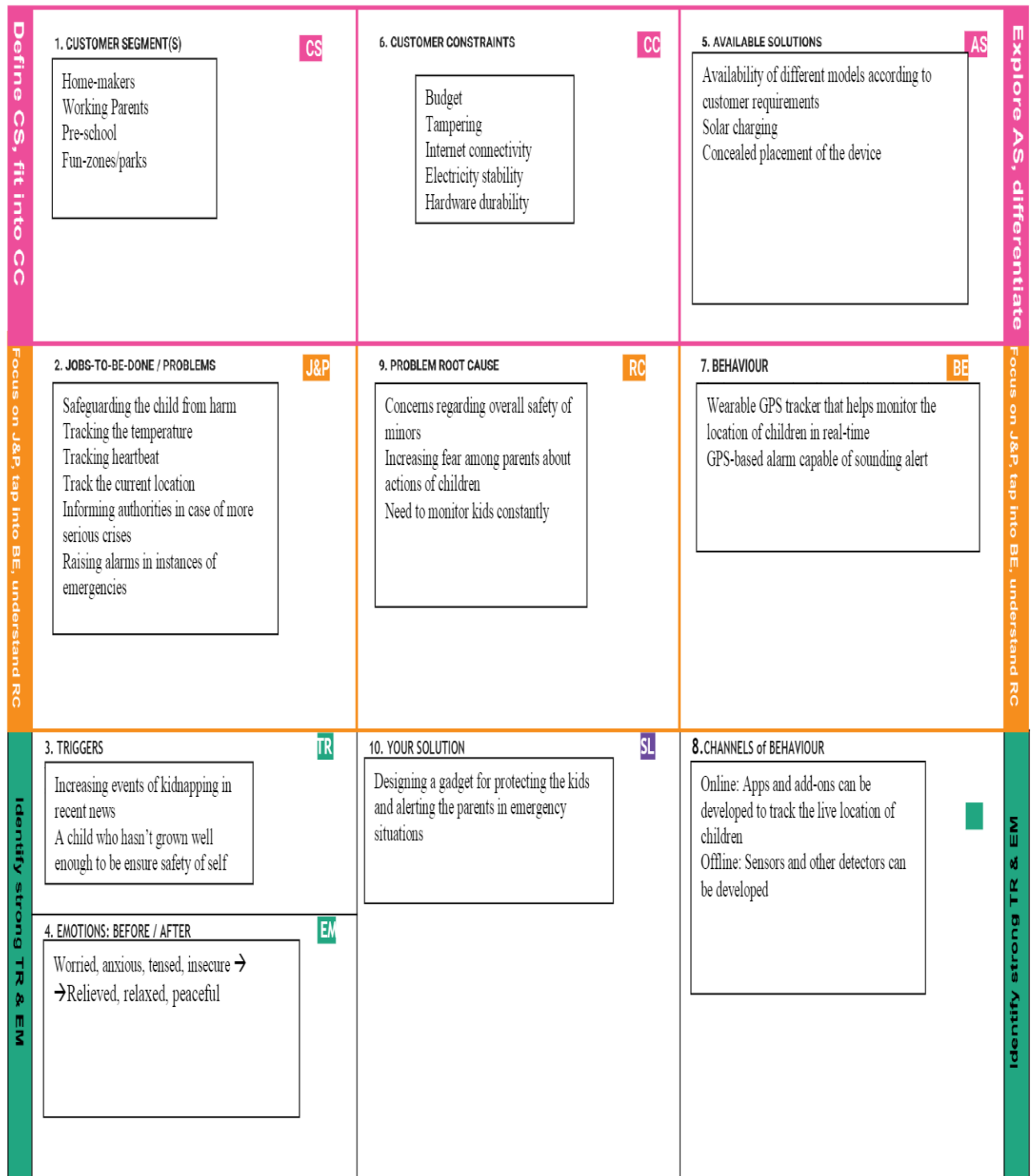


Fig 3.4.1 Problem Solution Fit

## CHAPTER 4

### REQUIREMENT ANALYSIS

#### 4.1 FUNCTIONAL REQUIREMENT

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	User Notification	Notification send to Mobile Number Notification send through message/ call
FR-4	User Location Check	Check through Account

Table 4.1.1 Functional Requirements

#### 4.2 NON-FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Allow parents to track their child's location and also monitor them.
NFR-2	Security	Creates a secure environment for children to monitor around
NFR-3	Reliability	Increased reliability towards technology
NFR-4	Performance	High performance in terms of simple usage and security
NFR-5	Availability	Backup power supply
NFR-6	Scalability	Increase in scalability

Table 4.2.1 Non-Functional Requirements

## CHAPTER 5

### PROJECT DESIGN

#### 5.1 DATA FLOW DIAGRAMS

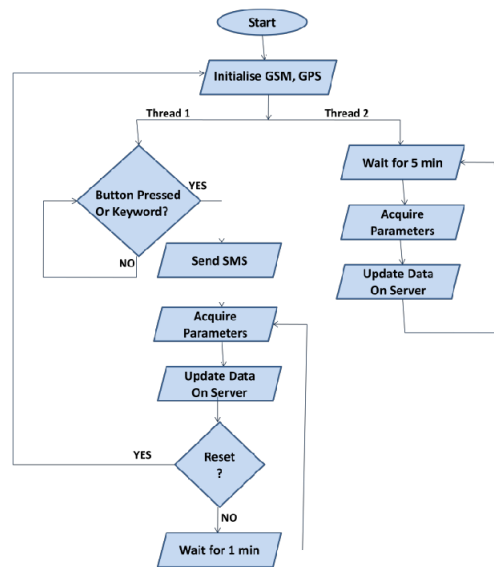


Fig 5.1.1 Data Flow Diagrams

#### 5.2 Solution & Technical Architecture

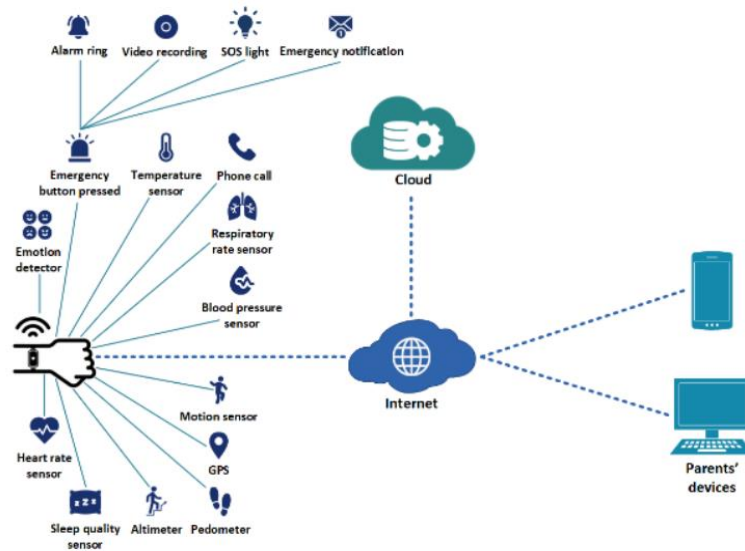


Fig 5.2.1 Solution Architecture

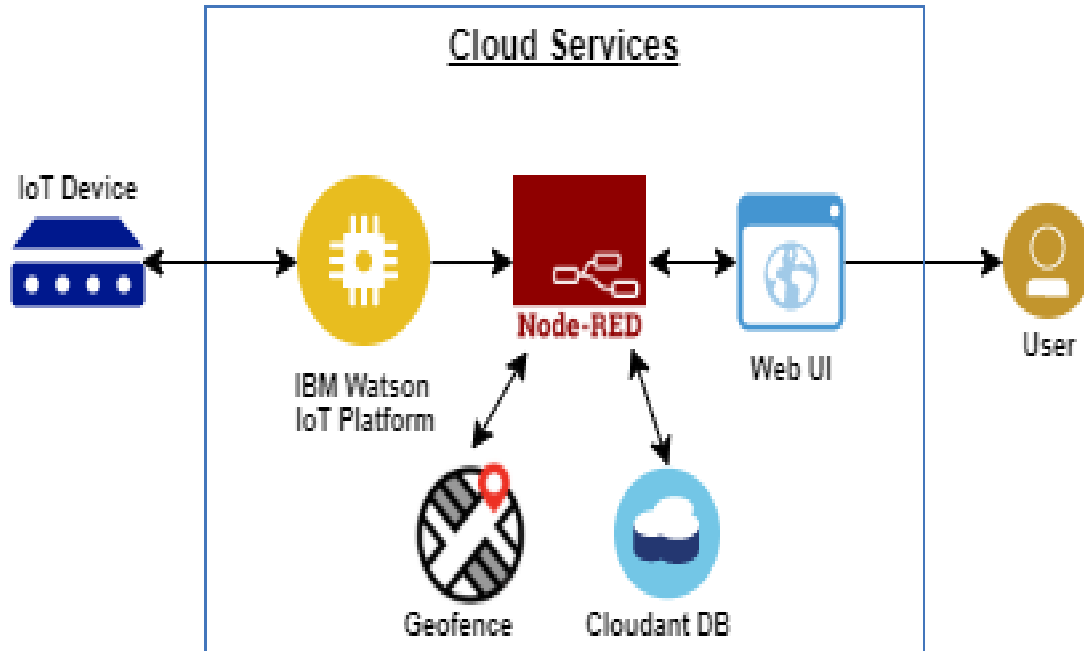


Fig 5.2.2 Technical Architecture

## COMPONENTS & TECHNOLOGIES:

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

Table 5.2.3 Components & Technologies

### APPLICATION CHARACTERISTICS:

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

Table 5.2.4 Application Characteristics

## 5.3 USER STORIES

### IoT Based Safety Gadget for Child Safety Monitoring & Notification



Fig 5.3.1 User Stories

## CHAPTER 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 user, I can register for the application by entering my email, password and confirming my password.	3	High	Mohamed Riyas
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application.	3	High	Mohammed Hashim
Sprint-1	Login	USN-4	As a user, I can register for the application.	3	Medium	Hadhi Sulaiman
Sprint-2	Dashboard	USN-3	As a user, I can log into the application by entering email & password.	5	High	Rumais Ahamed
Sprint-4		USN-6	As a user, I can receive alert notifications if the movement is beyond the geofence.	13	High	Mirshad KT
Sprint-3		USN-7	As a user I can add the geofence.	10	Medium	Mohamed Riyas
Sprint-3		USN-8	As a user I can update the geofence whenever necessary.	13	Medium	Mohammed Hashim

Table 6.1.1 Sprint Planning & Estimation

## 6.2 SPRINT DELIVERY SCHEDULE

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	20	High
		USN-2	As a user, I will receive confirmation email once I have registered for the application	20	High
		USN-3	As a user, I can register for the application through Facebook	5	Low
		USN-4	As a user, I can register for the application through Gmail	10	Medium
	Login	USN-5	As a user, I can log into the application by entering email & password	20	High
<b>Dashboard</b>					
Customer (Web user)	Login		When I enter I can view the working of applications, scan and monitor the operations and check if all the users are authorized	10	Medium
Customer Care Executive	Login		Maintaining and accessing the database containing the locations are secure and accurate and update constantly	20	High
Administrator	Login		As a user I can register for the application by entering my correct credentials	20	High

Table 6.2.1 Sprint Planning & Estimation



## 6.3 REPORTS FROM JIRA

### ROADMAP

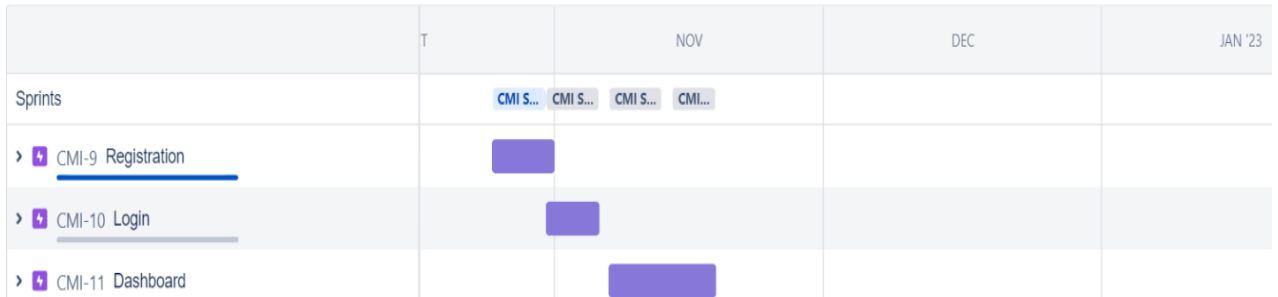


Fig 6.3.1 Road Map

### BACKLOG

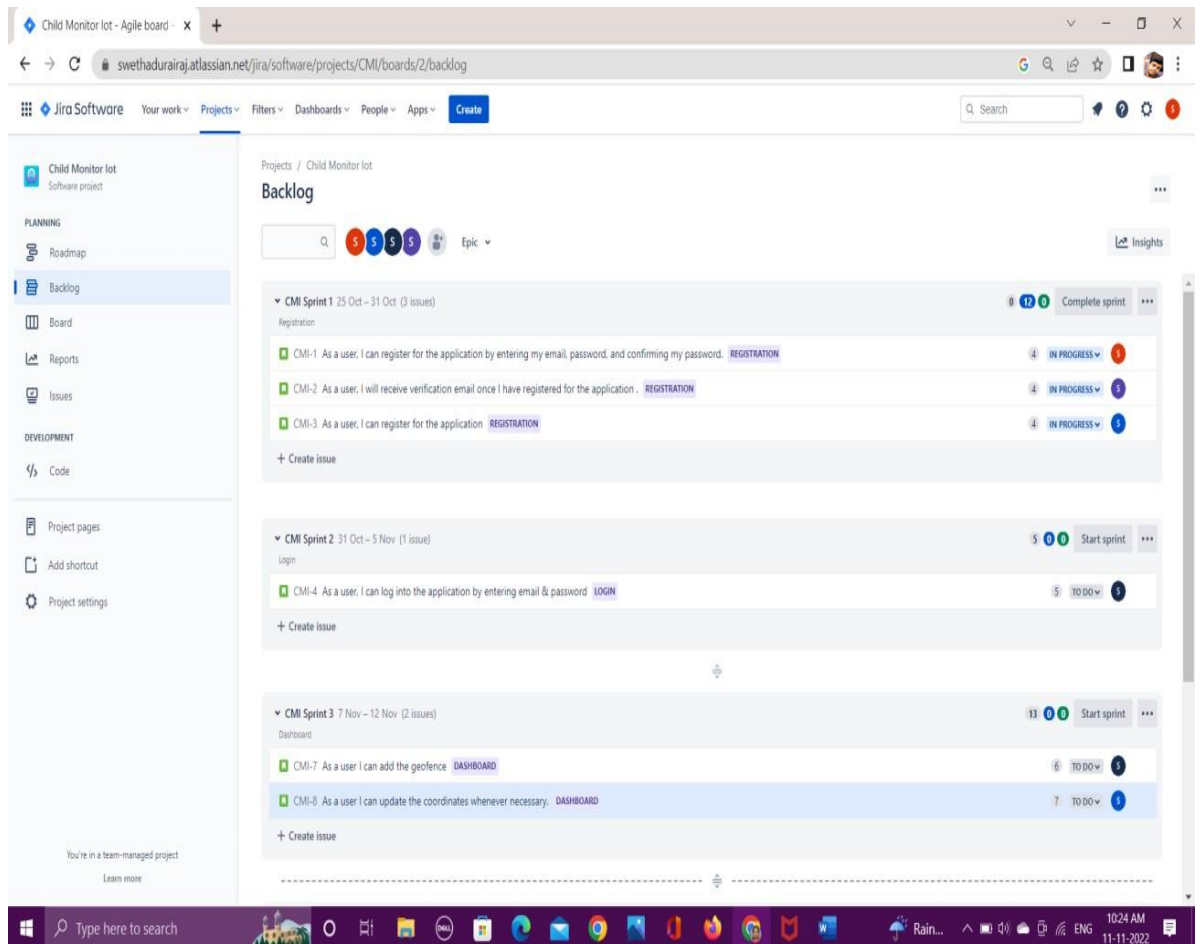


Fig 6.3.2 Backlog

## CHAPTER 7

### CODING & SOLUTIONING

#### 7.1 FEATURE 1 (ADDING GEOFENCE)

- Geofence is like a round wall covering the given location. So parents can use them to mark the location where their children are going.

```
package com.example.geofence;

import android.app.PendingIntent;
import android.content.Context;
import android.content.ContextWrapper;
import android.content.Intent;import android.widget.Toast;
import com.google.android.gms.common.api.ApiException;
import com.google.android.gms.location.Geofence;
import com.google.android.gms.location.GeofenceStatusCodes;
import com.google.android.gms.location.GeofencingRequest;
import com.google.android.gms.maps.model.LatLng;
public class GeofenceHelper extends ContextWrapper {

    private static final String TAG =
        "GeofenceHelper";PendingIntent pendingIntent;

    public GeofenceHelper(Context base) {
        super(base);
    }

    public GeofencingRequest getGeofencingRequest(Geofence
geofence) {return new GeofencingRequest.Builder()
        .addGeofence(geofence)

        .setInitialTrigger(GeofencingRequest.INITIAL_TRIGGER_ENTER)
        .build();
    }
```

```

        public Geofence getGeofence(String ID, LatLng latLng, float
radius,int transitionTypes) {
            return new Geofence.Builder()
                .setCircularRegion(latLng.latitude,
latLng.longitude,
radius)

                .setRequestId(ID)
                .setTransitionTypes(transitionTypes)
                .setLoiteringDelay(5000)
                .setExpirationDuration(Geofence.NEVER_EXPIRE)
                .build();
        }

        public PendingIntent getPendingIntent() {
            if (pendingIntent != null) {
                return pendingIntent;
            }
            Intent intent = new Intent(this,
GeofenceBroadcastReceiver.class);
            pendingIntent = PendingIntent.getBroadcast(this, 2607, intent,
PendingIntent.FLAG_IMMUTABLE);
            return pendingIntent;
        }

        public String getErrorString(Exception e) {
            if (e instanceof ApiException) {
                ApiException apiException = (ApiException) e;
                switch (apiException.getStatusCode()) {
                    case GeofenceStatusCodes
                        .GEOFENCE_NOT_AVAILABLE:
                        return "GEOFENCE_NOT_AVAILABLE";
                    case GeofenceStatusCodes

```

```

GEOFENCE_NOT_AVAILABLE:
    return "GEOFENCE_NOT_AVAILABLE";
case GeofenceStatusCodes
    .GEOFENCE_TOO_MANY_GEOFENCES:
    return "GEOFENCE_TOO_MANY_GEOFENCES";
case GeofenceStatusCodes
    .GEOFENCE_TOO_MANY_PENDING_INTENTS:
    return "GEOFENCE_TOO_MANY_PENDING_INTENTS";}}

```

## 7.2 FEATURE 2 (ALERT NOTIFICATION)

- Once geofence is added, when the child enters the geofence a notification will be sent
- When the child leaves the geofence a notification will be sent.

```

package com.example.geofence;

import android.content.BroadcastReceiver;import
android.content.Context;

import android.content.Intent; import android.location.Location;import
android.os.CountDownTimer;import android.util.Log;

import android.widget.Toast;

import com.google.android.gms.location.Geofence;
import com.google.android.gms.location.GeofencingEvent
import java.util.List;

import android.os.Handler;

public class GeofenceBroadcastReceiver extends
BroadcastReceiver {

    private static final String TAG =
"GeofenceBroadcastReceiv";

    @Override

    public void onReceive(Context context, Intent intent) {

        // TODO: This method is called when the

```

```

        BroadcastReceiver is receiving
        // an Intent broadcast

        //.

        /*Toast.makeText(context, "GEOFENCE_ENTERED",
Toast.LENGTH_SHORT).show();

final Toast mToastToShow;
int toastDurationInMilliseconds = 1200000;
mToastToShow = Toast.makeText(context, "GEOFENCE_EXITED",
Toast.LENGTH_LONG);
// Set the countdown to display the toast
        CountdownTimer toastCountDown;
        toastCountDown = new
CountdownTimer(toastDurationInMilliseconds, 100000) {
            public void onTick(long millisUntilFinished) {
                mToastToShow.show();
            }

            public void onFinish() {
                mToastToShow.cancel();
            }
        };
// Show the toast and starts the countdown
        mToastToShow.show();
        toastCountDown.start();*/

```

```

    NotificationHelper notificationHelper = new NotificationHelper(context);
    notificationHelper.sendHighPriorityNotification("GEOFENCE_TRANSITION_ENTER",
    "", MapsActivity.class);

```

```

GeofencingEvent geofencingEvent = GeofencingEvent.fromIntent(intent);
If (geofencingEvent.hasError())

```

```

    Log.d(TAG, "onReceive: Error receiving geofence event...");
    return;
}

```

```

    List<Geofence> geofenceList =
geofencingEvent.getTriggeringGeofences();
    for (Geofence geofence: geofenceList) {
        Log.d(TAG, "onReceive: " + geofence.getRequestId());
    }
//    Location location = geofencingEvent.getTriggeringLocation();
    int transitionType = geofencingEvent.getGeofenceTransition();

```

```

    switch (transitionType) {
        case Geofence.GEOFENCE_TRANSITION_ENTER:

            notificationHelper.sendHighPriorityNotification("Entered the
Location", "", MapsActivity.class);
            break;

```

```

        case Geofence.GEOFENCE_TRANSITION_EXIT:
notificationHelper.sendHighPriorityNotification("Exited the Location ", "",
MapsActivity.class);
            break;} } }

```

### 7.3 DATABASE SCHEMA

We assume that only one child can leave the set maximum distance at a time. The beacons take 20 seconds to update the previous location data, hence we assume the notification trigger has a 20-40 seconds' lag in updating the right location. We assume that Wi-Fi is readily available since the backend server is located in the cloud and then to use the mobile devices' location services.

Moto Xplay Mobile Device	1	Communication Hardware	OS:Android Qualcomm Snapdragon 615 Octa-core Memory:32GB
Google Asus Table	1	Communication Hardware	OS:Android Quad-core 1.2GHZ Cortex-A9 Bluetooth 3.0 Memory:1GB
Sony Xperia D5803	1	Communication Hardware	OS:Android Qualcomm MSM8974AC snapdragon RAM:2GB Memory:16GB Bluetooth 4.0
Cloud Storage Amazon EC2	1	Communication Hardware	OS:Ubuntu Memory:1GB RAM:2GB

## CHAPTER 8

### TESTING

#### 8.1 TEST CASES

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage_TC_01	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on App		1.Enter App 3.Verify login/Signup popup displayed or not		Login/Signup popup should display	Working as expected	Pass		Y		SeethaShri, Swetha
LoginPage_TC_02	UI	Home Page	Verify the UI elements in Login/Signup popup		1.Enter App 2.Verify login/Signup popup with below UI elements: a.email text box b.password text box c.Login button d.New customer? Register		Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Register	Working as expected	Pass		Y		Shamugapriya, Swetha
LoginPage_TC_03	Functional	Home page	Verify user is able to log into application with Valid credentials		1.Enter App 2.Enter Valid username/email in Email text box 3.Enter valid password in password text box 4. Click on Login button	Username: sbcd@gmail.com password: Testing123	User should navigate to user account homepage	Working as expected	Pass		Y		Shakthi
LoginPage_TC_04	Functional	Login page	Verify user is able to log into application with Invalid credentials		1.Enter App 2.Enter Invalid username/email in Email text box 3.Enter valid password in password text box 4. Click on Login button	Username: sbcd@gmail.com password: Testing123	Application should show "Login error. There is no user record corresponding to the identifier"	Working as expected	Pass		Y		Shakthi, Shamugapriya
LoginPage_TC_04	Functional	Login page	Verify user is able to log into application with Valid credentials		1.Enter App 2.Enter Valid username/email in Email text box 3.Enter Invalid password in password text box 4. Click on Login button	Username: sec19ec020@airamtap.edu.in password: Testing123678686786876	Application should show "the Password is invalid"	Working as expected	Pass		Y		Swetha B, SeethaShri
LoginPage_TC_05	Functional	Login page	Verify user is able to log into application with Invalid credentials		1.Enter App 2.Enter Invalid username/email in Email text box 3.Enter Invalid password in password text box 4. Click on Login button	Username: sbcd password: Testing123678686786876	Application should show "Login error. There is no user record corresponding to the identifier"	Working as expected	Pass		Y		Swetha
Dashboard	Functional	Dashboard	Adding geofence in the location need		1.Enter App 2.Enter the valid username and password 3.Enter the location		Application show a red circle around the location	Working as expected	Pass		Y		Seetha Shri
Alert Notification	Functional	Notification	Notification when the user entered the geofence		1.Enter App 2.Enter the valid username and password 3.Add the Geofence		Application sent the notification "Entered the location"	Working as expected	Pass		Y		Shamugapriya, Swetha
Alert Notification	Functional	Notification	Notification when the user exited the geofence		1.Enter App 2.Enter the valid username and password 3.Add the Geofence		Application sent the notification "Exited the location"	Working as expected	Pass		Y		Shakthi, Swetha

Fig 8.1.1 Test Cases



## 8.2 USER ACCEPTANCE TESTING

### 1. 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	3	20	35
Not Reproduced	0	0	2	0	2
Skipped	0	0	2	1	3
Won't Fix	0	5	2	1	8
Totals	24	15	13	25	77

Table 8.2.1 Defect Analysis

### 2. TEST CASE ANALYSIS

Section	TotalCases	Not Tested	Fail	Pass
Print Engine	5	0	1	4
Client 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	1	2

Table 8.2.2 Test Case Analysis

## CHAPTER 9

### RESULTS

#### 9.1 PERFORMANCE METRICS

##### 1. USER REGISTRATION:

User gets registered to the app using their mail and create their password. On the user is registered a verification mail will be sent to the user mail id. The user needs to verify the account. All user details are stored in the firebase and verification mail is sent by firebase authentication.

##### Registration Page:



The screenshot shows the registration page of the 'Geofence' app. At the top, there is a purple header with the word 'Geofence' in white. Below the header is a cartoon illustration of a boy with orange hair, wearing a yellow shirt and blue pants, with his arms outstretched. Underneath the illustration is a green 'Register' button. Below the button are two input fields: 'Email' and 'Password'. At the bottom of the form is a purple 'REGISTER' button. Below the button, there is a link that says 'Already registered Login here'.

Fig 9.1.1 User Registration

##### Verification mail

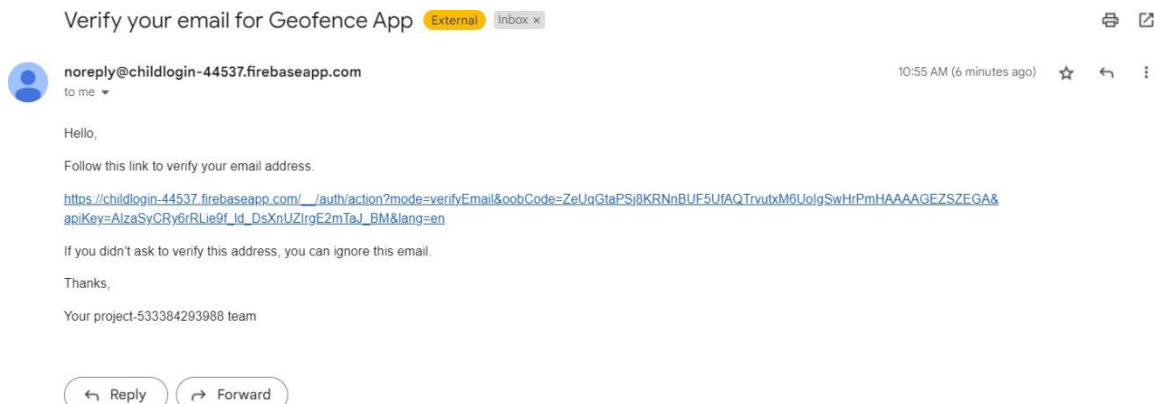


Fig 9.1.2 Verification Mail

## 2. USER LOGIN

User with their registered mail and password will login to the account. As the details are stored in firebase, when invalid mail or password is entered a message say invalid mail or password occur

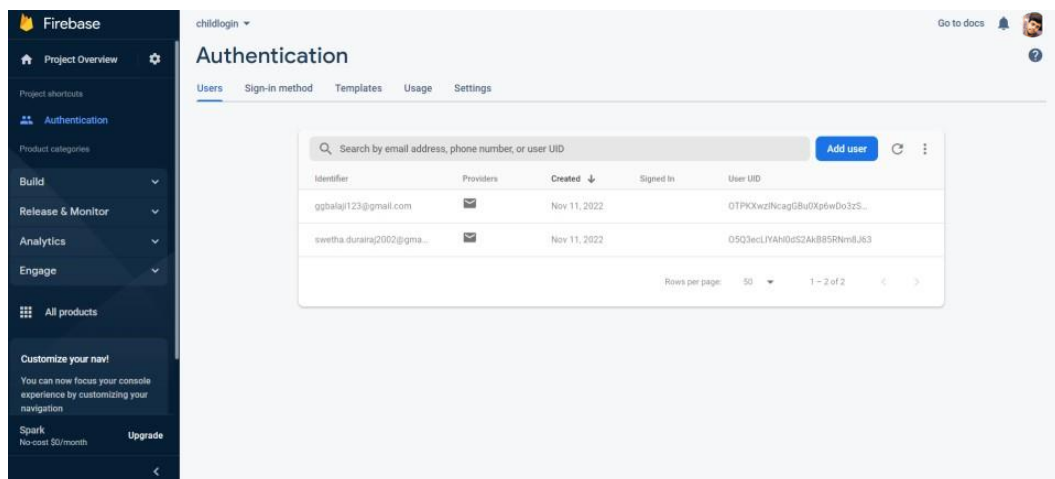
**Login page:**



The login page features a purple header with the text "Geofence". Below the header is a cartoon illustration of a boy with brown hair, wearing a yellow shirt and blue pants, with his arms outstretched. Underneath the illustration is the word "Login" in a green, sans-serif font. Below this are two white input fields: the first is labeled "Email" and the second is labeled "Password". At the bottom of the form is a purple button with the text "LOGIN" in white. Below the button is a link that says "Not registered yet [Register here](#)".

Fig 9.2.1 User login

## User Details



The screenshot shows the Firebase Authentication console. On the left is a dark sidebar with the Firebase logo and navigation links: Project Overview, Authentication, Build, Release & Monitor, Analytics, Engage, All products, and a section for customizing the navigation. The main area is titled "Authentication" and has tabs for Users, Sign-in method, Templates, Usage, and Settings. The "Users" tab is active, showing a table of users. At the top of the table is a search bar and an "Add user" button. The table has columns for Identifier, Providers, Created, Signed In, and User UID. There are two users listed. At the bottom of the table, there is a "Rows per page" dropdown set to 50 and a pagination indicator "1 - 2 of 2".

Identifier	Providers	Created	Signed In	User UID
ggbaiaj123@gmail.com	📧	Nov 11, 2022		0TPKwzRncag5Bu0Xp6wDo3zS...
sweetha.durairaj2002@gmail.com	📧	Nov 11, 2022		05Q3ecLYAH0etS2A8B85RnmlJ63

Fig 9.2.2 User Details

### 3. ADDING GEOFENCE AND ALERT NOTIFICATION

User can add geofence in the location where they want to add or where their child is going play so they can monitor the child location. Once the child enters the geofence alert notification says entered the location will be displayed. When the child leaves the geofence alert notification says exited the location will have displayed.

#### Geofence

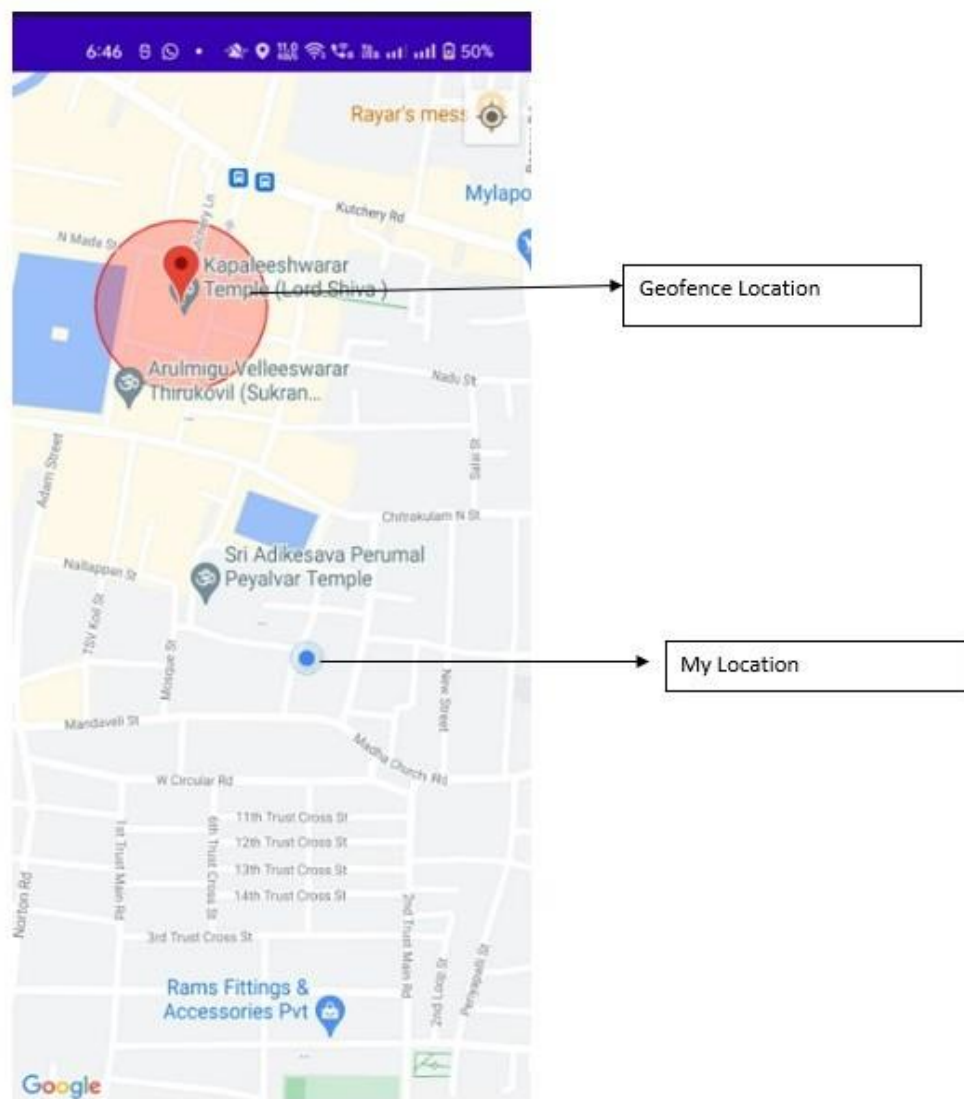


Fig 9.3.1 Adding Geofence

## NOTIFICATION

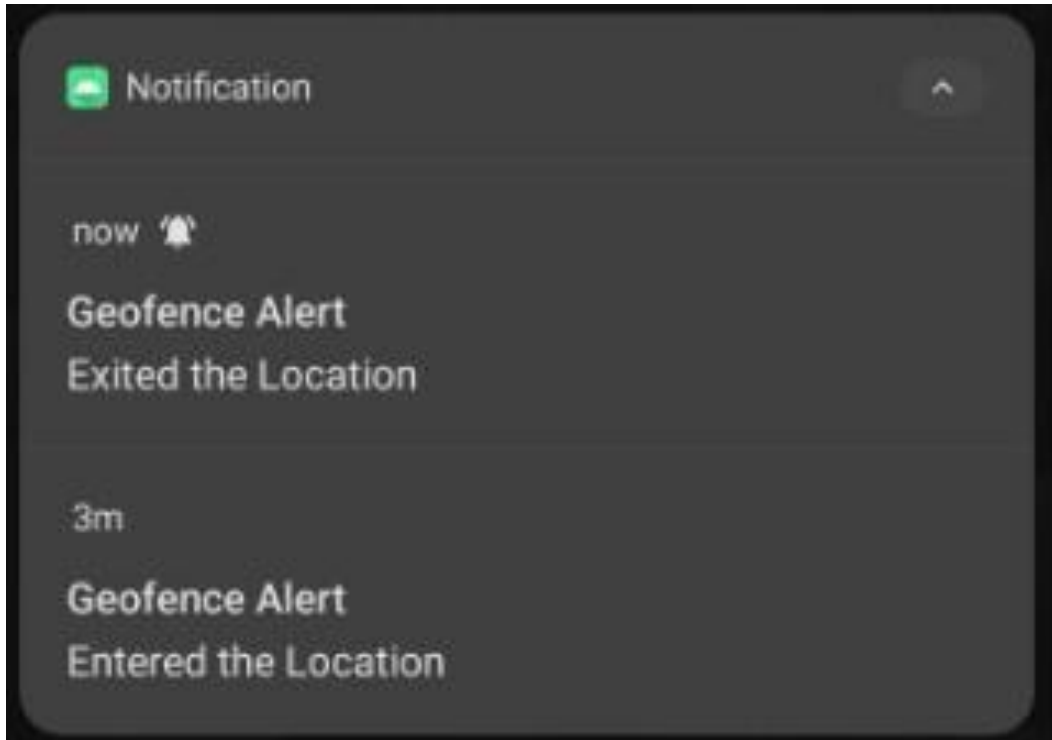


Fig 9.3.2 Alert Notification

## **CHAPTER 10**

### **ADVANTAGES & DISADVANTAGES**

#### **ADVANTAGES:**

- ✓ Simple and easy to use
- ✓ Parents can feel secure because if the child leave the desired location and immediately a notification will be sent.
- ✓ Geofence can be added easily.
- ✓ Accurate real-time data.
- ✓ Efficient use of resources.
- ✓ Accountability and Safety.
- ✓ Process automation

#### **DISADVANTAGES:**

- ✓ Multiple geofence can be a problem.
- ✓ Maintenance can be time-consuming.
- ✓ Pushback due to privacy concerns.
- ✓ Battery and data draining.
- ✓ Lack of formal policies.

## **CHAPTER 11**

### **CONCLUSION**

This research demonstrates Smart IoT device for child safety and tracking, to help the parents to locate and monitor their children. Through this device, the parent can track and monitor their child with just a simple app. It is not possible to always stay beside children as most of the parents need to go for work. With this project, parents can track the location of their children and get alerts whenever the child out of the geofence. It becomes easy for parents to look after their child while working. This device is efficient to use. Thus, by keeping in mind the advantages and applications we are developing a child monitoring device. In order to avoid kidnapping cases, the child monitoring system is needed.

## **CHAPTER 12**

### **FUTURE SCOPE**

The future work would be to further develop and implement the safety wearable device so that it could be watch or sown into a fabric that could be worn, using synthetic fibers. When a violation of child safety is identified, a certain sensor in the child module will emit a signal, which is the main function of the suggested child tracking system. These sensors and WFPS will send this signal to the microcontroller, which will then send it to the transmitter, which will then send it to the parent module. The decision will be made by the parent module, and the violation handling procedure will begin. The kid tracking system's functionality necessitates hardware between the child and parent models, which comprises a drive circuit for the sensors' activation.



## CHAPTER 13

## APPENDIX

Source Code

<https://github.com/IBM-EPBL/IBM-Project-41285-1660640896/tree/main/Final%20Deliverables/Final%20Code>

GitHub

<https://github.com/IBM-EPBL/IBM-Project-41285-1660640896>

Project Demo Link

<https://github.com/IBM-EPBL/IBM-Project-41285-1660640896/blob/main/Final%20Deliverables/Demonstration%20Video%20Link/IBM%20IOT%20Demo%20Video.mp4>