

IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

A PROJECT REPORT

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE OF ENGINEERING

NOVEMBER - 2022

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1.INTRODUCTION

1.1 Project Overview

The motivation for this wearable comes from the increasing need for safety for children in present times as there can be scenarios of the child getting lost in the major crowded areas. This paper focusses on the key aspect that lost children can be helped by the people around the child and can play a significant role in the child's safety until reunited with the parents. Therefore, it is intended to use the SMS as the communication type between the parent and child's wearable device, as this has fewer chances of failing when compared to Wi-Fi and Bluetooth.

1.2 Purpose

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. The entire location data will be stored in the database.

2. LITERATURE SURVEY

2.1 Existing Problem

This project focuses communication mode to be in SMS text form using GSM. The parent will send a keyword in form of SMS “SOS”, “BUZZ”, “LOCATION”, “TEMPERATURE” etc., to the devices. The device will reply back the real time accurate location of the child and will also provide the surrounding temperature, or any of the data asked by the parents. It helps parents to keep track if the temperature around their kid is not proper for their kid. The secondary idea implemented was distress alarm buzzer and a bright SOS Light on the device that can be activated by the guardians via sending the keywords in the SMS. Parents can text the keywords to ON the SOS signal brightly and can also send the keyword to sound an alarm which a people near child or bystander can instantly help the child's till the parents arrive. People around could also contact the parents and help them to reunite child with his or her parents. Hence this project provides parents a sense of protection for their kid in today's unsafe environment. The drawback of this system is that parent have to remember the keywords.

2.2 References

- ✓ M Nandini Priyanka, Smart IOT Device for Child Safety and Tracking and Exploring Engineering (IJITEE) “International Journal of Innovative Technology”.

Child safety and tracking is a major concern as the more number of crimes on children are reported nowadays. With this motivation, a smart IoT device for child safety and tracking is developed to help the parents to locate and monitor their children. The system is developed using LinkIt ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency. The

parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. The above system ensures the safety and tracking of children.

- ✓ Lai Yi Heng, IoT-based Child Security Monitoring System, Asia Pacific University of Technology and Innovation, Technology Park, Bukit Jalil, Kuala Lumpur, Malaysia.

Children's involvement in crime is on the rise today, which makes people more concerned about child protection. The goal of this research is to suggest an Internet of Things-based smart band for child safety. Data collection techniques include semi-structured interviews and online questionnaires. By providing questions electronically and requiring respondents to submit their responses online, the online survey collects feedback. In a semi-structured interview, the researcher meets the respondents and poses some preset questions while posing others that were not before thought of. A smart band has been proposed to monitor children's safety based on the information obtained. Parents can take action if something goes wrong because they are aware of what is going remotely thanks to this. In the future, this device will be improved by adding features and software to create.

- ✓ Mr. Raghavendrchar S, Wearable Safety Device for Children, Published by ijraset in the year of 2022-04-13.

In recent years, attacks on children have increased at an unprecedented rate, leaving the victims in dangerous situations with little opportunities to contact their relatives. The major objective of this project is to develop a child-safe smart wearable device that makes use of cutting-edge technologies. This tactic is therefore seen as the children's wearable sending an SMS to their parents or guardians. Through the use of a GSM module, this initiative uses cutting-edge technology to protect the child, making sure that they do not feel alone as they cope with such societal difficulties. The wearable will have an Arduino Nano, GSM, GPS, temperature sensor, heartbeat sensor, and a panic button.

- ✓ Kaushik Gupta, Child Monitoring System – TAGSY, Student, Department Of Information Technology, Thakur Shyamnarayan Degree College, Mumbai, Maharashtra, India in the year of April 2022.

Today's environment is dependent entirely on technology, thus author ought to be ready to address any issue with contextually appropriate IT solutions. This concept suggests a clever Internet of Things-based gadget that can lessen parents' anxiety over knowing the whereabouts of their kids in real-time. The project's goal is to develop a system that will enable parents to monitor their kids when they aren't in their immediate care. This is accomplished by having the child wear a covert WFPS-enabled device that is linked to the parents' smartphone over a mobile network. This child monitoring device enables remote monitoring or tracking of the youngster and their activities. This mechanism has a crucial function. It keeps tabs on the kids' security.

- ✓ Anwaar Al-Lawati, RFID-based System for School Children Transportation Safety Enhancement, Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February, 2015.

In order to improve child safety during everyday transit to and from school, this paper describes a system to track pick-up and drop-off of school children. The bus unit and the

school unit are the two basic components of the system. When a child enters or exits the bus, the equipment on the bus can detect it. This information is given to the school department, which determines which of the kids missed the bus or got off early and sends out an alert message in response. A web-based database-driven application that was designed for the system facilitates management and gives authorised individuals relevant information about the kids. To verify the functionality of the suggested system, a full prototype was created and put to the test.

- ✓ Prakriti Agarwal, Survey on Child Safety Wearable Device Using IoT Sensors and Cloud Computing, International Journal of Innovative Science and Research Technology, february 2020.

Due of a child's fragility and the greater prevalence of crimes against children, child safety is a key concern in any community. In order to help parents assure their children's safety, a smart wearable Internet of Things sensor network for tracking a child's environment can be created.

Additionally, a method for tracking the child must be included. The fact that this wearable device can be accessible from any mobile device and doesn't require a lot of technological expertise from the user to use is a benefit of its design. This device's objective is to make it easier for a parent or guardian to find their child and ensure their well-being.

- ✓ N. Manjunatha, IoT Based Smart Gadget for Child Safety and Tracking, International Journal of Research in Engineering, Science and Management Volume-3, Issue-6, June-2020.

This study focuses on designing a device that can track a child's whereabouts using GPS, as well as having a panic button that can warn the parent by using a GSM module to call for help. Android parental software is created to control and track the device at any time. Smart gadget device is always linked to parental phone, which can receive and make calls as well as send and receive SMS on gadget via GSM module. Wireless technology is also implemented on device, which is useful to bind the gadget within a region of monitoring range; if gadget moves out of monitoring range, alert will be triggered on binding gadget, helping you keep a virtual eye on child.

- ✓ Dipali Badgujar, Smart and Secure IoT based Child Monitoring System, INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING AND TECHNOLOGY.

IOT is continually improving, and at the same time, its security is improving. In this proposed system, the primary focus is on child remote monitoring. We also use radar devices and obstacle sensors to detect alerts when children enter danger zones or are approaching dangerous objects. Alerts are then sent to the caregiver via mobile device in the form of an alarm or notification. We use a basic necklace that is handed to the baby for sensing purposes, with a waterproof ultrasonic obstacle sensor installed inside of it so that the locket may inform the caregiver via a mobile device, and a solar panel for battery backup.

- ✓ Mohammad Jahangir Alam, Child tracking and hidden activities observation system through mobile app, Indonesian Journal of Electrical Engineering and Computer Science, June 2021.

Information technology is causing the world to change quickly, and everyone is working hard to keep up with this race through their employment and businesses. Nowadays, parents spend more time at work than they do at home, yet they are constantly concerned and afraid for their kids because of the misuse of technology and the law and order situation in the nation. In order to relieve their burden, parents want to be able to follow and monitor their child's whereabouts and activities from any location. But due to a variety of factors, it is not always possible for parents to personally watch over their children. This study outlines a technology that will enable parents to track their kids' whereabouts and activity using a mobile phone.

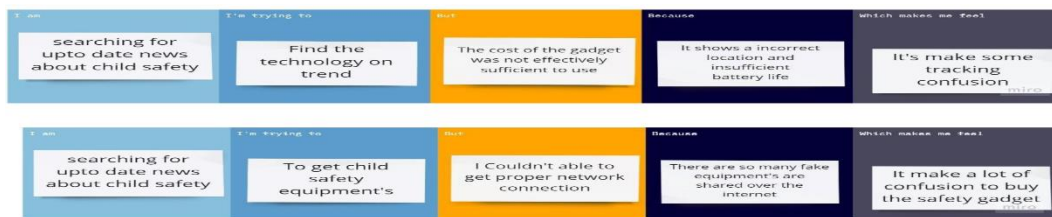
- ✓ Digambar Jadhav, Missing Person Detection System in IoT, 2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA).

The rate of missing persons has increased as a result of India's rapid economic expansion. India needs to pay special attention to finding the missing and recognising them in order to reduce the number of people who go missing. The Internet of Things (IoT) is a collection of mechanical, electronic, and human devices that are linked together and equipped with the ability to share data. The Internet of Things (IoT) is a network of sensors where data is transferred over a system without the need for any type of human-to-human or human-to-PC connection. We suggest an innovative IoT platform for missing person detection. The suggested structure would be implemented over the entire smart city or region. This framework allows for the identification of missing people, the transmission of live photographs of those who have been found missing.

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.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Searching for up to day news about child safety	Find the technology on trend	The cost of the gadget was not effectively sufficient to use	It shows a incorrect location and insufficient battery life	It's make some tracking confusion
PS-2	Searching for up to day news about child safety	To get the child safety Equipment's	I couldn't able to get proper network connection	There are so many fake equipment's are shared over the internet	It's make a lot of confusion to buy the Safety gadget



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3.

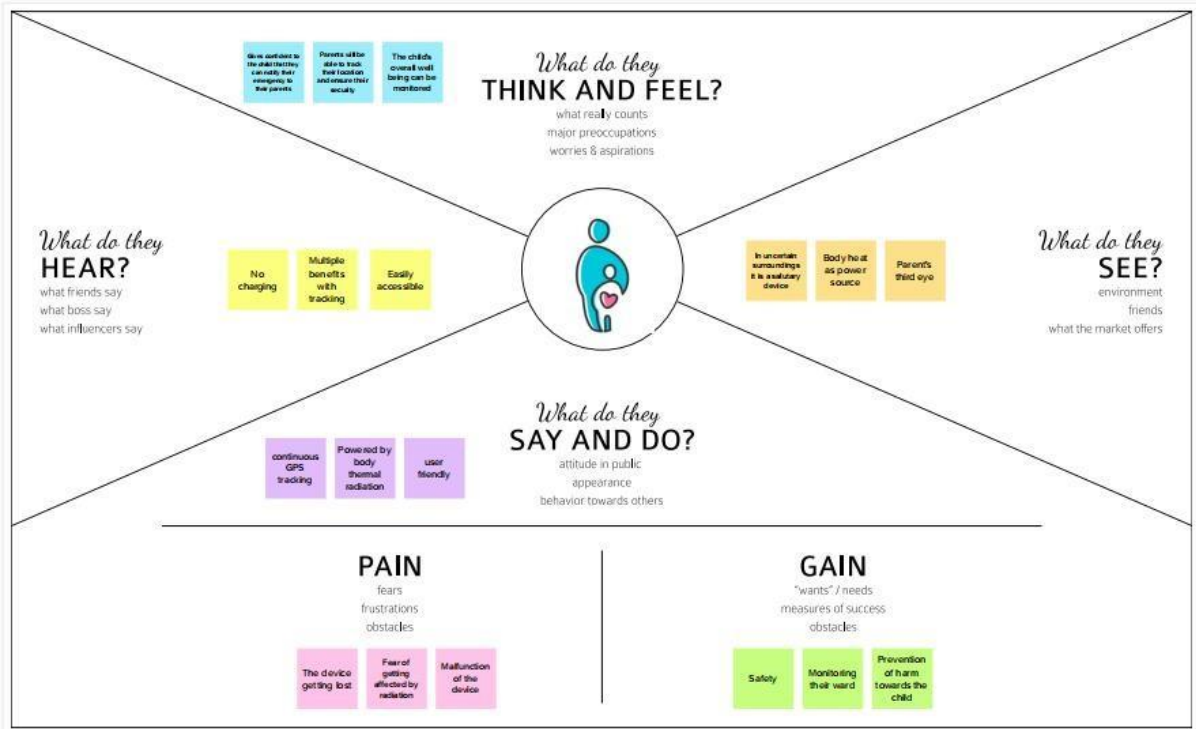
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

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



3.2 Ideation & Brainstorming

IDEA1:

The device has IoT monitoring and a GSM module that allows the child to be monitored at all times. It also has numerous sensors that are connected to and are used to detect exact signals such as heart rate, temperature, and other dangers and alert the parents. In the event of a power outage, the wearable serves as a backup. On the device, there is an additional panic button. The purpose of this button is to notify parents and the police of a child's current location whenever they are in a perilous scenario. A GPS module is utilised to access their present location, and a GSM module assists in transmitting the information via SMS to designated contacts. In this approach, the device tries to provide child safety while remaining unobtrusive.

IDEA2:

Our proposed system is based on the Internet of Things-based Smart Child Safety Wearable Device System designed as an efficient and low-cost IoT-based system for monitoring infants in real-time. This system plays a key role in providing better care for the lost children until they reconvene with the parents. In this present era, most of the wearable devices today are designed based on the location, activity, temperature, pressure, etc of the child and inform the parents via GPS. Therefore it is intended to use voice call as the way of communication between the parent mobile and child's wearable device. The system

operates on the microcontroller board and the functions of sending and receiving notifications, calls, voice messages via GPS.

Template



Brainstorm & idea prioritization

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

⌚ 10 minutes to prepare
👥 1 hour to collaborate
👤 2-4 people recommended

Before you collaborate

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

⌚ 10 minutes

A

Team gathering

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

B

Set the goal

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

C

Learn how to use the facilitation tools

Use the Facilitator's Superpowers to run a happy and productive session.

[Open article](#) →

Define your problem statement

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

⌚ 5 minutes

PROBLEM

How might we [solve problem statement]?



MONITORING THE CHILD ACTIVITY

PROVIDING GOOD SUPPORTS TO CHILD

TRACKING CHILD'S LOCATION

MONITORING CHILD'S SITUATION

TO REDUCE THE PANIC

INFORM TO PARENTS

MONITORING HEALTH CONDITION

COMMUNICATE WITH CHILD

COLLECT THE INFORMATION ABOUT CHILD

WARNING TO KIDNAPPERS THROUGH MESSAGE

RREDUCE THE STRESS OF CHILD

INFORMATION FORWARD TO CHILD CARE

MONITOR THE PRESENT ACTIVITY OF CHILD

PROVIDING THE SECURITY FEELINGS TO CHILD

COMMUNICATION BETWEEN PARENTS & CHILD

TRACKING THEIR MOVEMENTS

FIND THE CURRENT PLACE

SAVE THE LIFE OF CHILD

GATHER THE INFORMATION ABOUT CHILD'S SITUATION

TRACKING CHILD'S PATH

ALERTS THE GUIDANCE

INFORM TO HELPLINE

INFORMATION SHARED TO FAMILIES

INFORMATION FORWAD TO POLICE

REDUCE THE FEARNESS

MONITORING LOCATION, SURROUNDING TEMPERATURE

MONITOR THE ALL HAZARDS

SEND THE INFORMATION TO POLICE CONTROL

TRACK THE DAILY ACTIVITY

TRACKING OF MISSING KIDS

MONITOR THE CHILD'S HEALTH CONDITION

PARENTS WITH REAL-TIME LOCATION

IN EMERGENCY, COMMUNICATE WITH PARENT

FIND THE LIVE LOCATION INFORMATION

FIND THE LOCATION OF THEIR CHILD

STAYING CONNECTED WITH CHILD

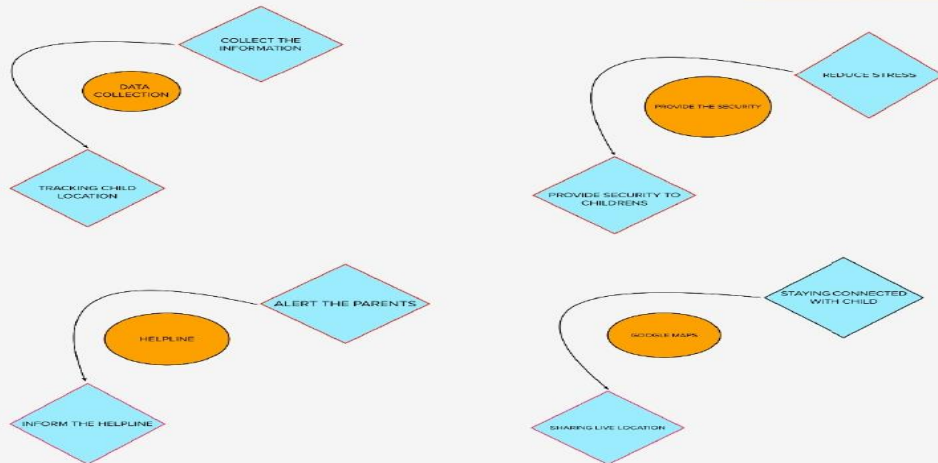
3

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 can 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.

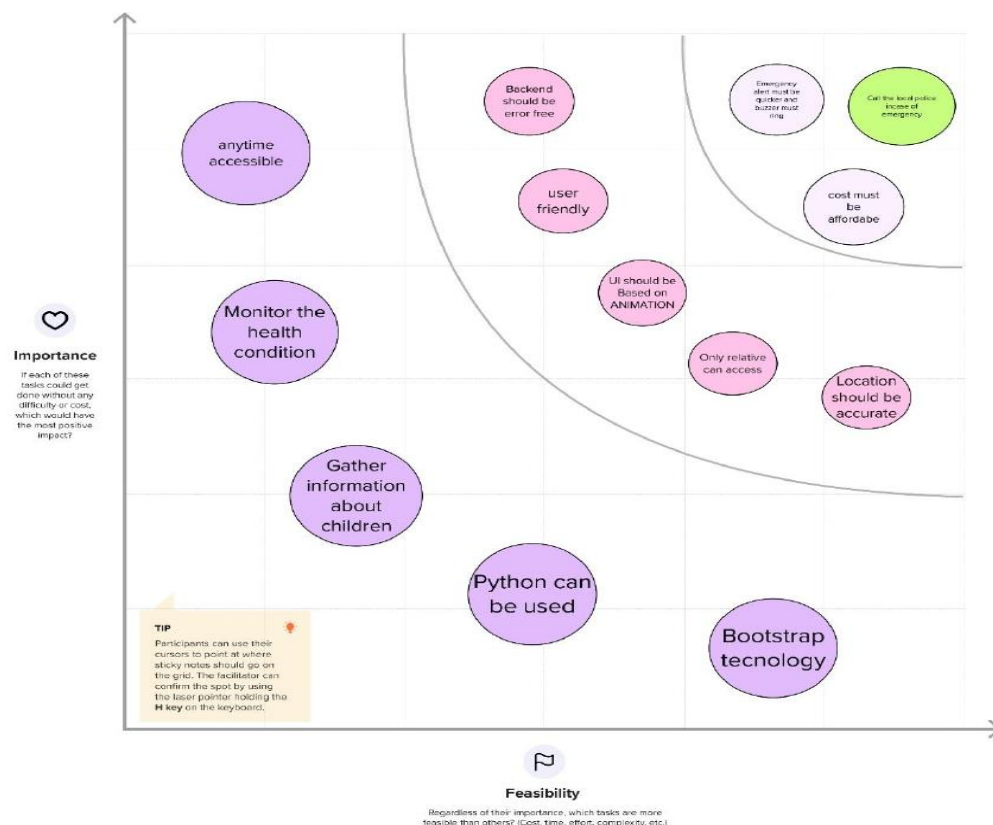


4

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



3.3 Proposed Solution

Sl.NO	Parameter	Description
1.	Problem Statement (Problem to be solved)	With the increasing rate of child kidnapping and trafficking and lack of tracking technology for child, there is limited application for child monitoring. Hence an IoT based safety gadget for child safety is probably the need of the hour today
2.	Idea / Solution description	A good solution to this issue would be to design a smart wearable Internet of Things sensor based device for monitoring the environment of a child along with a mechanism for tracking the child. The gadget will make use of GPS and a python script to publish the location details to the IBM IoT platform. The wearable also functions to send immediate alerts to the user through in case if the child crosses the geofence.
3.	Novelty / Uniqueness	All the existing systems make use of GPS and a mobile app to track and receive alerts regarding the child's location, while this system make use of the IBM Watson IOT Platform and IBM Cloud Services which is reliable and efficient to maintain the database of the child's location. The parent can set geofence and receive alerts through the web application which is user friendly and secure created using the Node RedService.

Business Model (Revenue Model)

The target audience of this device is majorly the parents. Considering the Tracking ability of the device, **Hardware quality, used technology and sensors**, the starting range of price would go from Rs. 6000 and above.

Scalability of the Solution

With the present needs for monitoring the child, the system is designed. It has a location database to maintain the entire location history of the child and the parent can set the geofence to determine the safer boundary of the child.

3.4 Problem Solution Fit

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

4. REQUIREMENT ANALYSIS

4.1 Functional requirements

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	<ul style="list-style-type: none"> ➤ Registration through Phone ➤ Registration through Gmail
FR-2	User Confirmation	<ul style="list-style-type: none"> ➤ Confirmation through Email ➤ Confirmation through Mobile Alert
FR-3	App installation	<ul style="list-style-type: none"> ➤ Installation through website APK's ➤ Installation through play store.
FR-4	Detecting child	<ul style="list-style-type: none"> ➤ Detecting location through SMS ➤ Detecting location through mobile app
FR-5	Set Geofence	<ul style="list-style-type: none"> ➤ Setting by user to find child location
FR-6	User End Result	<ul style="list-style-type: none"> ➤ Parents need not worry about their children.
FR-7	User Objective	<ul style="list-style-type: none"> ➤ Easy to monitor the child anywhere ➤ Helps to identify the child.

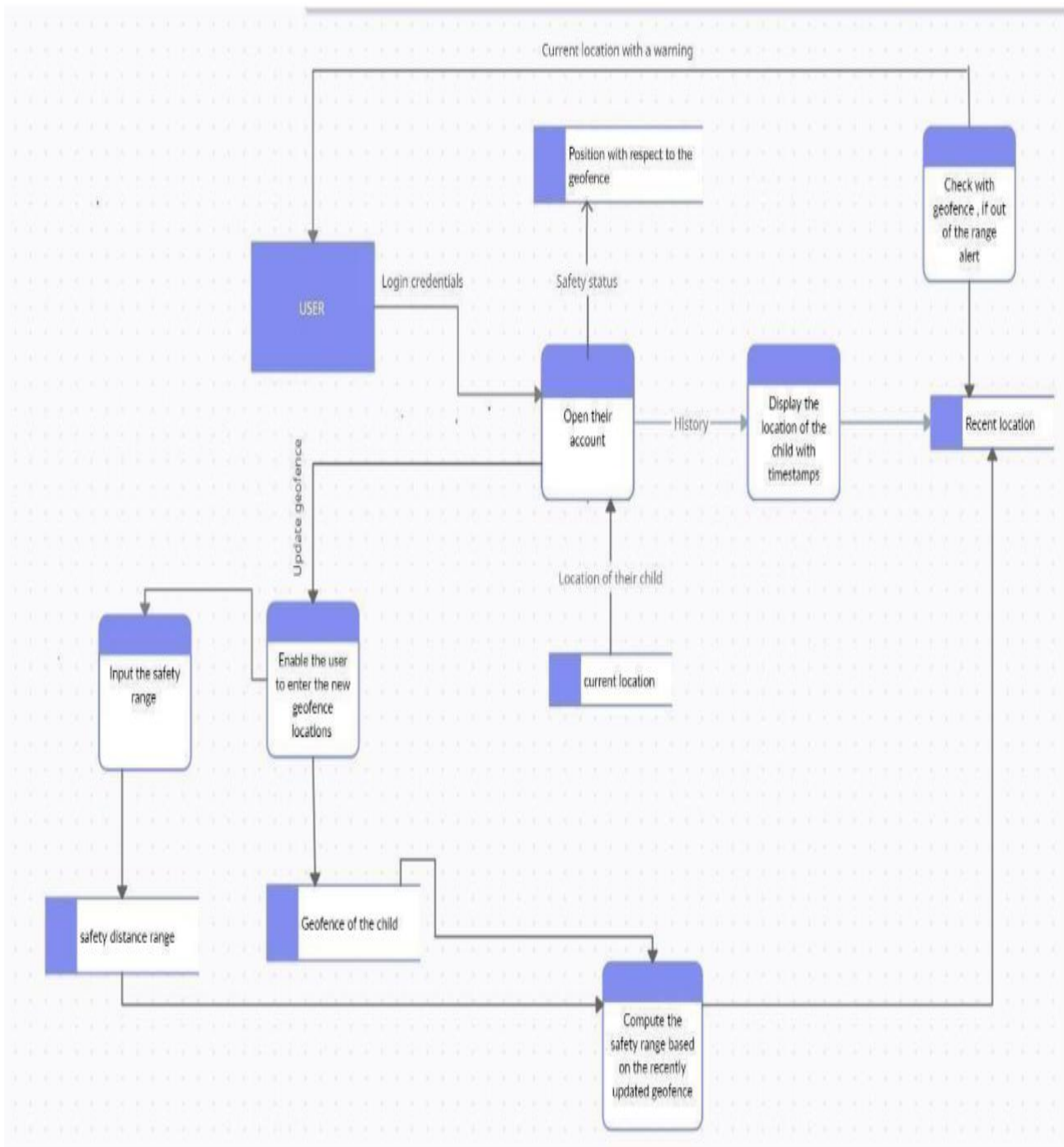
4.2 Non-Functional Requirements

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	<ul style="list-style-type: none">➤ The device has GSM can help to inform the parents about the current situation of the child, alert by message immediately to save the child.➤ Seamless communication is possible between people, processes, and things.
NFR-2	Security	<ul style="list-style-type: none">➤ Make children parents more assure about their kid's security, we have a feature in our device called Geo-Fence.➤ Securing your IoT devices and network as you scale up production and deployment can be challenging one, we have a feature like storing all data in the database.
NFR-3	Reliability	<ul style="list-style-type: none">➤ The reliability of an item is to perform a required function in a correct manner.➤ It is easy to use and more flexible.
NFR-4	Performance	<ul style="list-style-type: none">➤ Create a Child tracker which helps the parents with continuously monitoring the child's location.➤ The website's load time should not be more than one second for users.➤ The notification will be sent according to the child's location to their parents. The overall data collection is stored in the database.
NFR-5	Availability	<ul style="list-style-type: none">➤ The system is accessible to a user at a given point in time.
NFR-6	Scalability	<ul style="list-style-type: none">➤ It is the ability of the application to handle an increase in workload without performance, degradation.➤ Parents does not need worry about their children safety.

5. Project Design

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

FEATURES:

Development of a safety gadget for children to ensure their protection without direct monitoring of their parents. The various features involve:

- GPS
- Geo fence
- Notify alert signal

SOLUTION:

Track current location of the child using GPS and continuous monitoring of the same is done. When the gadget detects the activity to be outside the given geo fence

(as mentioned by the parent or guardian), alert messages or notifications are sent to the registered device, appropriately. Additional features such as recording of messages could be done if any kind of danger is sensed.

SOLUTION ARCHITECTURE DIAGRAM:

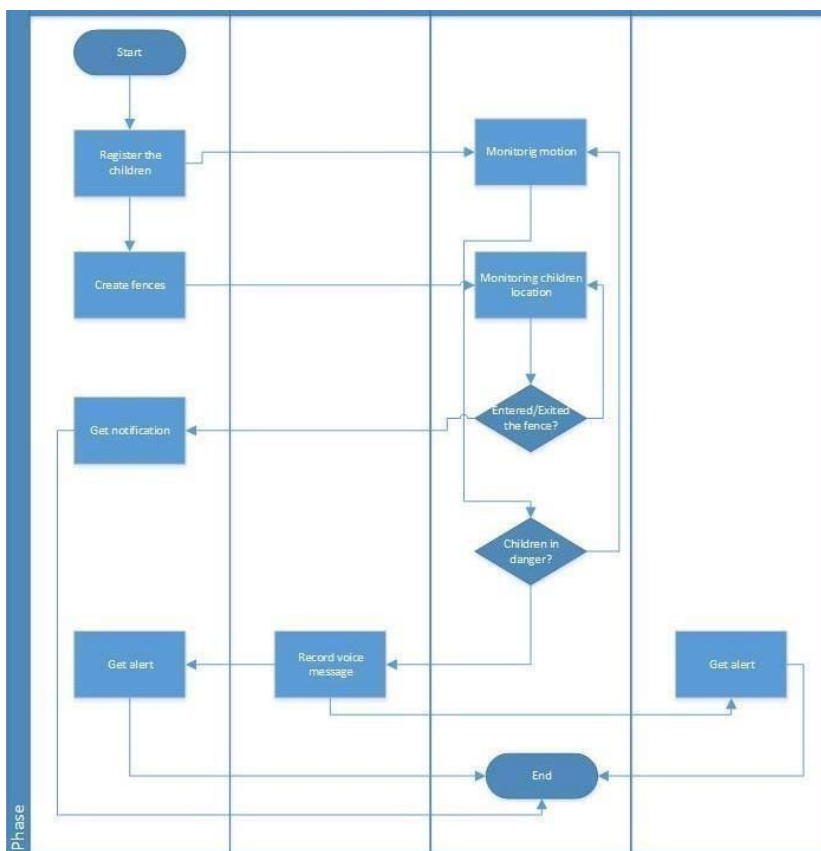
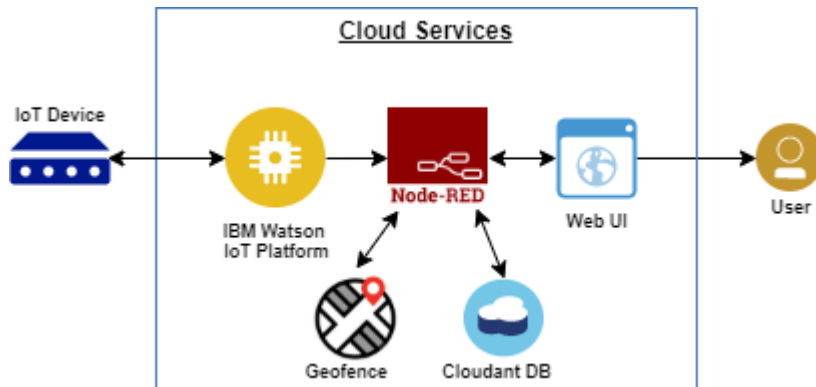


Figure 1: Architecture and data flow of the child safety gadget sy

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

IOT BASED SAFETY GADGETS FOR CHILD MONITORING AND NOTIFICATIONS

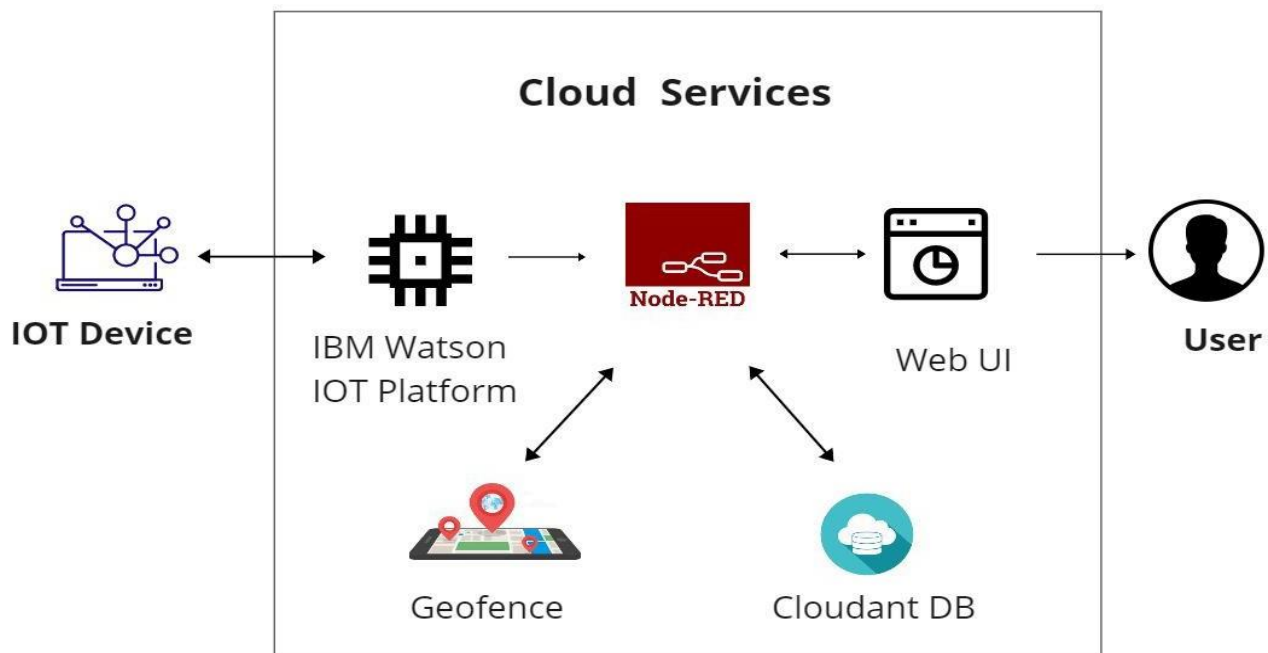


Table-1: Components & Technologies:

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

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The proposed solution being framed in the form of an android application providing the end user an easy surveillance 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.	Encryptions, IAM Controls.
3.	Scalable Architecture	The app format comes the way easier to handle and operate.	Not yet determined
4.	Availability	The developed solution tends to be available in the market at any time	Not yet determined
5.	Performance	Highly proper and betterment functionalities are to be ensured in the designed solution	Not yet determined

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) and (Web user)	Registration	USN-1	As a user, I can register my account by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered myself	I can receive confirmation Email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through google account	I can register & access the dashboard with google account Login	High	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering user id & password		High	Sprint-1
	Dashboard					
Customer Care Executive	Login		As I enter I can view the working of the application and scan for any glitches and monitor the operation and check if all the users are authorized	I can login only with my provided credentials	Medium	Sprint - 3
Administrator	Login		Maintaining and making sure the database containing the locations are secure and accurate and updated constantly.	I can login only with my provided credentials	High	Sprint - 3

6. PROJECT PLANNING & SCHEDULING

6.1 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.	3	High	Yamuna Priyadharshini
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application.	3	High	Chopra
Sprint-1	Login	USN-4	As a user, I can register for the application.	3	Medium	Kovarthini
Sprint-2	Dashboard	USN-3	As a user, I can log into the application by entering email & password.	5	High	varshini
Sprint-4		USN-6	As a user, I can receive alert notifications if the movement is beyond the geofence.	13	High	Yamuna Priyadharshini K
Sprint-3		USN-7	As a user I can add the geofence.	10	Medium	Chopra
Sprint-3		USN-8	As a user I can update the geofence whenever necessary.	13	Medium	Kovarthini

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
Dashboard					
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

6.3 Reports from JIRA

6.3.1 RoadMap

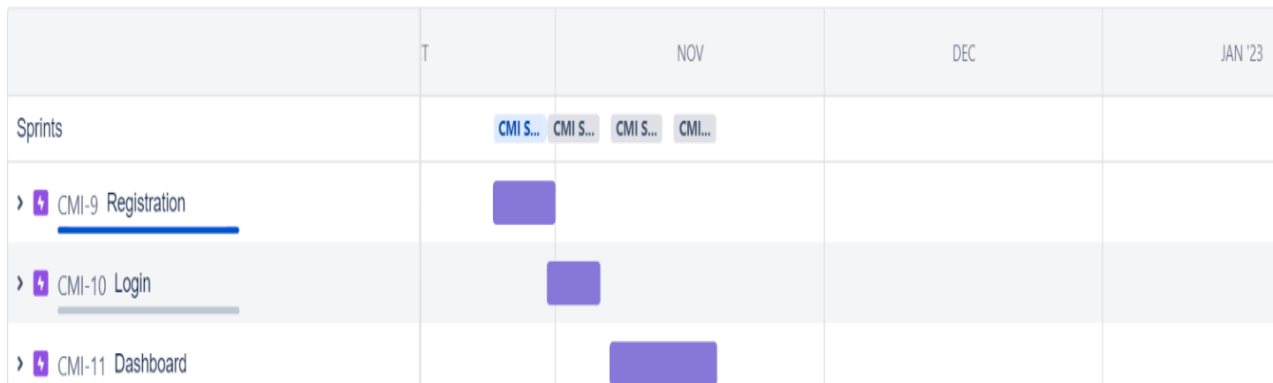


Fig 6.3.1 Road Map

7. CODING & SOLUTIONING

7.1FEATURE 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 =
    "GeofenceBroadcastReceiver";

    @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 theLocation",
            "", MapsActivity.class);
            break;

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

```

8. TESTING

8.1 Test Cases

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

8.2 User Acceptance Testing

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

9.Results

9.1 PERFORMANCE METRICS

USER REGISTRATION:

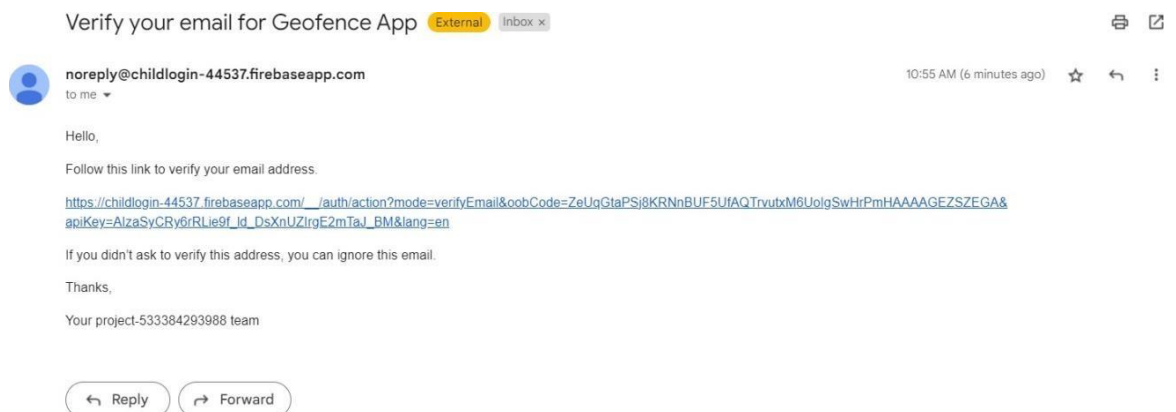
User gets registered to the app using their mail and create their password. On the user is registered a verification mail will be sent to the user mail id. The user needs to verify the account. All user details are stored in the firebase and verification mail is sent by firebase authentication.

Registration Page:



The screenshot shows the registration page for the 'Geofence' app. At the top, there is a purple header with the text 'Geofence'. 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'.

Verification mail



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 saying invalid mail or password occurs.

Login page:

Geofence




Login

LOGIN

Not registered yet [Register here](#)

User Details

 **Firebase**

Project Overview

Project shortcuts

Authentication

Product categories

Build

Release & Monitor

Analytics

Engage

All products

Customize your nav!

You can now focus your console experience by customizing your navigation

Spark

No-cost \$0/month



Upgrade

childlogin

Authentication

Users Sign-in method Templates Usage Settings

Add user

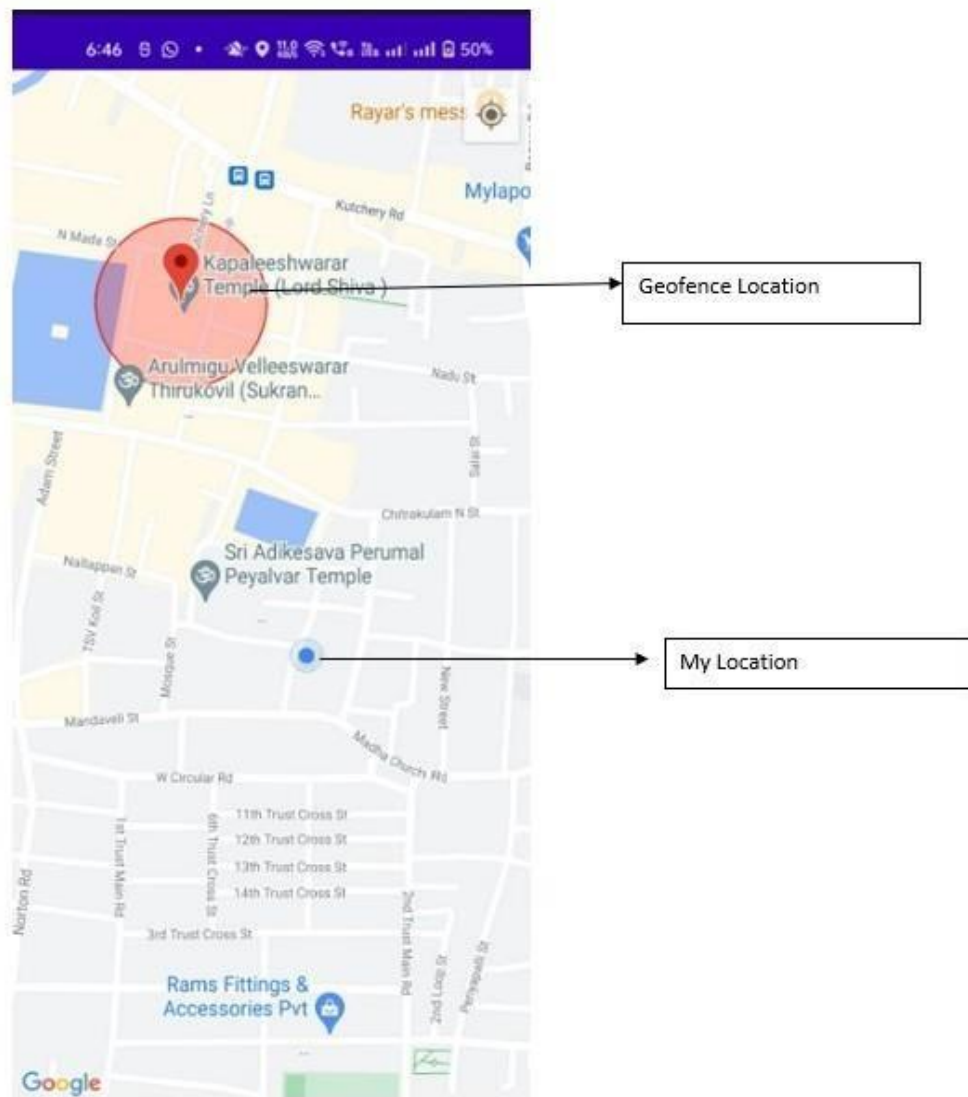
Identifier	Providers	Created	Signed in	User UID
ggbalaj123@gmail.com		Nov 11, 2022		OTPKXwzIkcagGBu0XpewD03zs...
sweettha.duranta2002@gma...		Nov 11, 2022		05Q3ecLYAH0eS2AA8B5RNmJ63

Rows per page: 50 1 - 2 of 2

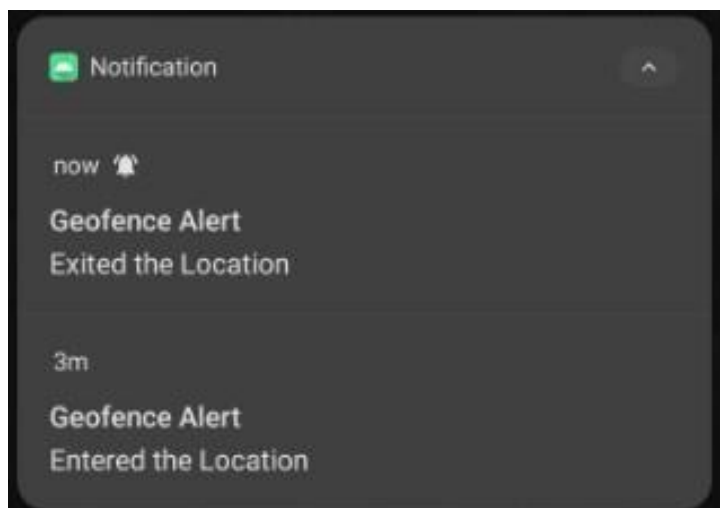
ADDING GEOFENCE AND ALERT NOTIFICATION

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



NOTIFICATION



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.

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.

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.

13. Appendix

Github :

<https://github.com/IBM-EPBL/IBM-Project-52901-1661181310>