IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

A PROJECT REPORT

Submitted by

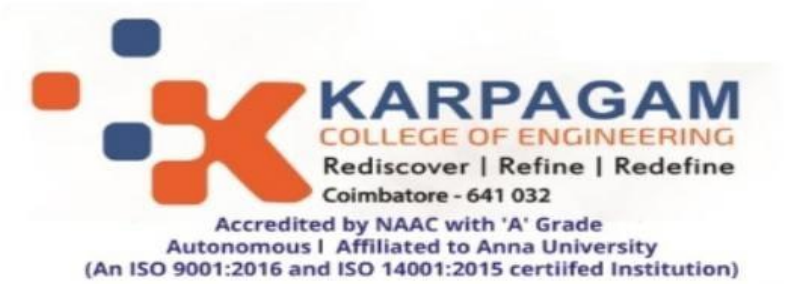
CHOPRA S V	**19L310**
KOVARTHINI S	**19L324**
VARSHINI S	**19L348**
YAMUNA PRIYADHARSHINI K	**19L354**

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING



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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 asthe morenumber of crimes on children are reported nowadays. With this motivation, a smart IoT device for child safety and tracking is developed to helpthe parents tolocate 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 childare used for parametric analysis and results are plotted for the same. The abovesystem ensures the safety and tracking of children.

- ✓ Lai Yi Heng, IoT-based Child Security Monitoring System, Asia Pacific Universityof 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 beimproved by adding features and software to create.

- ✓ Mr. Raghavendrachar S, Wearable Safety Device for Children, Published byijraset 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 theydo 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 Montoring System – TAGSY, Student, Department OfInformation 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 contextuallyappropriate IT solutions. This concept suggests a clever Internet of Things-basedgadget 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 toand 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 individualsrelevant 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 andCloud Computing, International Journal of Innovative Science and Research Technology, feburary 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 orderto 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 thiswearable device can be accessible from any mobile device and doesn't require alot of technological expertise from the user to use is a benefit of its design. Thisdevice's objective is to make it easier for a parent or guardian to find their childand ensure their well-being.

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

  This study focuses on designing a device that can track achild'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, itssecurity 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 ornotification. 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 andComputer 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 thanthey 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 avariety of factors, it is not always possible for parents to personally watch overtheir children. This study outlines a technology that will enable parents to tracktheir 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 equippedwith 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 missin

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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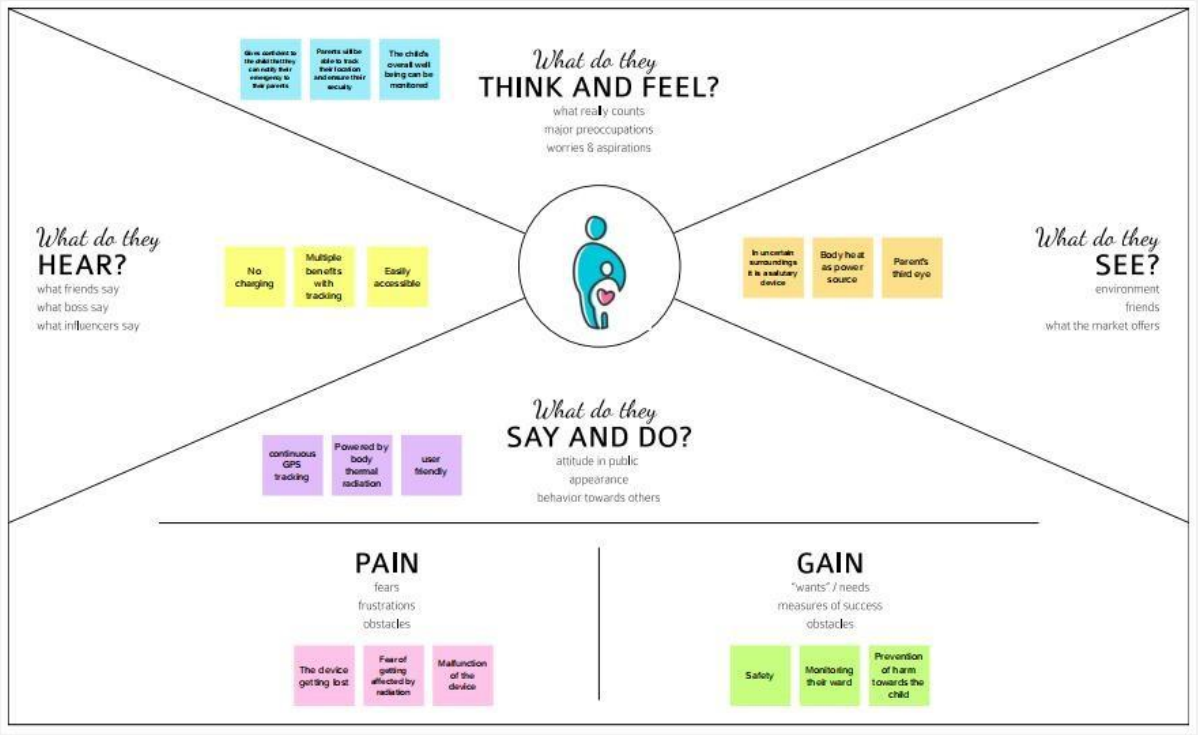
3.

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

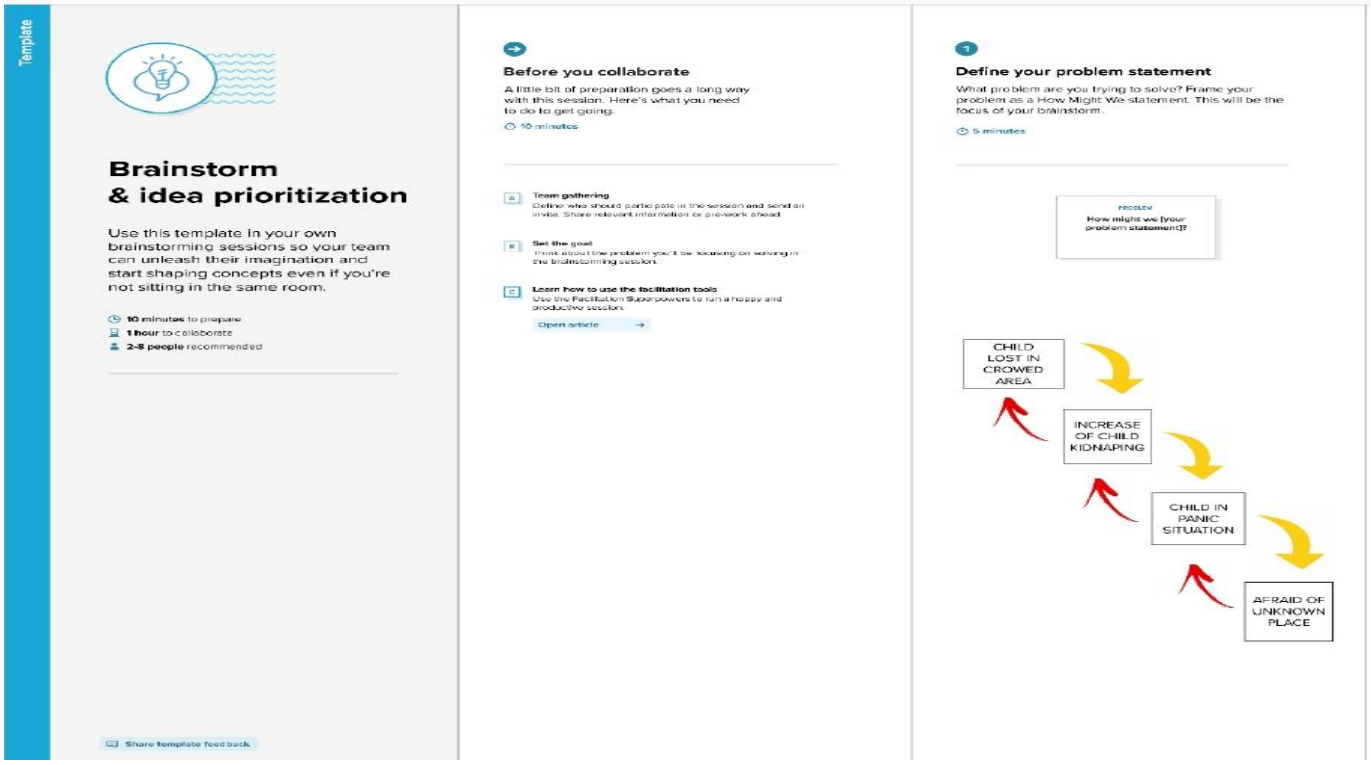
IDEA1:

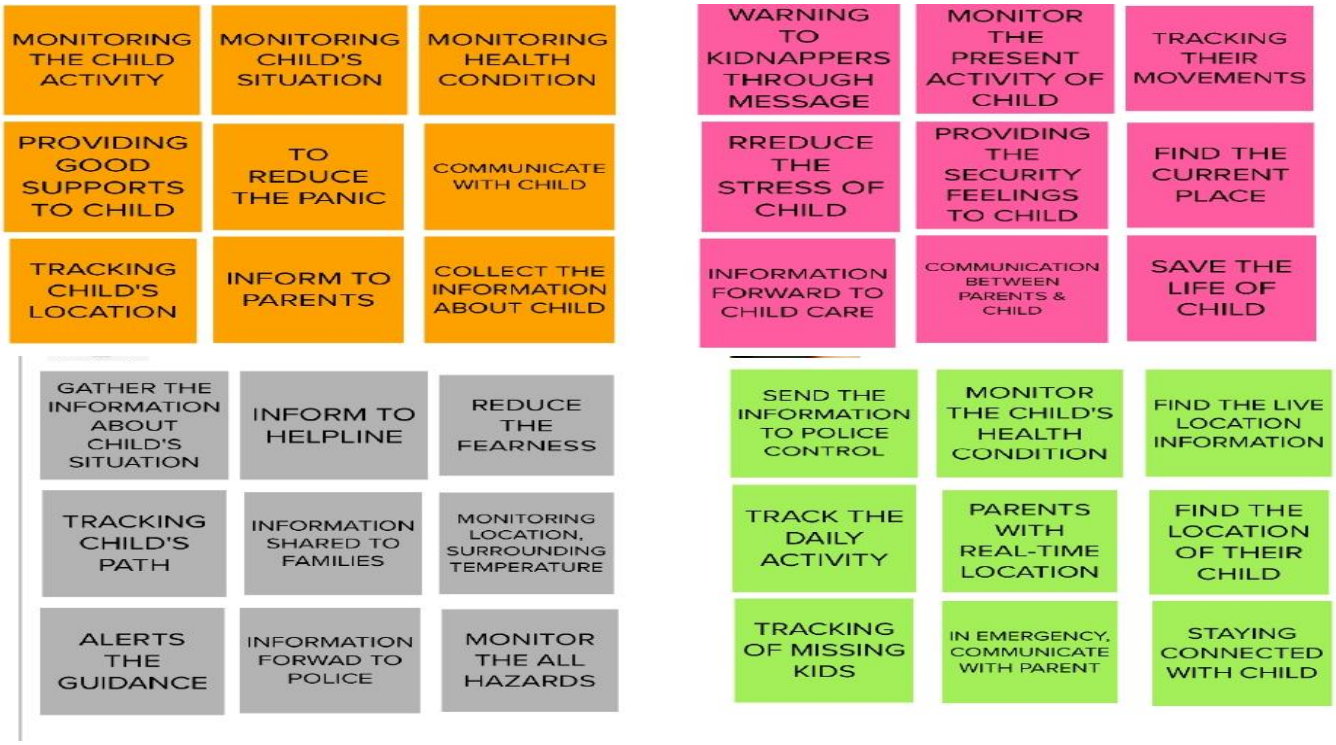
The device has IoT monitoring and a GSM module that allows the child to be monitored at all times. It also has numerous sensors that are connected to and are used to detect exact signals such as heart rate, temperature, and other dangers and alert the parents. In the event of a power outage, the wearable 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 inproviding 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 in form the parents via GPS. Therefore it is intended to use voice call as the way of communication between the parent mobile and child’ swearable device.The system

operates on the microcontroller board and the functionsofsending and receiving notifications, calls,voice messages via GPS.



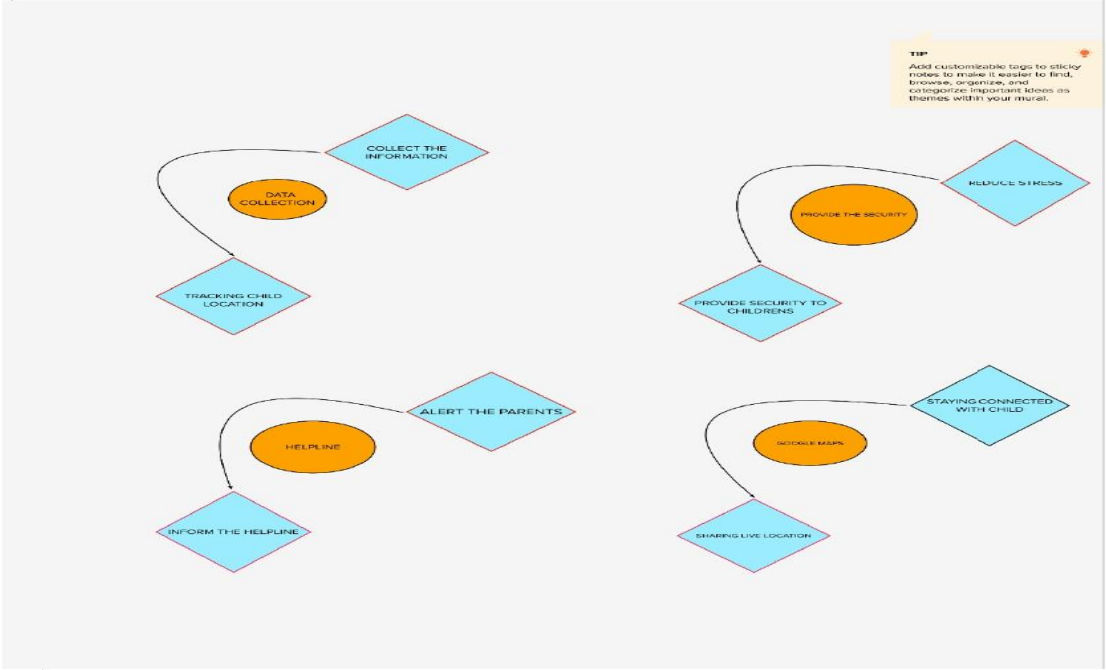


3

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

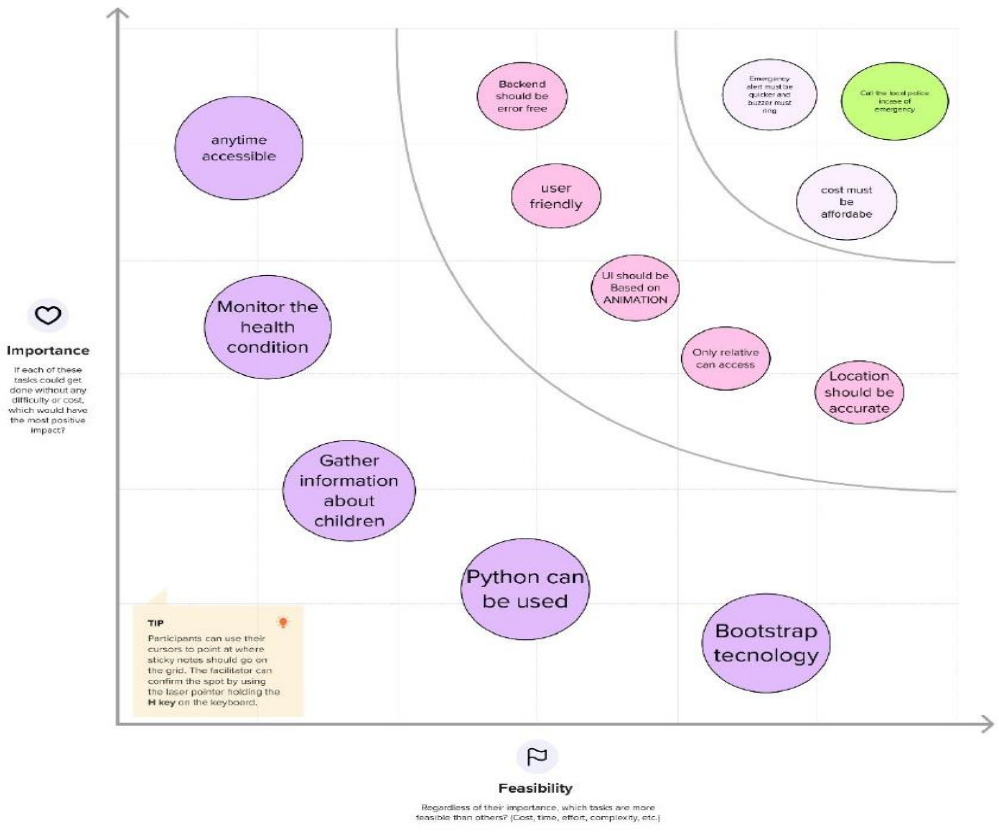


4

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

SI.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 regardingthe child's location, while this system make useof the IBM Watson IOT Platform and IBM Cloud Services which is reliable and efficient tomaintain 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. .

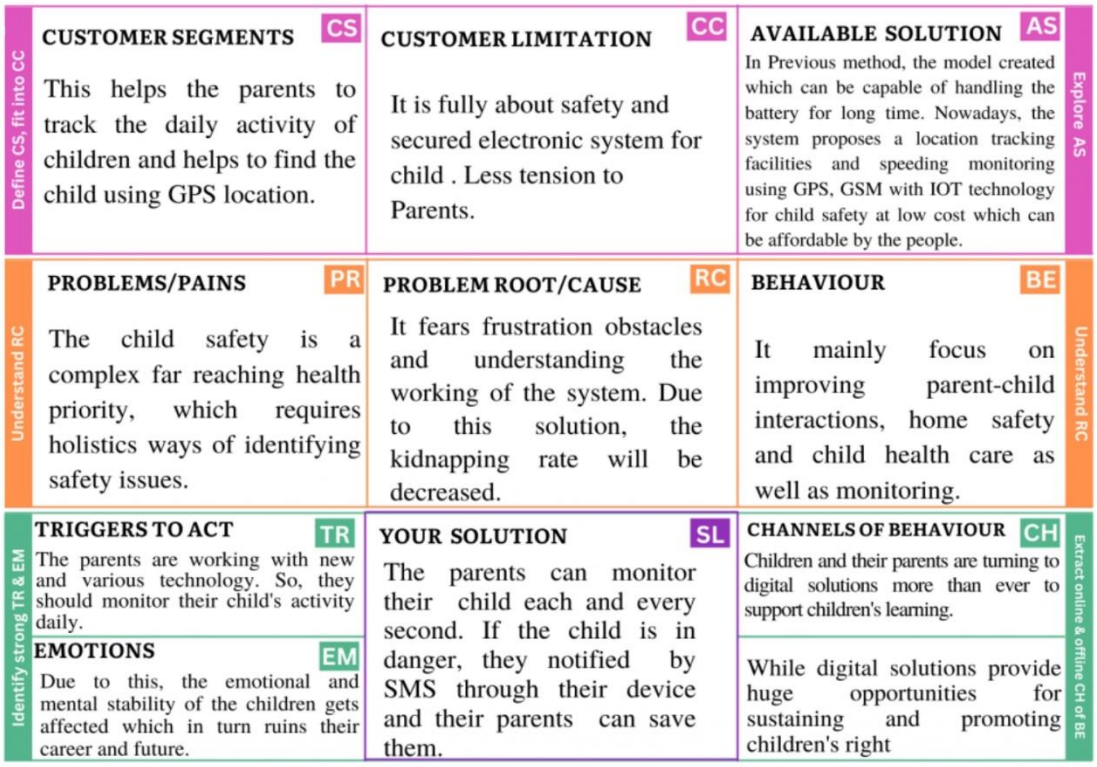
Business Model (Revenue Model)

The target audience of this device is majorly the parents. Considering the Tracking ability of thedevice, **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 databaseto 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



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**	➢ Registration through Phone ➢ Registration through Gmail
FR-2	**User Confirmation**	➢ Confirmation through Email ➢ Confirmation through Mobile Alert
FR-3	**App installation**	➢ Installation through website APK's ➢ Installation through play store.
FR-4	**Detecting child**	➢ Detecting location through SMS ➢ Detecting location through mobile app
FR-5	**Set Geofence**	➢ Setting by user to find child location
FR-6	**User End Result**	➢ Parents need not worry about their children.
FR-7	**User Objective**	➢ Easy to monitor the child anywhere ➢ Helps to identify the child.

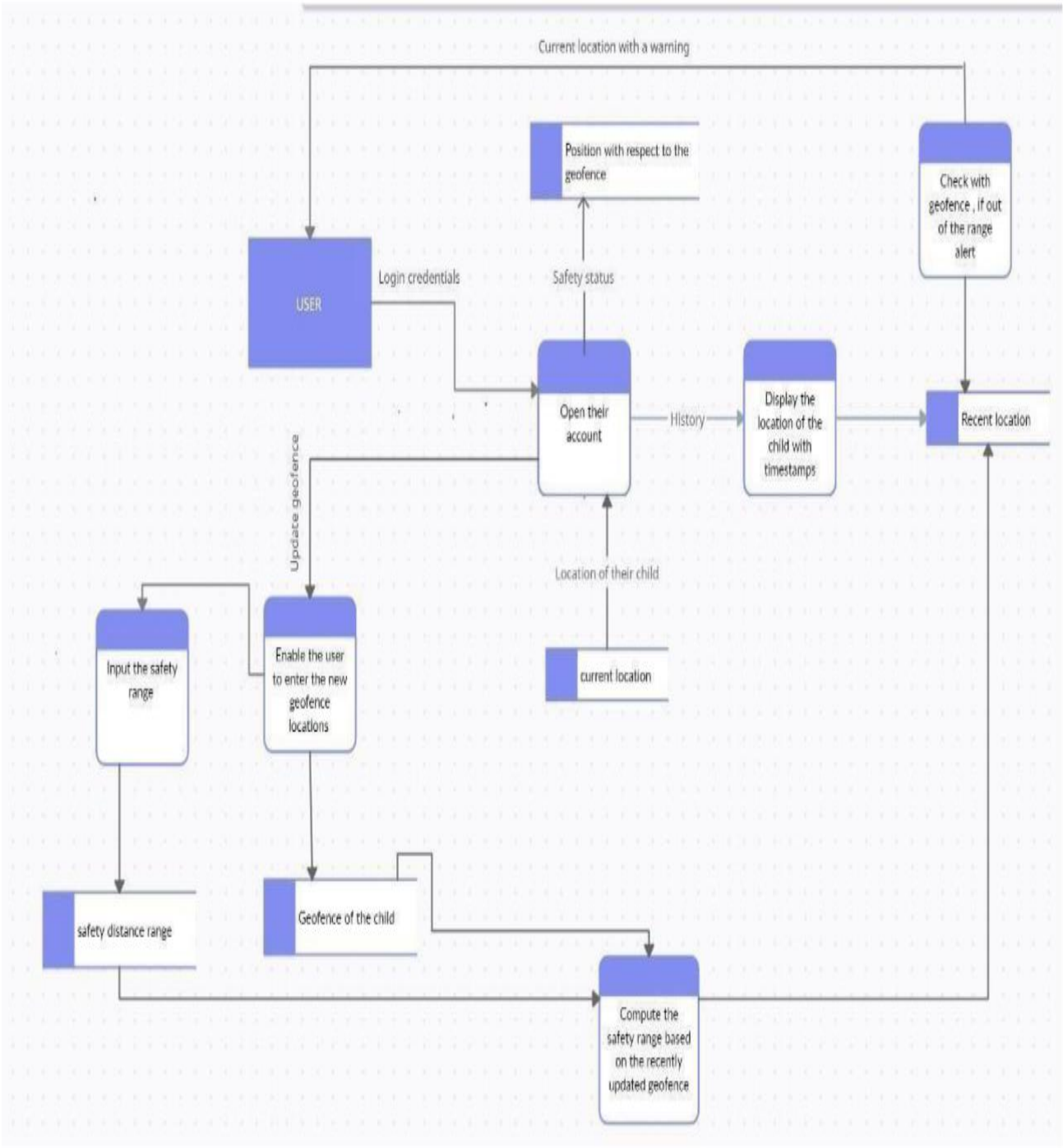
4.2 Non-Functional Requirements

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	➢ 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**	➢ 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**	➢ 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**	➢ 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**	➢ The system is accessible to a user at a given point in time.
NFR-6	**Scalability**	➢ 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 bridgesthe 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 directmonitoring of their parents. The various features involve:

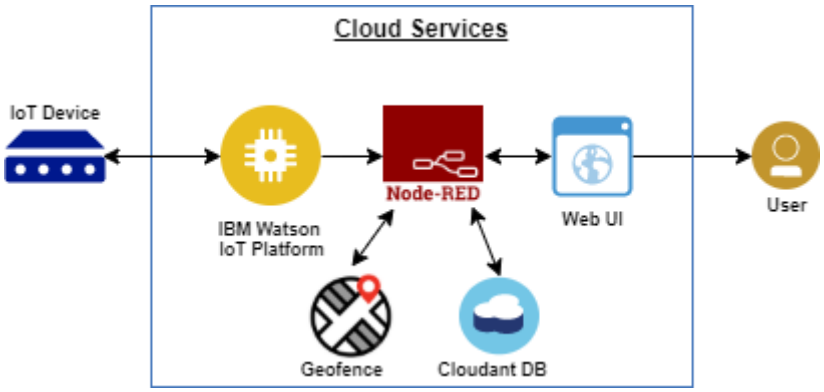
- GPS
- Geo fence
- Notify alert signal

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 tothe registered device, appropriately. Additional features such as recording of messages could be done if any kind of danger is sensed.

SOLUTION ARCHITECTURE DIAGRAM:



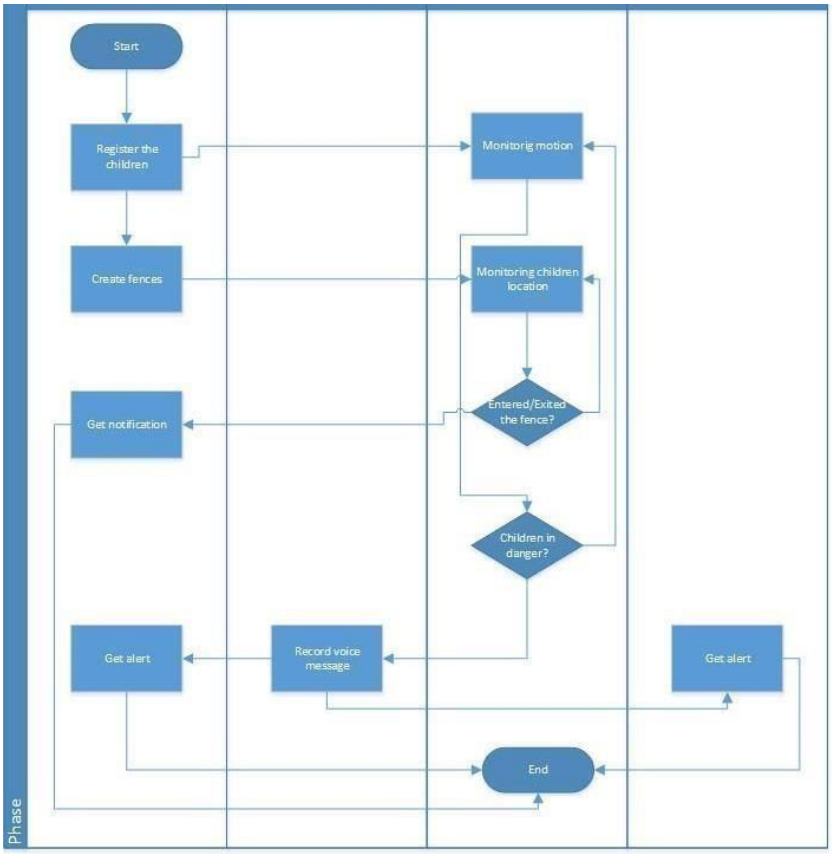


Figure 1: Architecture and data flow of the child safety gadget sy

Reference: https://www.ijraset.com/research-paper/wearable-safety-device-for-

Technical Architecture:

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

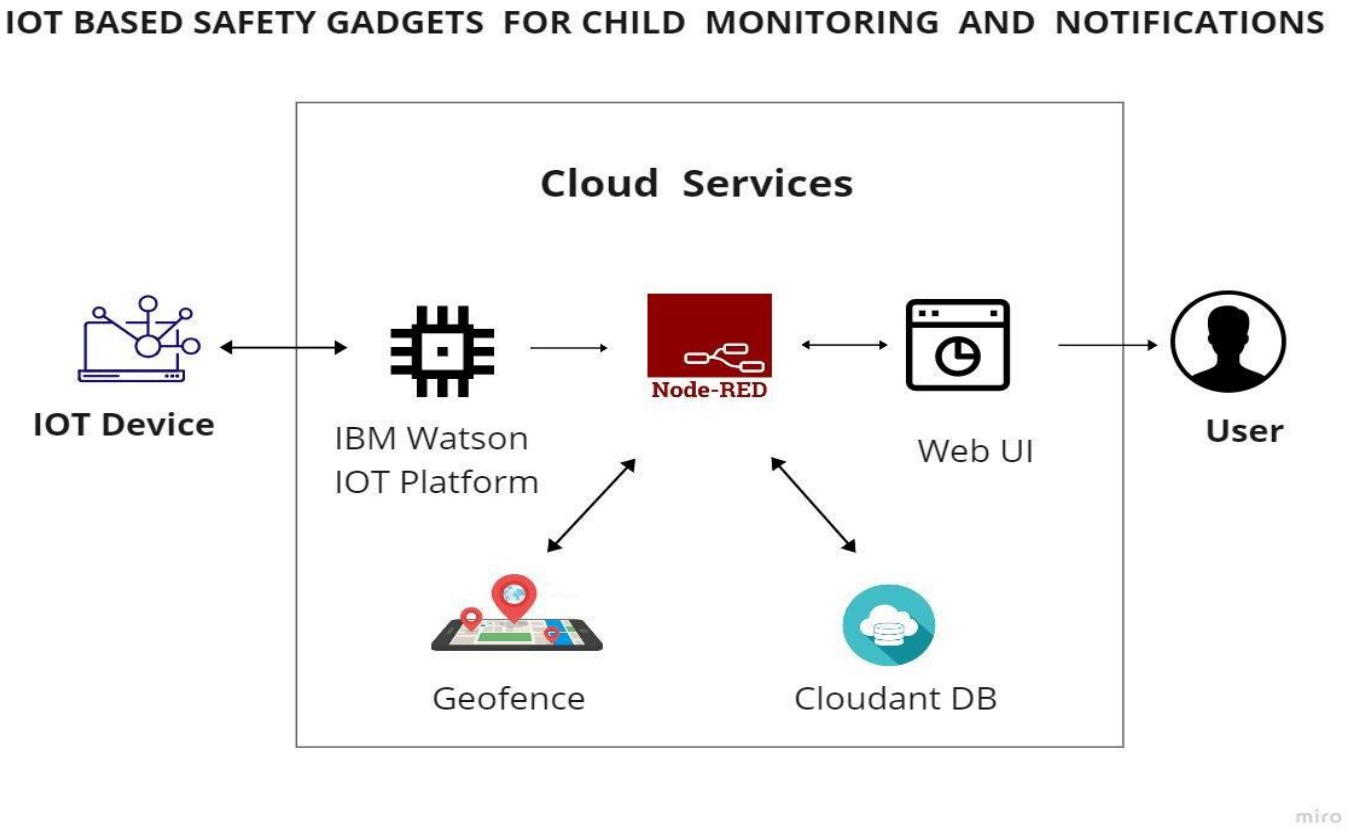


Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The communication protocol being used inthe proposed solution might act as an interface the way like WiFi, Bluetooth andZigBee	MIT app
2.	Application Logic	The data to be collected and sent to the authenticator's(parent) via GSM providingthe GPS coordinates to easily locate access and monitor the child	IBM Watson STT service, pythonetc.
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 theform an android application providing the end user an easy surveillance of their children (preferably users are parents)	UI/UX design developement
2.	Security Implementations	The developed application should be accessible in the way it can only respond tothe comments of the relevant users.	Encryptions, IAM Controls.
3.	Scalable Architecture	The app format comes the way easier tohandle and operate.	Not yet determined
4.	Availability	The developed solution tends to beavailable 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 emailonce 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 loginto the application byentering 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 applicationthrough Facebook	5	Low
		USN-4	As a user, I can registerfor the application through Gmail	10	Medium
	Login	USN-5	As a user, I can log into the application byentering email & password	20	High
Dashboard					
Customer (Web user)	Login		When I enter I can view the working of applications, scan and monitor the operationsandcheck if all the users are authorized	10	Medium
Customer Care Executiv e	Login		Maintaining and accessing the database containing the locations are secure and accurate and update constantly	20	High
Administra tor	Login		As a user I can register forthe application by entering my correct credentials	20	High

6.3 Reports from JIRA

6.3.1RoadMap

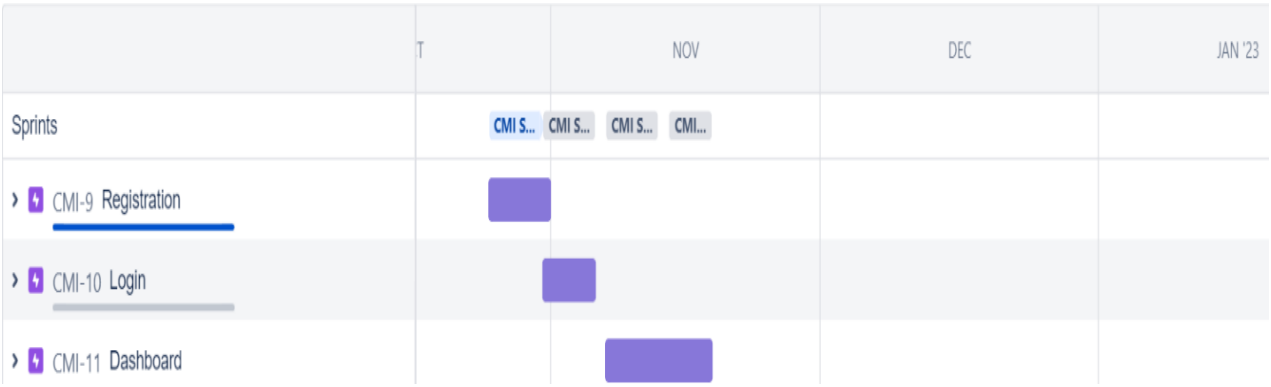


Fig 6.3.1 Road Map

7. CODING & SOLUTIONING

7.1 FEATURE 1 (ADDING GEOFENCE)

- Geofence is like a round wall covering the given location. So parents can usethem to mark the locationwhere 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, floatradius,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 willbe 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.GeofencingEventimport
java.util.List;
import android.os.Handler;
public class GeofenceBroadcastReceiver extendsBroadcastReceiver
{
        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_EN TER",
 "", 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

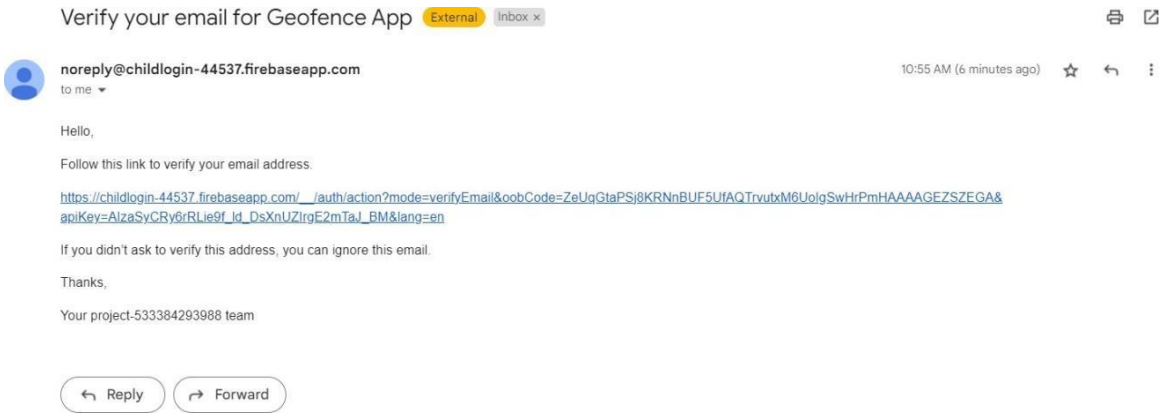
9.1 PERFORMANCE METRICS

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:

Verification mail

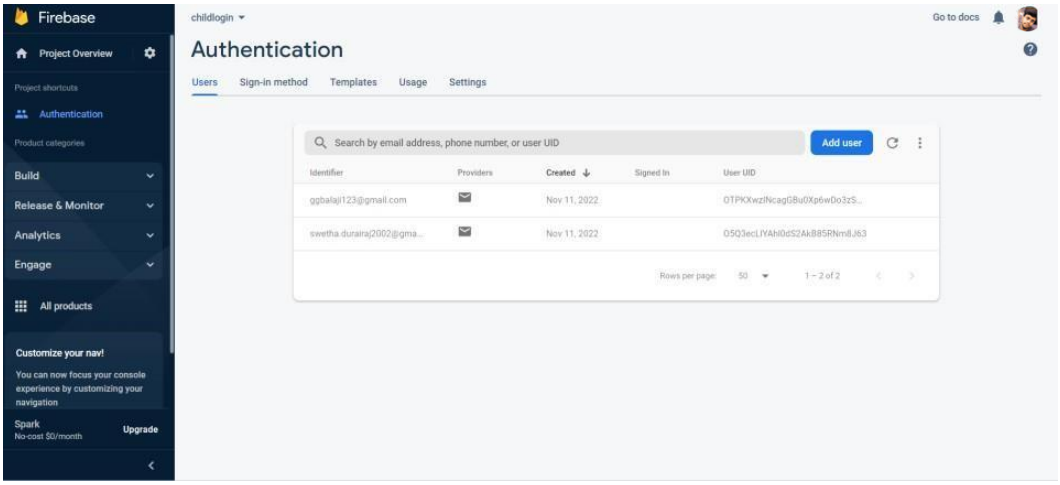


USER LOGIN

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

Login page:

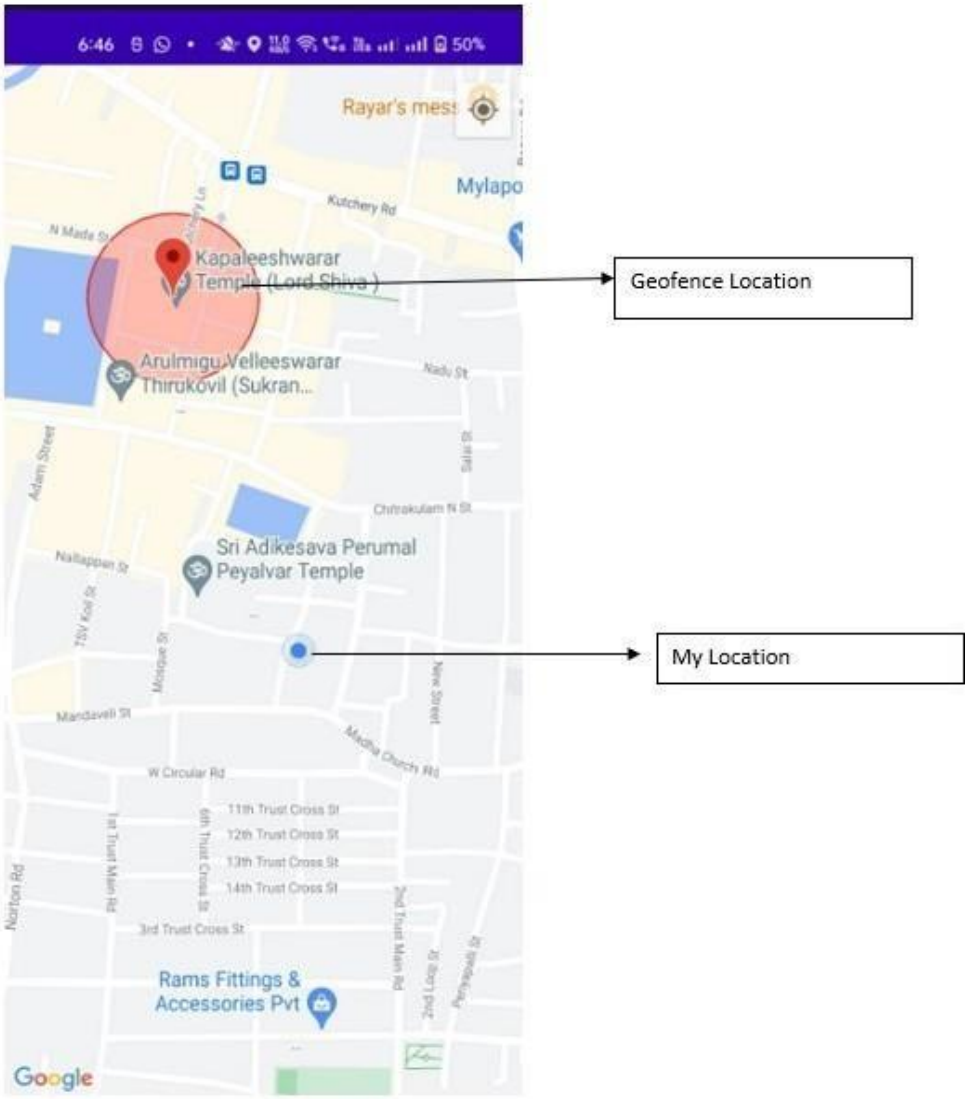
User Details



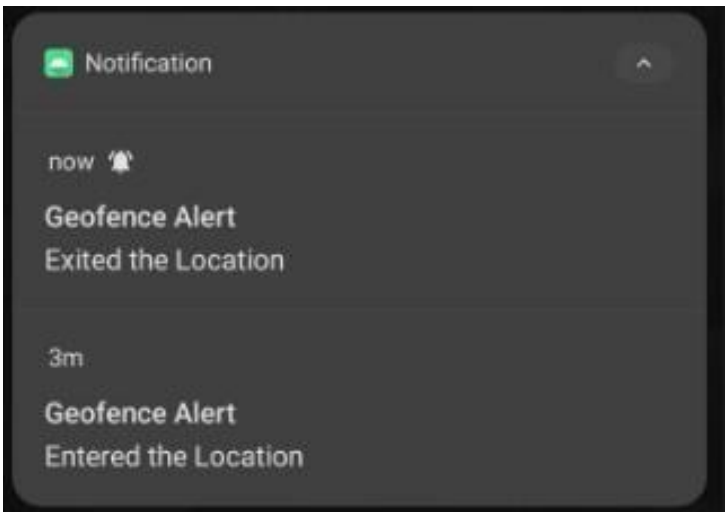
ADDING GEOFENCE AND ALERT NOTIFICATION

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 desiredlocation and immediately anotification 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 asmost 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 thatit 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. Thedecision 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

Source code :

http://github.com/IBM-EPBL/IBM-Project-22046-1659801996/tree/main/IoT%20Based%20Safety%20Gadget%20For%20Child%20Safety%20Monitoring%20%26%20Notification/Final%20Deliverables/FINAL%20CODE

Github :

https://github.com/IBM-EPBL/IBM-Project-22046-1659801996