# IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING & NOTIFICATION

**A IBM NALAIYATHIRAN PROJECT REPORT**

***Submitted by***

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# INTRODUCTION

Child safety is a challenging problem nowadays due to antisocial Elements in the society. The crime rate is day by day increasing. Schools and working places need high surveillance for ensuring the Safety among children. Smart Gadget major role for ensuring the Safety, where some mobile based applications provide alert systems. During the emergency, Application alert the control room of nearby Police station or caretakers of children. The literature shows that Location tracking devices are available in the market, but it does not Provide the complete solution to the problem. The solution to this problem is to design an IoT device, which senses the child’s location And environment and during emergency, it should send the alert to the Parents automatically.

* 1. **PROJECT OVERVIEW**

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.

* 1. **PURPOSE**

IoT Based Safety Gadget for Child Safety Monitoring & Notification 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 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’ s wearable device. The system operates on the Microcontroller board and the functions of sending and receiving Notifications ,calls, voice messages via GPS.

1. LITERATURE SURVEY
   1. EXISTING SOLUTION

The overall percentage of child abusements filed nowadays in the world is about 80%, out of which 74% are girl children and the rest are boys. For every 40 seconds, a child goes missing in this world. Children are the backbone of one’s nation, if the future of children was affected, it would impact the entire growth of that nation. Due to the abusements, the emotional and mental stability of the children gets affected which in turn ruins their career and future. These innocent children are not responsible for what happens to them. So, parents are responsible for taking care of their own children. But, due to economic condition and aims to focus on their child’s future and career, parents are forced to crave for money. Hence, it becomes difficult to cling on to their children all the time. In our system, we provide an environment where this problem can be resolved in an efficient manner. It makes parents to easily monitor their children in real time just like staying beside them as well as focusing on their own career without any manual intervention. Many family’s spends their time for work and social duties but since they need care of family. The current situation of our country is not comfortable for monitoring children in school. child safety is the major concern for many of the parents. Lack of child monitoring in school affect the child’s behaviour. Under age children may be premature in the way they act and planes to be most of the human behaviour is shaped in childhood stage,in order to get acceptable behaviour child monitoring system is necessary. This IoT- enabled digital system architecture integrates the Cloud, Mobile and GPS technology to precisely locate the geographical location of a child on an event map.

* 1. **REFERENCE**

1. M. Madhuri, A. Q. Gill and H. U. Khan, "IoT-Enabled Smart Child Safety Digital System Architecture," *2020 IEEE 14th International Conference on Semantic Computing (ICSC)*, 2020, pp. 166-169, doi: 10.1109/ICSC.2020.00033.
2. A. Srinivasan, S. Abirami, N. Divya, R. Akshya and B. S. Sreeja, "Intelligent Child Safety System using Machine Learning in IoT Devices," *2020 5th International Conference on Computing, Communication and Security (ICCCS)*, 2020, pp. 1-6, doi: 10.1109/ICCCS49678.2020.9277136.
3. B. Ranjeeth, B. S. Reddy, Y. M. K. Reddy, S. Suchitra and B. Pavithra, "Smart Child Safety Wearable Device," *2020 International Conference on Electronics and Sustainable Communication Systems (ICESC)*, 2020, pp. 116- 120, doi: 10.1109/ICESC48915.2020.9156001.
4. M. Benisha *et al*., "Design of Wearable Device for Child Safety," *2021 Third International Conference on Intelligent Communication Technologies and*

*Virtual Mobile Networks (ICICV)*, 2021, pp. 1076-1080, doi: 10.1109/ICICV50876.2021.9388592

* 1. **PROBLEM STATEMENT DEFINITION**

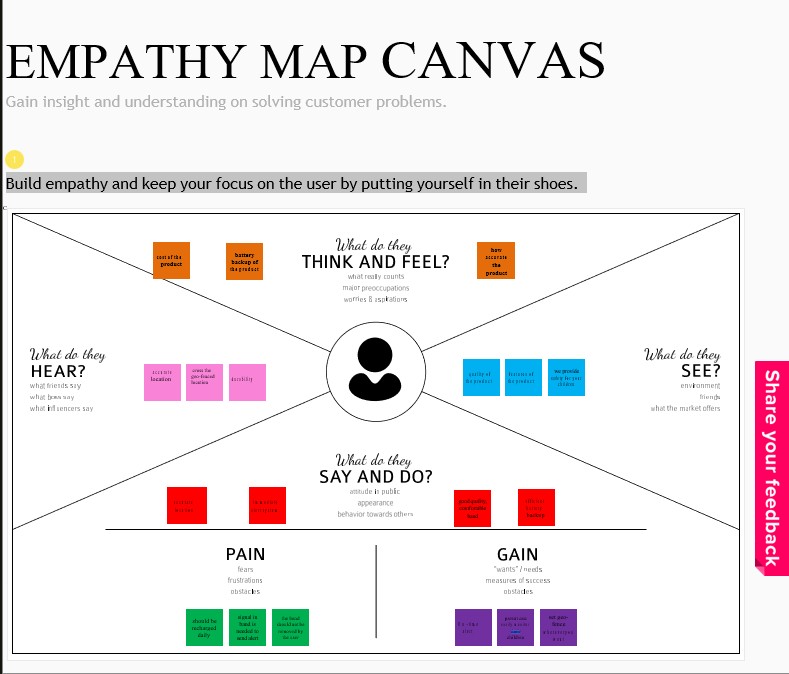
**Customer Problem Statement:**

The child needs to be monitored even when the parents are distracted. A momentary lack in parental supervision should be combated with an appropriate IT solution in context. The child needs to stay generally within the line of sight. It is necessary for the proposed system to alert the parents when the child walks too far away and outside the circle of safety‟ (generally the parents‟ line of vision), even if the parents are distracted. If the child does go missing, the aid of technology can increase efficiency and decrease the time necessary to locate the child. The child needs to be located, only at the will of the authorized persons (the parents). Once there is data available about the location of the missing child, this data needs to be displayed as information that the parents caneasily understand and use.

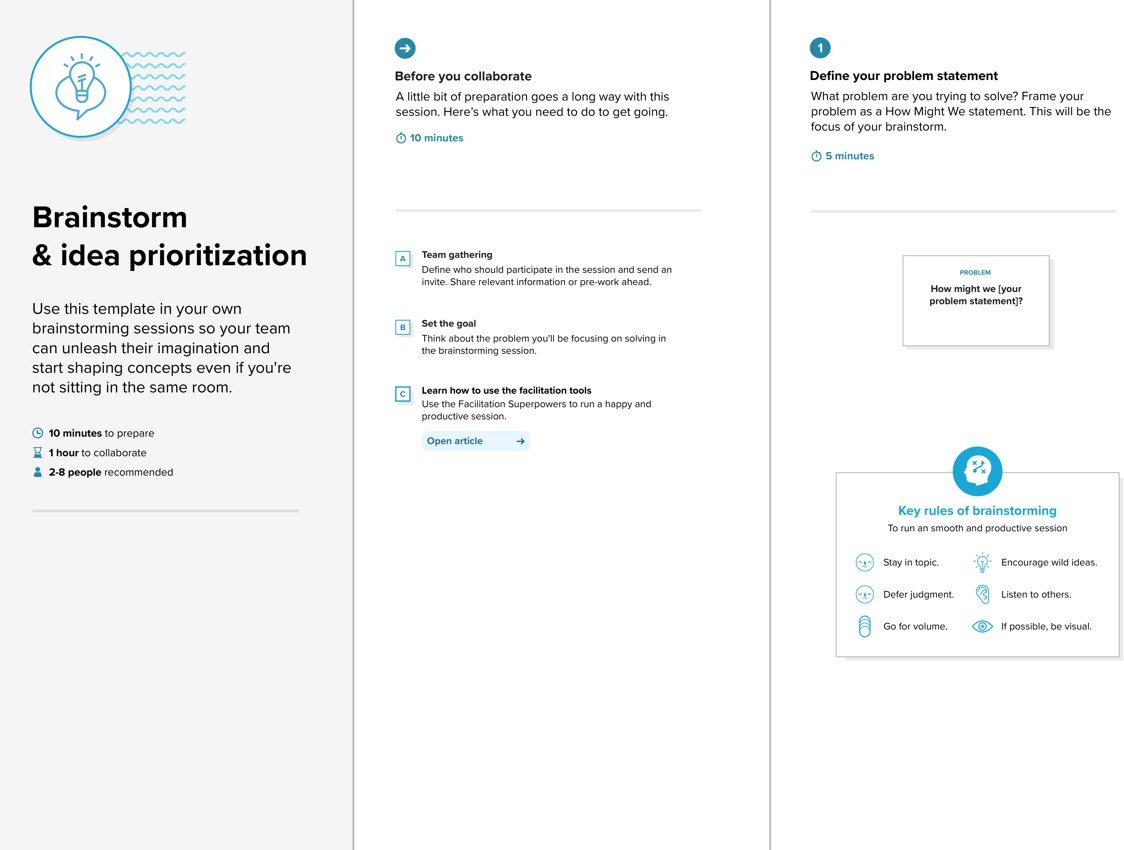


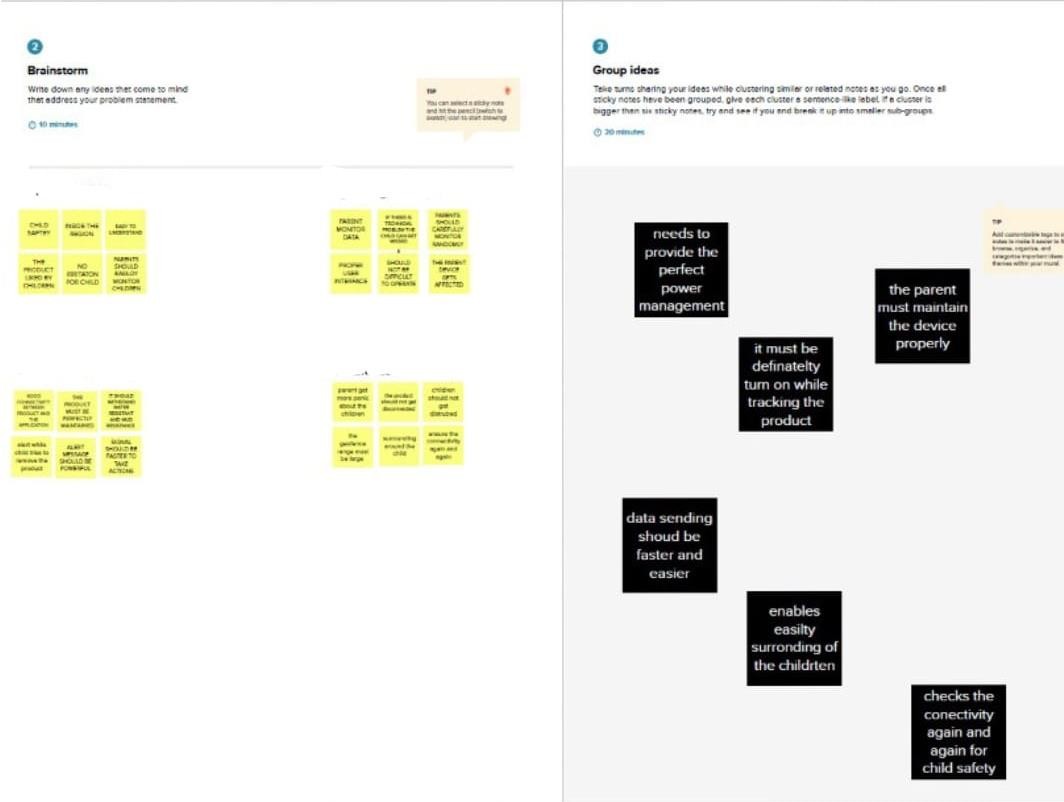
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Problem Statement (PS)** | **I am (Customer)** | **I’m trying to** | **But** | **Because** | **Which makes me feel** |
| PS-1 | Mother | Look after my child | I can’t be with him | Having lots of work to be done | Worried about safety provided prior on him |
| PS-2 | child | Give information about my location  frequently | I can’t achiev e | I | Feel worried |

1. **IDEATION & PROPOSED SOLUTIONS**
   1. **EMPATHY MAP**

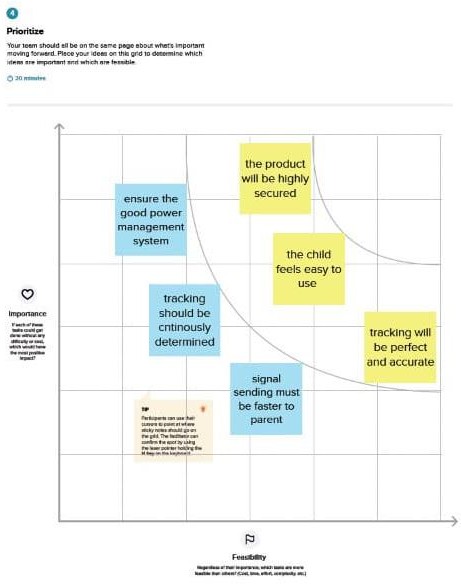


* 1. **IDEATION & BRAINSTORMING**

**Step-1: Team Gathering, Collaboration and Select the Problem Statement**

**Step-2: Brainstorm, Idea Listing and Grouping**

**Step-3: Idea Prioritization**

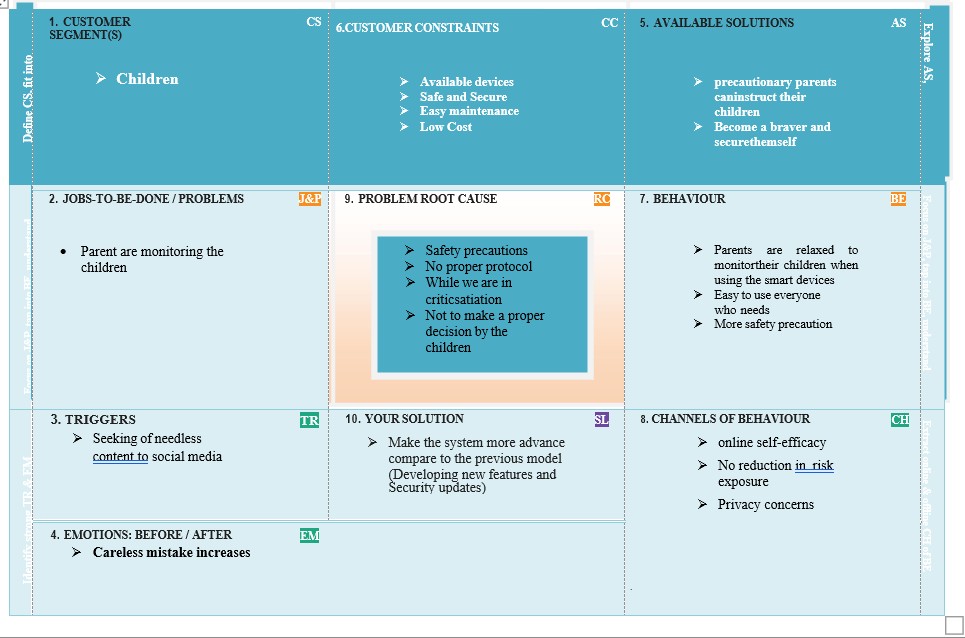


**3.3 PROPOSED SOLUTION**

|  |  |  |
| --- | --- | --- |
| **S.NO.** | **PARAMETER** | **DESCRIPTION** |
| 1. | PROBLEM STATEMENT (PROBLEM TO BE SOLVED) | Parents are often worried about their children when they are out of sight, The aim of this project is to help parents to monitor their children’s location and to see whether their child is safe or not. This system provides a tracking solution for the parent to keep tracking their child's location outdoors by using GPS as it allows them to determine the exact  location of the child. |
| 2. | IDEA / SOLUTION DESCRIPTION | It has always been a troublesome process for the parents to look after their children with their busy schedules, so this system sends a notification message to parents and stores the data of the child’s movement and geo space periodically. At times the notification may not hear or be received to the parents, We aim to develop and provide a good interface that would give a tremendous output. The technology used here is  PYTHON IDLE and CLOUD for storing data. |
| 3. | NOVELTY / UNIQUENESS | This project is basically for the parents who cannot balance their children and work at the same time and also for nonworking parents. The uniqueness of our project is about geofencing, high noise alert, and location monitoring. |
| 4. | SOCIAL IMPACT  / CUSTOMER SATISFACTION | The parents will have the satisfaction that their child is safe and not involved in any critical situation even in their absence. |
| 5. | BUSINESS MODEL (REVENUE MODEL) | The business model is in such a way that everyone can afford it.  We can generate revenue by offering subscription-based  applications to the people. |

|  |  |  |
| --- | --- | --- |
| 6. | SCALABILITY OF THE SOLUTION | Child safety monitoring is a guardian angel for the parents who can have the exact location of their child which helps to protect the child from any critical situations. So we resolve the problems like low noise notification, high standard geofencing and since we store data in the cloud it can be  retrieved when needed. |

**3.4. PROBLEM SOLUTION FITS**



1. **REQUIREMENT ANALYSIS**
   1. **FUNCTIONAL REQUIREMENTS**

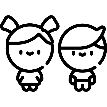
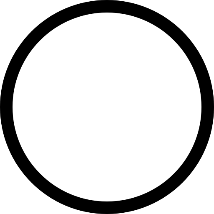
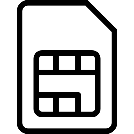
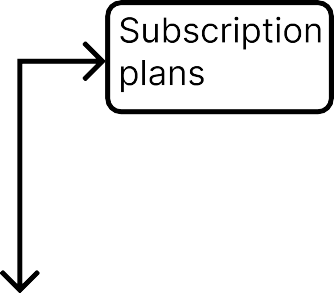
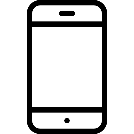
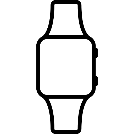
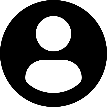
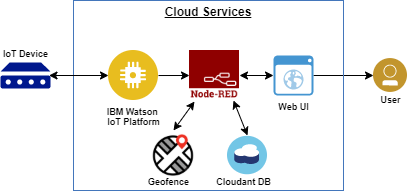
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| --- | --- | --- |
| **FR**  **No.** | **Functional**  **Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR- 1 | User Registration | Registration through Form Registration through Gmail  Registration through LinkedIN |
| FR-  2 | User Confirmation | Confirmation via Email  Confirmation via OTP |
| FR-  3 |  |  |
| FR-  4 |  |  |

* 1. **FUNCTIONAL REQUIREMENTS**

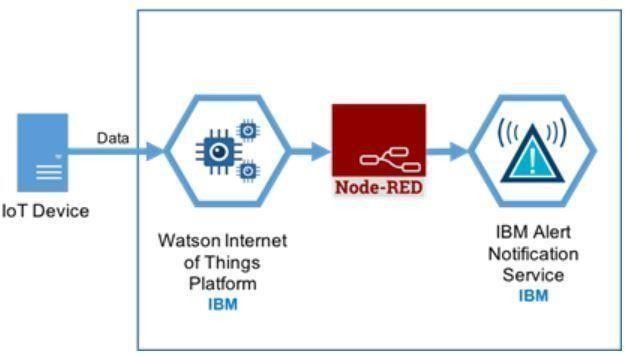
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| --- | --- | --- |
| **FR**  **No.** | **Non-**  **Functional Requirement** | **Description** |
| NFR- 1 | **Usability** | The parents will have the satisfaction that their child is safe and not involved in any critical situation even in their absence. |
| NFR- 2 | **Security** | Location of the child is tracked only by the authorised people(Parents). |
| NFR- 3 | **Reliability** | It would definitely be easier for parents if they get reliability on safety of children. This would encourage them to work vigorously on other application components so that the safety of the child would enhance more. |
| NFR- 4 | **Performance** | able to detect location properly and device sends notifications properly. |

|  |  |  |
| --- | --- | --- |
| NFR- 5 | **Availability** | Device tracks and sends the location within 10 seconds and sends notification in case of any emergency within 30 seconds |
| NFR- 6 | **Scalability** | Child safety monitoring is a guardian angel for the parents who can have the exact location of their child which helps to protect the child from any critical situations. So we resolve the problems like low noise notification, high standard geofencing and since we store data in  the cloud it can be retrieved when needed. |

1. **PROJECT DESIGN**
   1. **DATA-FLOW DIAGRAM**



* 1. **SOLUTION & TECHNICAL ARCHITECTURE SOLUTION ARCHITECTURE:**
  + The safety device protects individuals from potential harms and dangers.
  + Research done was proposed by the child safety wearable device using raspberry pi 3.
  + The raspberry pi 3 gathers data from pi camera, pulse sensor and sound sensors. Then, send collected data to parents’ smartphones by SMS using GSM shield.
  + Images captured from pi camera and children’s location detected by GPS will also be sent to parents’ devices. In another study, designed a wearable smart watch for women security.
  + Sensor inside the smartwatch senses the heartbeat of a child or woman who wears it.
  + When he/she is exposed to attacks, heartbeat rate will be high. When this is detected, alarm sound will be triggered. It will then automatically make calls to registered contact and to the nearest police station.
  + Based on the location provided by GPS, police will arrive soon at the correct destination.



**SCALABILITY:**

**NOTIFICATION ALERT**

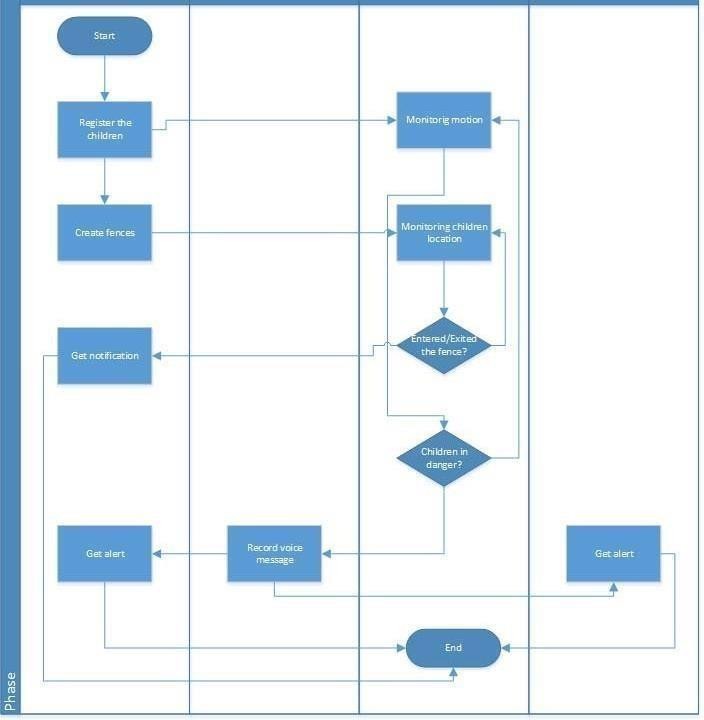
* To show the child's actual data with reference values.
* Enable sending of notification if the child is out of location or when the

device realizes abnormal conditions/situations.

* To trigger the alarm and enable automatic video recording whenever the emergency button is pressed. Then, emergency notification along with real-time video will be sent to and display in the parents' mobile apps.
* Develop a prototype of IoT wearable smart band connected to parents’ mobile apps so that they can monitor the actual condition of children at anytime and anyplace.

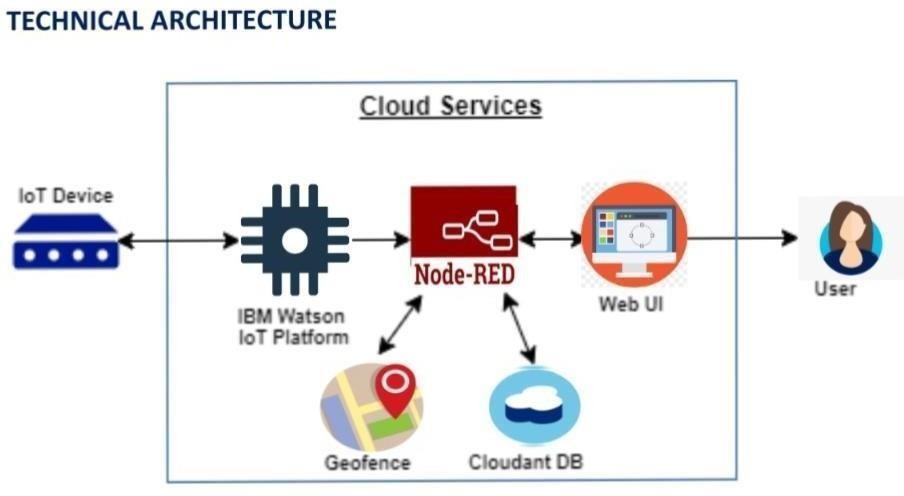
**RELIABILITY:**

* University Application process itself being a tedious task students needs lots of endeavour and determination for completing overall application process. Parents have to work on lots of things when both of them work to run the family.
* It would definitely be easier for parents if they get reliability on safety of children. This would encourage them to work vigorously on other application components so that the safety of the child would enhance more.
* This system shall be completely operational all hours of the day unless system failure or upgradation work is to be performed.

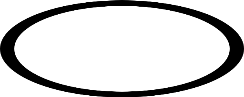
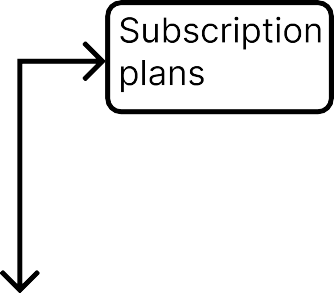
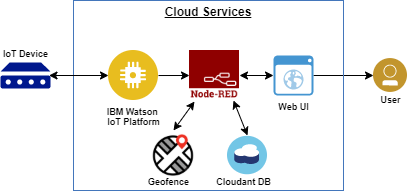


**FLOW DIAGRAM**

**TECHNICAL ARCHITECTURE**



**TECHNOLOGY ARCHITECTURE**



* 1. **USER STORIES**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **User Type** | **Functional Requirem ent (Epic)** | **User Story Numb**  **er** | **User Story / Task** | **Acceptan ce criteria** | **Priori ty** | **Relea se** |
| Customer (Mobile user) | Registratio n | USN-1 | As a user, I can  register for the applicatio n by  entering my email, password, and confirmin g my  password. | I can  access my account / dashboard | High | Sprint  -1 |
|  |  | USN-2 | As a user, I will  receive confirmati on email  once I have registered for the  applicatio n | I can  receive confirmati on email  & click confirm | High | Sprint  -1 |
|  |  | USN-3 | As a user, I can  register for the applicatio n through  Facebook | I can  register & access the dashboard with  Facebook Login | Low | Sprint  -2 |
|  |  | USN-4 | As a user, I can  register for the applicatio n through  Gmail |  | Mediu m | Sprint  -1 |
|  | Login | USN-5 | As a user, I can log into the applicatio n by  entering email & password |  | High | Sprint  -1 |
|  | Dashboard |  |  |  |  |  |
| Customer  (Web user) |  |  |  |  |  |  |
| Customer  Care Executive |  |  |  |  |  |  |
| Administra  tor |  |  |  |  |  |  |

1. **PROJECT PLANNING & SCHEDULING**
   1. **SPRINT PLANNING & SCHEDULE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **Functional Requirement (Epic)** | **User Story Numb er** | **User Story / Task** | **Story Points** | **Priorit y** | **Team Members** |
| Sprint-1 | Registration | USN-1 | As a user, I can register for the application byentering my email, and password, and  confirming my password. | 4 | High | JYOTI PRAKASH |
| Sprint-1 | Confirmation Email | USN-2 | As a user, I will receive a confirmation email  once I have registered for the  application | 4 | High | KISOR KUMAR |
| Sprint-1 | Authentication | USN-3 | As a user, I can register for the application  through Gmail and mobile app. | 4 | Mediu m | KABIL DEV |
| Sprint-1 | Login | USN-4 | As a user, I can log into the application by  entering email & password | 4 | High | LAKSHMANAN |
| Sprint-1 | Dashboard | USN-2 | As a user, I need to be able to view the  functions that I can perform | 4 | High | KISOR KUMAR |
| Sprint-2 | Notification | USN-1 | As a user, I should be able to notify my parent  and guardian in emergency  situations | 10 | High | JYOTI PRAKASH |
| Sprint-2 | Store data | USN-3 | As a user, I need to continuously store my  location data into the database. | 10 | Mediu m | KABL DEV |
| Sprint-3 | Communication | USN-1,3 | I should be able to communicate with my  parents | 6 | Low | JYOTI PRAKASH & KABIL  DEV |

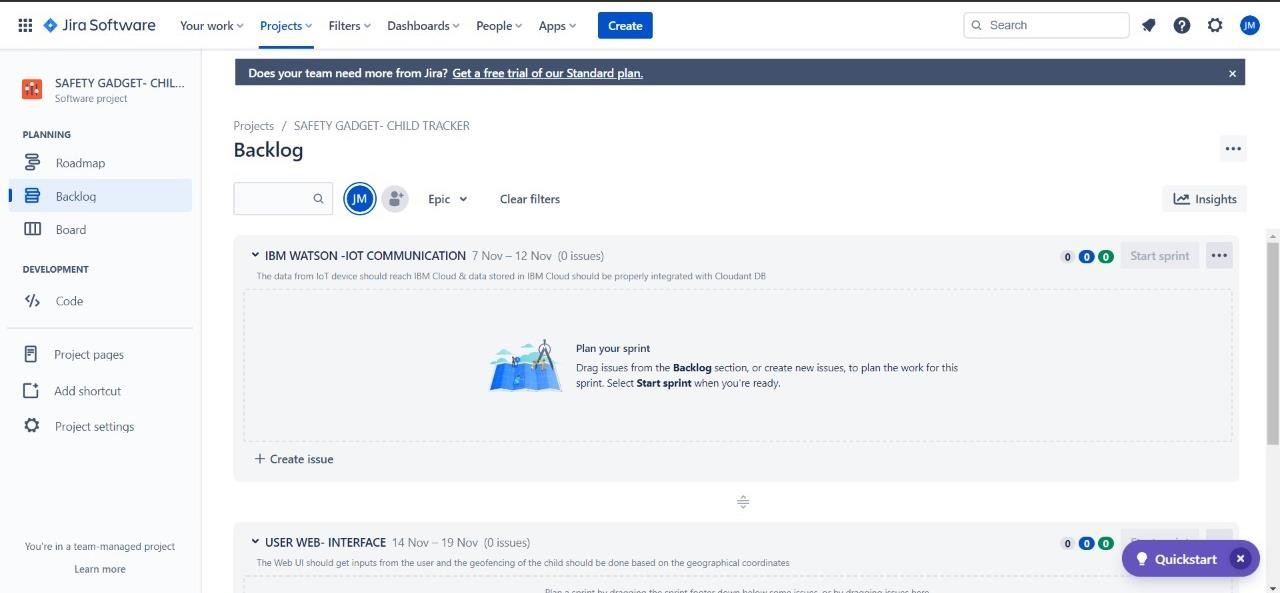
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **Functional Requirement (Epic)** | **User Story**  **Numb er** | **User Story / Task** | **Story Points** | **Priority** | **Team Members** |
| Sprint-3 | IoT Device – Watson communication | USN-1,4 | The data from IoT device should reach IBM  Cloud | 7 | Medium | JYOTI PRAKASH  & LAKSHMA  NAN |
| Sprint-3 | Node RED- CloudantDB communicati on | USN-2,3 | The data stored in IBM Cloud should beproperly integrated with Cloudant DB | 7 | High | KISOR KUMAR & KABIL DEV |

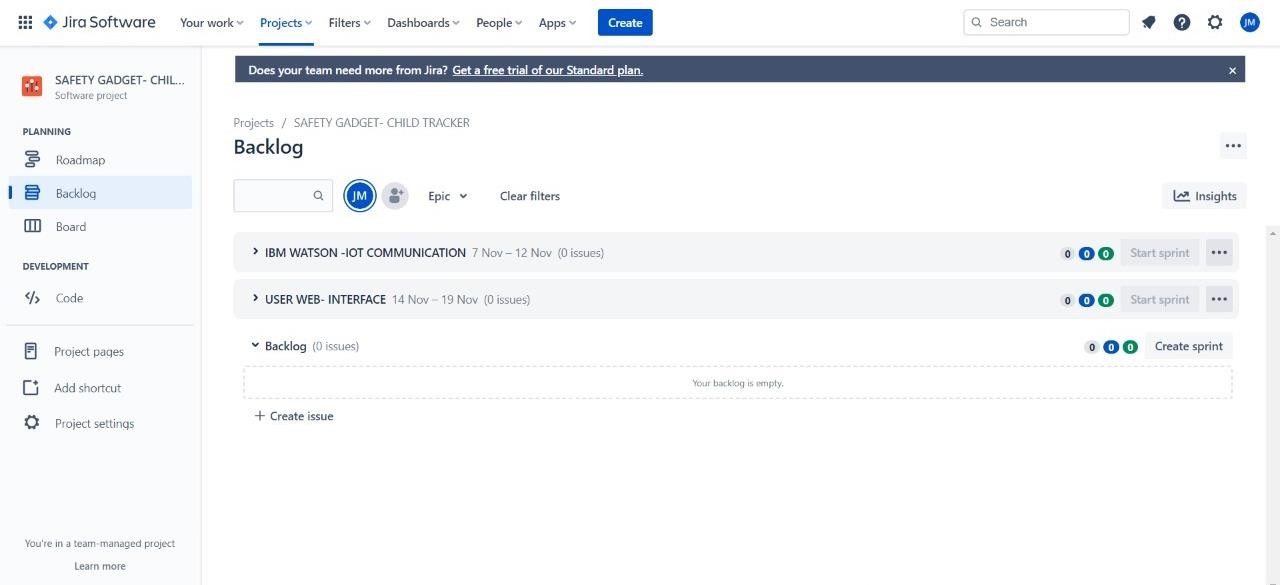
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sprint-4 | User – WebUI interface | USN-3,4 | The Web UI should get inputs from the user | 6 | High | KABIL DEV & LAKSHM ANAN |
| Sprint-4 | Geofencing | USN-1,2,3, | The geofencing of the child should be donebased on the geographical coordinates | 7 | High | JYOTI PRAKAS  H & KISOR KUMAR & KABIL DEV |

* 1. **SPRINT DELIVERY SCHEDULE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sprint** | **Total Story Points** | **Duration** | **Sprint Start Date** | **Sprint End Date (Plann**  **ed)** | **Story Points Completed**  **(as on Planned End Date)** | **Sprint Release Date (Actual)** |
| Sprint-1 | 20 | 6 Days | 24 Oct 2022 | 29 Oct 2022 | 20 | 29 Oct 2022 |
| Sprint-2 | 20 | 6 Days | 31 Oct 2022 | 05 Nov 2022 | 20 | 05 Nov 2022 |
| Sprint-3 | 20 | 6 Days | 07 Nov 2022 | 12 Nov 2022 | 20 | 12 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

* 1. **REPORTS FROM JIRA**





1. **CODING & SOLUTION**
   1. **FEATURE- 1**

In this system we uses the Node-Red to create a web Application for finding the location of the Child.The Parent has to create the username and password for the child.If the Parent enters the childsInformations on the Node-Red App ,The Geofence will search for the location and shows on the Screen.

**Coding :**

**HTML**

**<!DOCTYPEhtml>**

**<htmllang="en">**

**<head>**

**<metacharset="UTF-8">**

**<metahttp-equiv="X-UA-Compatible"content="IE=edge">**

**<metaname="viewport"content="width=device-width,initial- scale=1.0">**

**<linkrel="stylesheet"href="/css/login.css">**

**<title>SignUp</title>**

**<script>**

**if (window.location.hostname !== "localhost")**

**{if(location.protocol!=="https:"){ location.replace(**

**`https:${location.href.substring(location.protocol.length**

**)}`**

**)**

**}**

**}**

**</script>**

**<scriptsrc="./localforage.js"></script>**

**</head>**

**<body>**

**<divclass="wrapper">**

**<divclass="loginContainer">**

**<span>LogintoContinue</span>**

**<divclass="traditionalLoginContainer">**

**<formclass="signupForm"action="/"method="post">**

**<inputtype="text"name="firstName"placeholder="FirstName"i d="firstName">**

**<inputtype="text"name="lastName"placeholder="LastName"id**

**="lastName">**

**<inputtype="text"name="username"placeholder="UserName"id**

**="username">**

**<inputtype="email"name="email"placeholder="Email"id="ema il">**

**<inputtype="password"name="password"placeholder="Passwor d"id="password">**

**<inputclass="loginButton"type="submit"value="SignUp">**

**</form>**

**</div>**

**<divclass="loginWithFireContainer">**

**<button type="button" class="fire" title="Login with SAFETY" id="fire">Login withSAFETY</button>**

**</div>**

**<aclass="hyperLink"href="/login">AlreadyhaveanAccount?Log in↗</a>**

**</div>**

**</div>**

**<script>**

**//NecessaryforFireOAuthtoFunction**

**const fireBroadcastingChannel = new BroadcastChannel('fireOAuthChannel');fireBroadcastingChanne l.addEventListener('message',asyncevent=>{**

**letdata =event.data**

**/\*\***

* **@typedef{Object<string,any>}Data**
* **@property{boolean}success-Whethertheloginwassuccessful**
* **@property{string}token-Thedata returnedfromthelogini.e.FireToken**

**\*/**

**//data.tokenisthemessagesentfromthefireOAuthChannelafterverifi cation**

**//data.successisabooleanthatindicateswhethertheverificationwassu ccessful**

**//data.tokenisthefire token**

**//What todowiththeFireToken?**

**// \* Fire Token is an unique token which uniquely identifies the user who authorized your login attemptwithFire**

**//\* YoucanusethistokenONLYONCEasitwillbedestroyedafterthefirst use**

**//1.SendthefiretokentotheFireServertoverifythe user**

**//-Youcandothatclientsidedorserversided**

**//-YouneedtosendaPOSTRequesttotheFireServerwiththefiretoken**

**// attheURL:http://localhost:3003/api/tokens/verify**

**//-The FireServerwillverifythefiretokenandreturnaresponse**

**// - If the verification was successful - CODE (200), the Fire Server will return a response with theuser'sdata**

**// - If the verification was unsuccessful - CODE (400) or CODE (401), the Fire Server will return aresponsewithanerror'message'**

**//-YoucanusethedatareturnedfromtheFireServertocreate a newuserinyour database**

**// This example will send the token to Fire Servers and console.log the responseconsole.log("%c"+`FireToken:${data.token}`,`color:#f1c 40f;font-weight:bold;`);**

**const response = await fetch('https://fire.adaptable.app/api/tokens/verify',**

**{method:'POST', headers:{**

**'Content-Type':'application/json'**

**},**

**body: JSON.stringify({token:data.token**

**})**

**})**

**//get theresponse constresponseData=awaitresponse.json()**

**// console.log the responseconsole.log(responseData) awaitlocalforage.setItem('userData',{...responseData,isFire:true})**

**//AddingtheuserdatatotheuserDatabase**

**let database = await localforage.getItem("userDatabase")if(database ==null) { database=[]**

**}**

**database.push(responseData) awaitlocalforage.setItem("userDatabase",database)**

**// redirect to the home pagewindow.location.href**

**function popupwindow(url, title, w, h) {varleft=(screen.width/2)- (w/2);**

**vartop=(screen.height/2)-(h/2);**

**return window.open(url, title, 'toolbar=no, location=no, directories=no, status=no,**

**menubar=no,scrollbars=no,resizable=no,copyhistory=no,width='**

**+w+',height='+h+',top='+top+',left='+left);**

**}**

**document.getElementById("fire").addEventListener("click", function() {popupwindow("/fireoauth.html","Fire OAuth",450,600)**

**})**

**</script>**

**<script>**

**// this.Website's Scripts / App Logicdocument.querySelector(".signupForm").addEventListener ("submit",async(e)=>{**

**e.preventDefault()**

**let firstName = document.getElementById("firstName").valueletlastName = document.getElementById("lastName").valueletusername=docu ment.getElementById("username").valueletemail=document.getE lementById("email").value**

**let password = document.getElementById("password").valueletprofilePic=`https**

**://avatars.dicebear.com/api/adventurer neutral/${firstName}${lastName}.svg?backgroundColor=variant0 3`**

**let data = { firstName, lastName, username, email, password, profilePic }awaitlocalforage.setItem("userData",data)**

**let database = await localforage.getItem("userDatabase")if(database ==null) { database=[]**

**}**

**database.push(data)**

**await localforage.setItem("userDatabase", database)window.location.href= "/"**

**})**

**</script>**

**</body>**

**</html>**

* 1. **FEATURE- 2**

This system also consists of Wifi Module used to implement IOT and send all the monitored parameters to the cloud for android app monitoring on the parental device. Notification System also used in child Device to send the Alert message to the parental device through SMS.

**Adding the geofence and changing the geofence when needed:**

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.commo n.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.m odel.LatLng; public class GeofenceHelper extends ContextWrapper { private static final String TAG = "GeofenceHelper"; PendingIntentpendingIntent; public GeofenceHelper(Context base) {super(base); } public GeofencingRequestgetGeofencin gRequest(Geofence geofence)

{return new

GeofencingRequest.Builder()

.addGeofence(geofence)

.setInitialTrigger(GeofencingReq uest.INITIAL\_TRIGGER\_ENTE

1. .build(); } public Geofence getGeofence(String ID, LatLnglatLng, float radius, int transitionTypes) { return new Geofence.Builder()

.setCircularRegion(latLng.latitud e, latLng.longitude, radius) }

.setRequestId(ID)

.setTransitionTypes(transitionTy pes) .setLoiteringDelay(5000)

.setExpirationDuration(Geofence. NEVER\_EXPIRE) .build();

public PendingIntentgetPendingIntent()

{if (pendingIntent != null) { return pendingIntent; } Intent intent = new Intent(this,

GeofenceBroadcastReceiver.clas s); pendingIntent = PendingIntent.getBroadcast(this, 2607, intent,

PendingIntent.FLAG\_IMMUTA BLE); return pendingIntent; } public String

getErrorString(Exception e) {if (e instanceofApiException) { ApiExceptionapiException = (ApiException) e; switch (apiException.getStatusCode()) { case GeofenceStatusCodes

.GEOFENCE\_NOT\_AVAILAB

LE: return

"GEOFENCE\_NOT\_AVAILAB

LE"; case GeofenceStatusCodes

.GEOFENCE\_TOO\_MANY\_GE

OFENCES: return "GEOFENCE\_TOO\_MANY\_G EOFENCES"; case

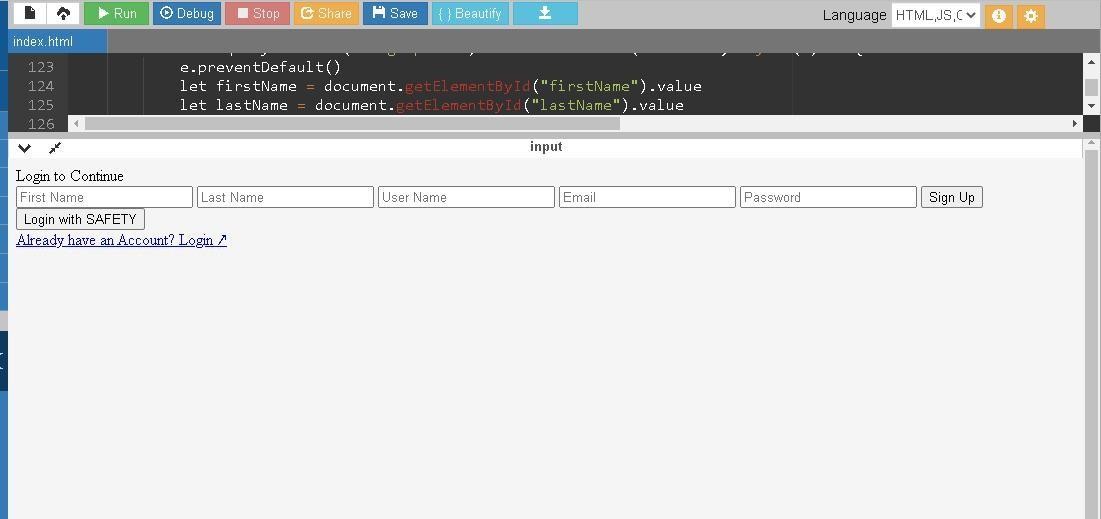
GeofenceStatusCodes

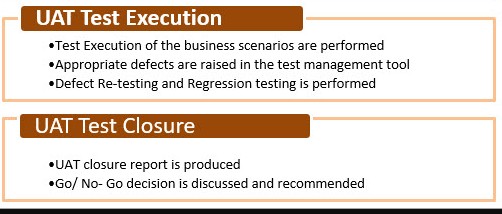
.GEOFENCE\_TOO\_MANY\_PE

NDING\_INTENTS: return "GEOFENCE\_TOO\_MANY\_PE

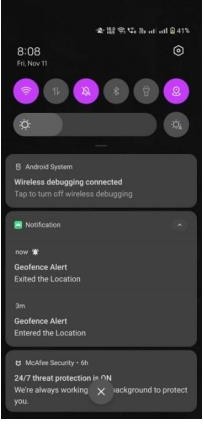
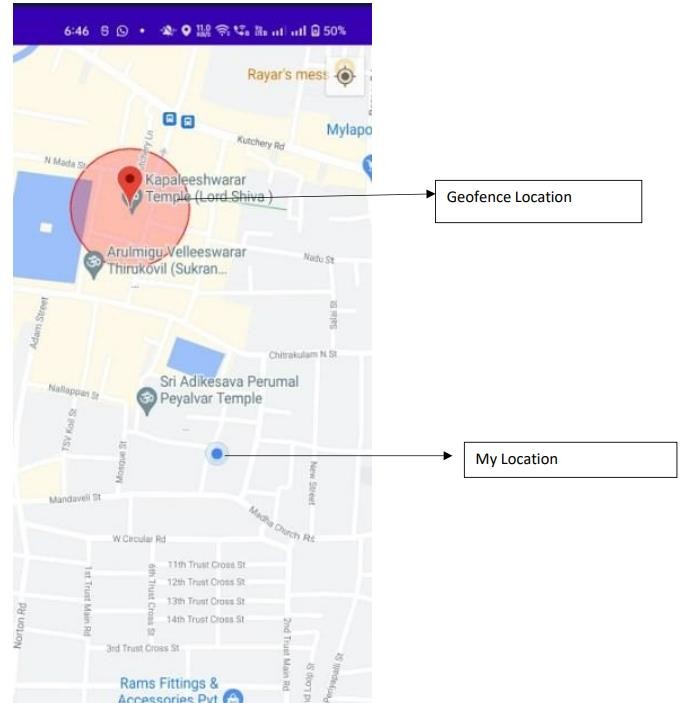
NDING\_INTENTS"; } } return e.getLocalizedMessage()

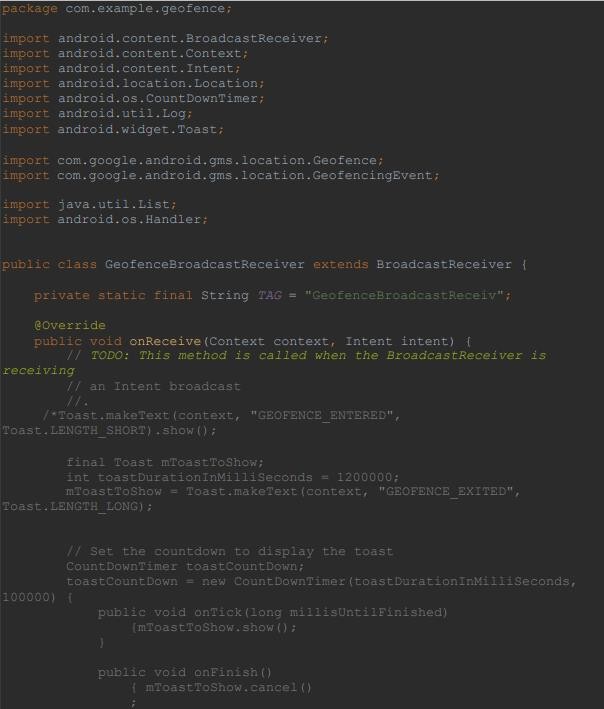
1. **TESTING**
   1. **TEST CASE**



* 1. **USER ACCEPTANCE TESTING**

1. **RESULTS**

**9.1. PERFORMANCE TESTING**



# ADVANTAGES & DISADVANTAGES ADVANTAGES:

* + Heart-beats, temperature is monitored and the values are updated to cloud continuously for parent app monitoring.
  + Boundary monitoring system is implemented on safety gadget with the help of BEACON technology, as soon as the safety gadget moves far away from the binding gadget an alert is provided to parent on binding gadget. the system is used to monitor the health parameters and also used for location tracking during necessary situations in safety concern

# DISADVANTAGES:

* + The child could not produce the exact alert command during a panic condition.
  + The command produced may not match with the previously stored command.
  + Project requires manual intervention.

# CONCLUSION

Throughout the research, it is clearly explained theIoT concept, child safety issues and the need of using child security system. Some previous studies have been included for designing the IoT-based child security smart band. It assists parents to monitor their children remotely.In case situations happen, notifications will be sent toparents so that actions can be taken. Through this, childsafety can be ensured and crime rate will be reduced. However, the proposed device is not robust enough and does not contain sufficient functions to operates like a mobile phone. Hence, the future enchantments will be adding more features, software, applications, hardware to make the proposed system capable of working more intelligently, meanwhile guarantee the safety of children

# FUTURE SCOPE

This research demonstrates Smart IoT device for child safety and tracking helping the parents to locate and monitor their children. If any abnormal values are read by the sensorthen an SMS is sent to the parents mobile and an MMS indicating an image captured by the serial camera is also sent. The future scope of the work is to implement the IoT device which ensures the complete solution for child safety problems.

# APPENDIX

**GITHUB LINK**

[IBM-EPBL/IBM-Project-24619-1659945959: IoT Based Safety Gadget for](https://github.com/IBM-EPBL/IBM-Project-35737-1660288227) [Child Safety Monitoring & Notification (github.com)](https://github.com/IBM-EPBL/IBM-Project-35737-1660288227)