PROJECT REPORT

IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

SUBMITTED BY:

TEAM ID : PNT2022TMID47921

TEAM LEADER:

D.SWETHA - 912019104030

TEAM MEMBERS:

G.DEEPA LAKSHMI - 912019104008

B.DURGA- 912019104009

P.KEERTHI - 912019104014

V.SAVITHA - 912019104027

CONTENTS

7. CODING & SOLUTIONING

7.1 Feature 1

7.2 Feature 2

7.3 Database Schema (if Applicable)

8. TESTING

8.1 Test Cases

8.2 User Acceptance Testing

9. RESULTS

9.1 Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

1. INTRODUCTION

1.1 PROJECT OVERVIEW

The internet of things (IoT) refers to the set of devices and system that stay interconnected with real-world sensor and to the internet. During years' Child safety is under threat and it is very important to provide a technology-based solution which will help them under panic situations and monitor them using a smart gadget. The proposed system is equipped with GSM and GPS modules for sending and receiving call and SMS between safety gadget and parental phone, the proposed system also consists of Wi-Fi module used to implement IoT and send all the monitoring parameters to the cloud for android app monitoring on parental phone. Android application can be used to track the current location of safety gadget using its location coordinates on parental phone android app and also via SMS request from parent phone to safety gadget. Panic alert system is used during panic situations and automatic SMS alert and phone call is triggered from safety gadget to the parental phone seeking for help and also monitored for plug and unplug from hand, as soon the gadget is unplugged from hand a SMS is triggered to parental phone and the alert parameter is also updated to the cloud. 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.

1.2 PURPOSE

The purpose of this device is to help the parents to locate their children with ease. At the moment there are many wearable's in the market which helps to track the daily activity of children and also helps to find the child using Wi-Fi and Bluetooth services present on the device. This paper is mainly streamed towards child safety solutions by developing a gadget which can be tracked via its GPS locations and also a panic button on gadget is provided to alert the parent via GSM module calling for help. Parental android app is developed to manage and track the device anytime.

Smart gadget device is always connected to parental phone which can receive and make phone calls and also receive SMS on gadget via GSM module, also a wireless technology is implemented on device which is useful to bound the device within a region of monitoring range, if device is moving out of monitoring range then rean alert will be triggered on binding gadget, this helps you keep a virtual eye on child. Health monitoring system on gadget checking for parameters like heart beat/pulse rate and temperature is included which can be monitored on parental app. Gadget also monitors whether it is plugged on hand or not using contact switch and alert the parent as soon as it is unplugged.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

1. To implement the IoT device which ensures the complete solution for child safety problems.
2. As, device's battery gives short life-time.
3. High power efficient model will have to be used which can be capable of giving the battery life for a longer time.
4. Some system is unable to sense human behavior of child.
5. Some device cannot be used in rural areas.

2.2 REFERENCES

[1] M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari, 'Smart IoT Device for Child Safety and Tracking' International Journal of Innovative Technology and Exploring Engineering, Volume 8, Issue 8, June 2019.

[2] Akash Moodbidri, Hamid Shahnasser (Jan. 2017) 'Child safety wearable device', International Journal for Research in Applied Science & Engineering Technology, Vol. 6 Issue 2, pp. 438-444.

[3] Aditi Gupta, Vibhor Harit, 'Child Safety & Tracking Management System by using GPS, Geo-Fencing & Android Application: An Analysis,' 2016 Second International Conference on Computational Intelligence & Communication Technology.

[4] Dheeraj Sunehera, Pottabhatini Laxmi Priya, 'Children Location Monitoring on Google Maps Using GPS and GSM,' 2016 IEEE 6th International Conference on Advanced Computing.

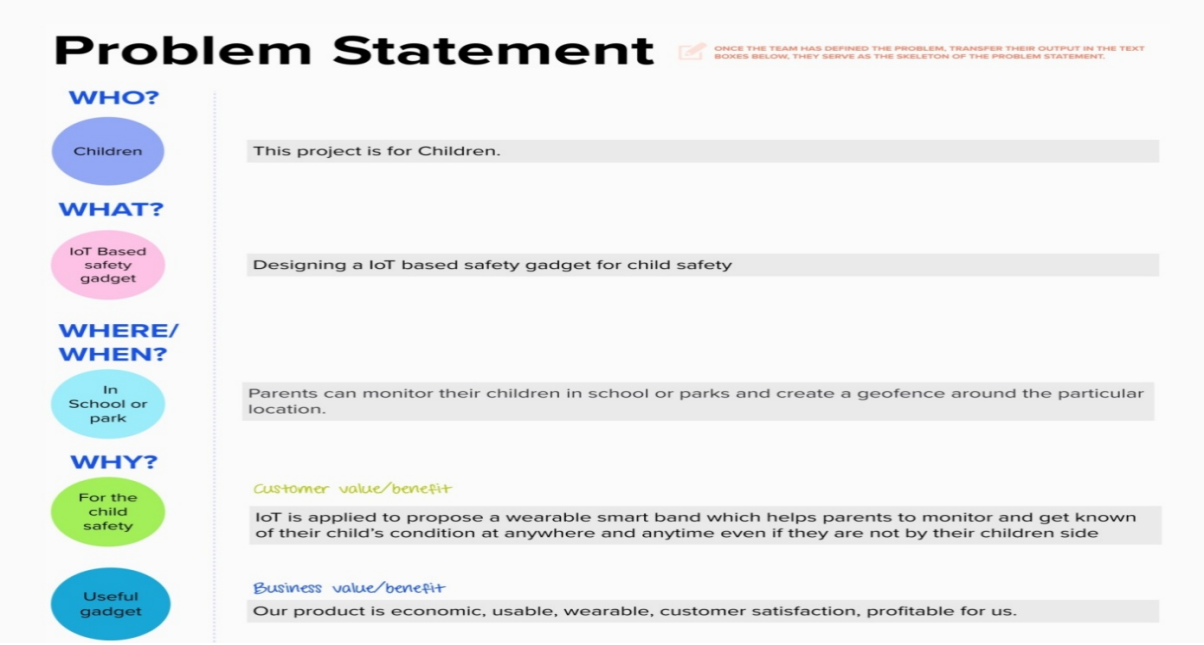
[5] Asmita Pawar, Pratiksha Sagare, Tejal Sasane, Kiran Shinde (March– 2017) 'Smart security solution for women and children safety based on GPS using IoT', International Journal of Recent Innovation in Engineering and Research, vol. 2, Issue 3, pp. 85-94.

[6] Nitishree, (May-June, 2016) 'A Review on IOT Based Smart GPS Device for Child and Women Safety', International Journal of Engineering Research and General Science, Vol. 4, Issue 3, pp. 159-164.

[7] Pramod, M Uday Bhaskar, Ch. V and Shikha, K. (January 2018) 'IoT wearable

device for the safety and security of women and girl' International Journal of Mechanical Engineering and Technology, Vol. 9, Issue 1, pp. 83-88.
[8] Anand Jatti, Madhvi Kannan, Alisha, RM Vijayalakshmi, P Shrestha Sinha (May 20-21, 2016), 'Design and Development of an IoT based wearable device for the Safety and Security of women and girl children' IEEE International Conference on Recent Trends in Electronics Information Communication Technology, India, pp. 1108-1112.
[9] Sarifah Putri Raflesia, Firdaus, Dinda Lestarini, 'An Integrated Child Safety using Geo-Fencing Information on Mobile Devices', International Conference on Electrical Engineering and Computer Science (ICECOS) 2018.
[10] Anwaar Al-Lawati, Shaikha Al-Jahdhami, 'RFID-based System for School Children Transportation Safety Enhancement', Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015.

2.3 PROBLEM STATEMENT DEFINITION



Problem Statement (PS)	*I am (Customer)*	*I'm trying to*	*But*	*Because*	*Which makes me feel*
PS1	PARENTS	Monitor their children without manual intervension	There is No way to Look over their children	children cannot complain about abusements which they face in their daily life to their parents so they are worried to prevent children before being attacked	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
PS2	CHILDREN	Move independently and explore the	Parents not allowing them	To prevent children before being attacked	Due to the abusements, the emotional

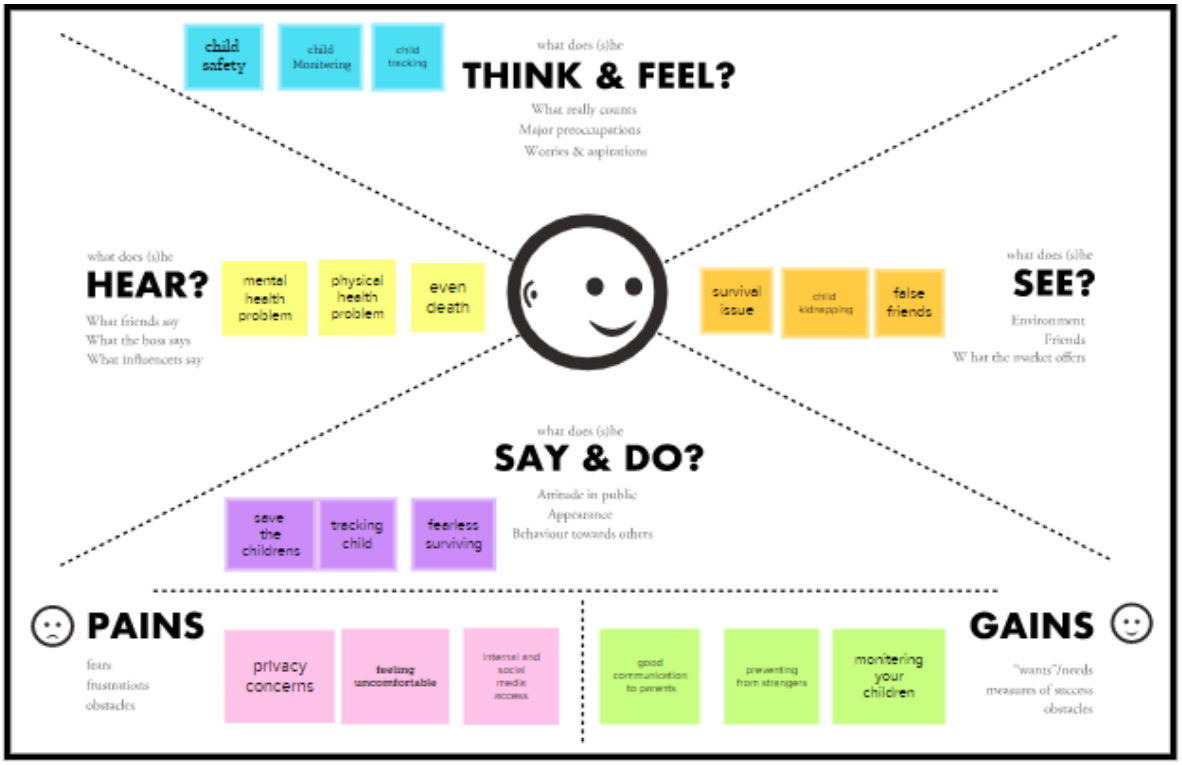
	world	alone	and mental stability of the children get affected which in turn ruins their career and future. These innocent children are not responsible for what happens to them

Now a days, crime rate associated with children keeps increasing due to which draws peoples' attention regarding child safety. This research is conducted to propose a child security smart band utilizing IoT technology. Online questionnaire and semi-structured interview are methodologies used to collect data. The online questionnaire gains feedbacks by sending questions electronically, where answers need to be submitted online. In the semi structured interview, researcher meets and asks respondents some predetermined questions while other being asked are not planned in advanced. Through information obtained, a smart band have been proposed to monitor the safety of children. By this, parents know what is happening remotely and can take actions if something goes wrong. The future improvements of

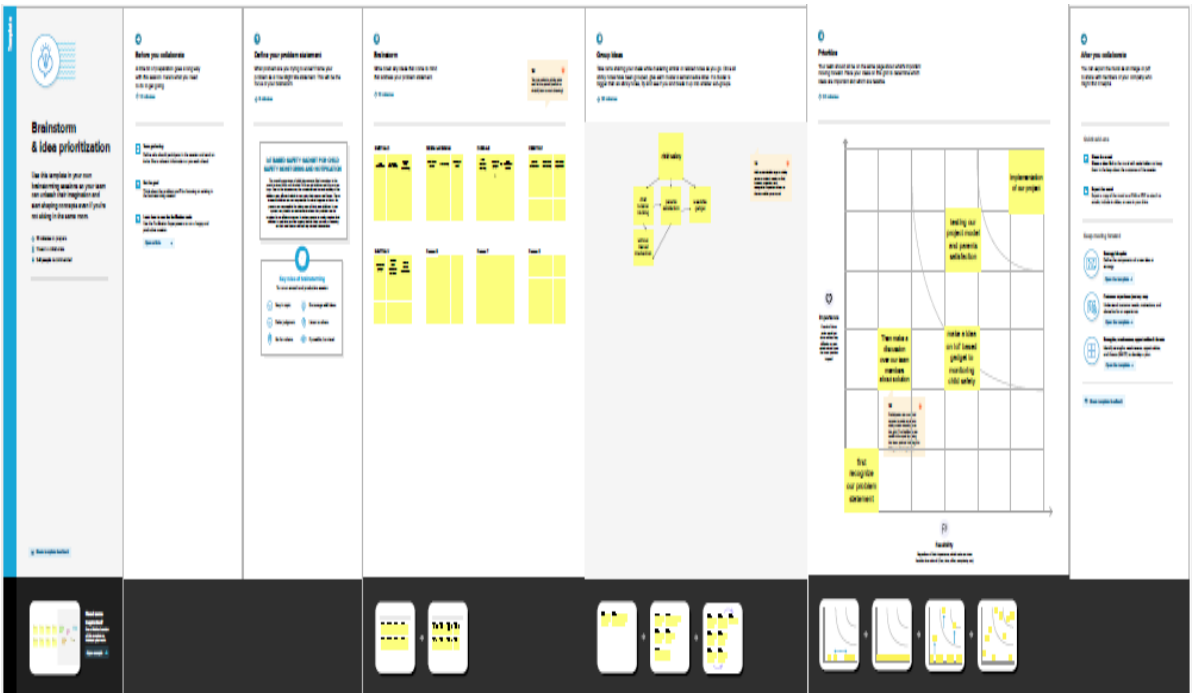
this device will be adding functions and software to make it works like a phone such as messaging, gallery, Google, YouTube, meanwhile, adding more child security features so that child safety is guaranteed.

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

S.No	Parameters	Description
1	Problem Statement (Problem to be solved)	The project is for child safety from, "**exposure to violence, family stress, inadequate housing, lack of preventive health care, poor nutrition, personal issues and substance abuse"** they are likely to have better outcomes in school and beyond.
2	Idea / Solution description	Our idea towards child safety solutions by developing a gadget which can be tracked via its GPS locations and also a panic button on gadget is provided to alert the parent via GSM module calling for help. Parental android app is developed to manage and track the device anytime. Smart gadget device is always connected to parental

		phone which can receive and make phone calls and also receive SMS on gadget via GSM module, also a wireless technology is implemented on device which is useful to bound the device within a region of monitoring range, if device is moving out of monitoring range then an alert will be triggered on binding gadget, this helps you keep a virtual eye on child. Health monitoring system on gadget checking for parameters like heart beat/pulse rate and temperature is included which can be monitored on parental app. Gadget also monitors whether it is plugged on hand or not using contact switch and alert the parent as soon as it is unplugged
3	Novelty / Uniqueness	1. Live Location Tracking 2. Panic Alert Systems 3. Stay Connected Feature

		4. Health Monitoring System 5. Gadget Plugged or Unplugged Monitoring 6. Boundary monitoring system
4	Social Impact / Customer Satisfaction	1. Cost efficient 2. Easy maintenance 3. Wearable 4. Quick alert 5. Child independent 6. Reduce parent's stress
5	Business Model (Revenue Model)	A good revenue model is a proven technique used by Internet of things. By using our gadget for some features like live location tracking, Panic Alert Systems. Stay Connected Feature Health Monitoring System Gadget Plugged or Unplugged Monitoring, Boundary monitoring system.
6	Scalability of the Solution	As our product is an important for now a days. Due to child abusement increased in this society. So, Our product is used by many user and have great

		demand on parent’s society

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR. No.	Functional Requirement (Epic)	Sub Requirement (Story/Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Notification	Notified via Mobile App
FR-4	User Interface	Mobile App-MIT App Inventor Able to see location of children when they are out of Geo fence

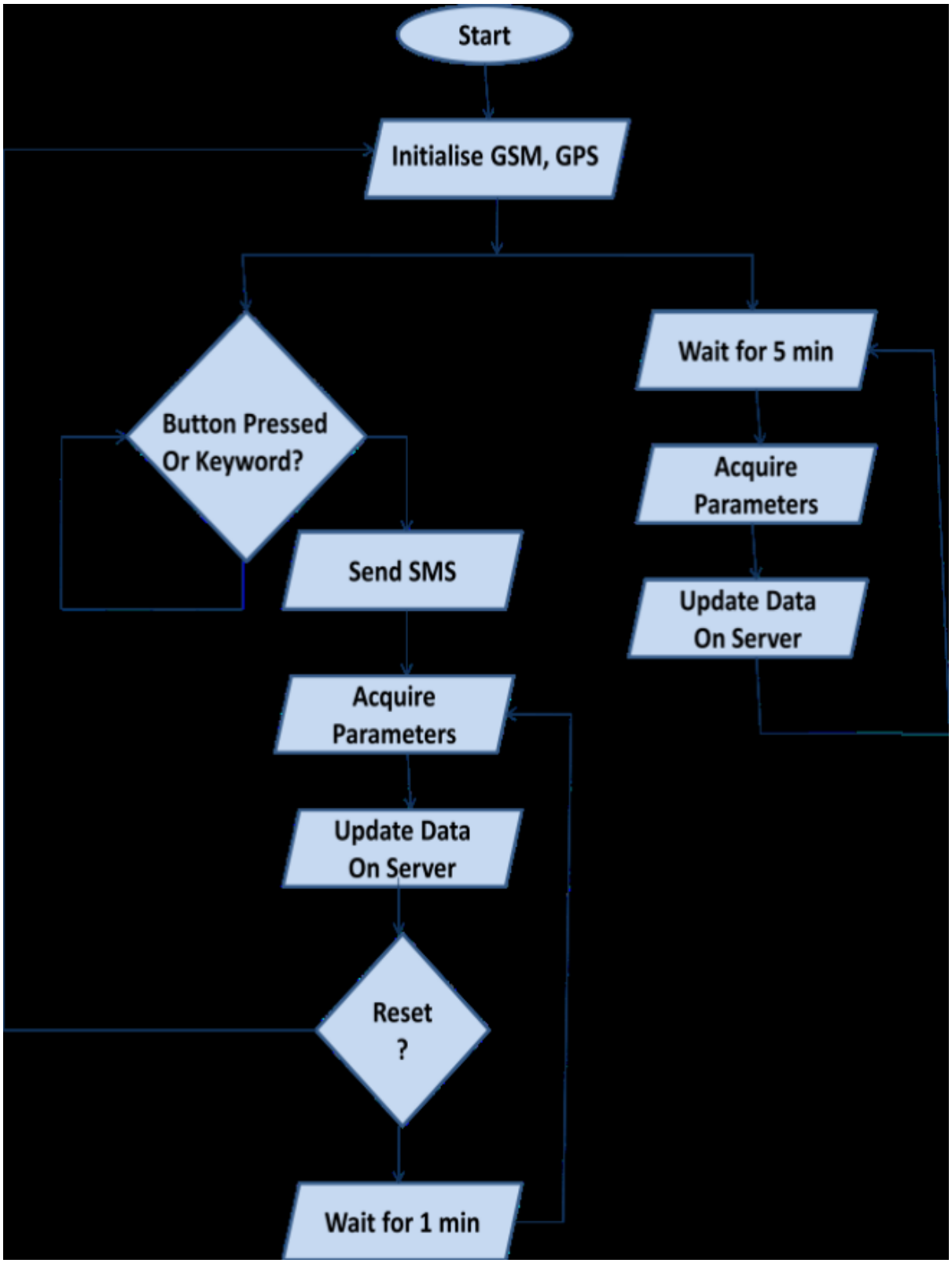
4.2 NON- FUNCTIONAL REQUIREMENTS

FR. No	Functional Requirement (Epic)	Sub Requirement (Story/Sub-Task)
FR-1	Usability	Accessed through Mobile App Showing location (latitude and longitude) of child
FR-2	Security	Database security must meet HIPAA requirements
FR-3	Reliability and Availability	Once logged in, webpage is available until Logging Out of the app

FR-4	Performance	Each page must load within 2 second
FR-5	Scalability	The liable by 8a.m. local time after an over night update

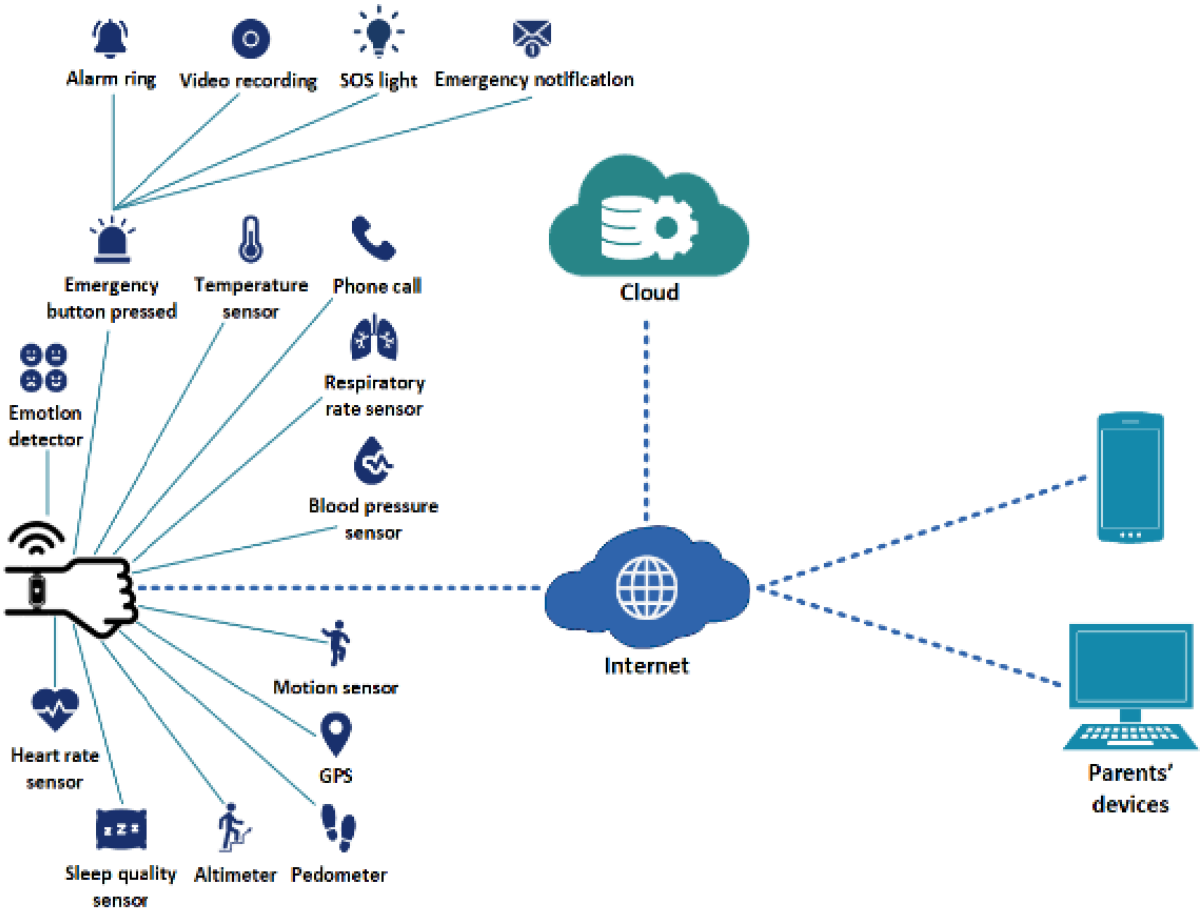
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION & TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE:



● An IoT based wearable smart band for children is proposed in this research for child security purposes. The smart band is waterproof, chargeable and equipped with sensors. Heart rate sensor measures pulse rate and BPM. Sleep quality sensor obtains children's sleep quality, cycle and positions.

● Altimeter detects changes in height and sense whether children are going down a slope or climbing stairs, there by measuring calorie count. On the other hand, pedometer is used for counting steps. The motion sensor is applied to determine whether children are jogging or running.

● Blood pressure sensor used to measure blood pressure. In addition, the respiratory rate sensor detects breathing patterns and respiratory rate. Furthermore, the temperature sensor is used to detect body temperature.

● Besides, by using the emotion detector the emotional state, pressure and anxiety levels can be gained. Apart from that, this smart band contains GPS for tracking,

identifying children's location and setting geo fences. Via the smart band, children can also contact parents. Emergency button, a feature in which will automatically record video and automatically call 4 emergency contacts when it is pressed.

● An alert message along with the video clip is sent to parents' devices. The alarm and SOS light will be activated by parents through their devices. As the diagram shows, sensors are connected through the internet. They detect and capture different kinds of data.

● These collections of data will then be sent to the cloud over the internet for securely process, analyze, monitor, store, access and retrieve data remotely.

● After that, the information indicating children's status, along with reference values will be sent to parents' devices with the app installed. If children's actual data is not within the range of reference value, alert notification and some suggestions will be sent to parents' devices. Also, when children leave geo fences, notification will be sent to parents' devices.

TECHNICAL ARCHITECTURE:

Components & Technologies

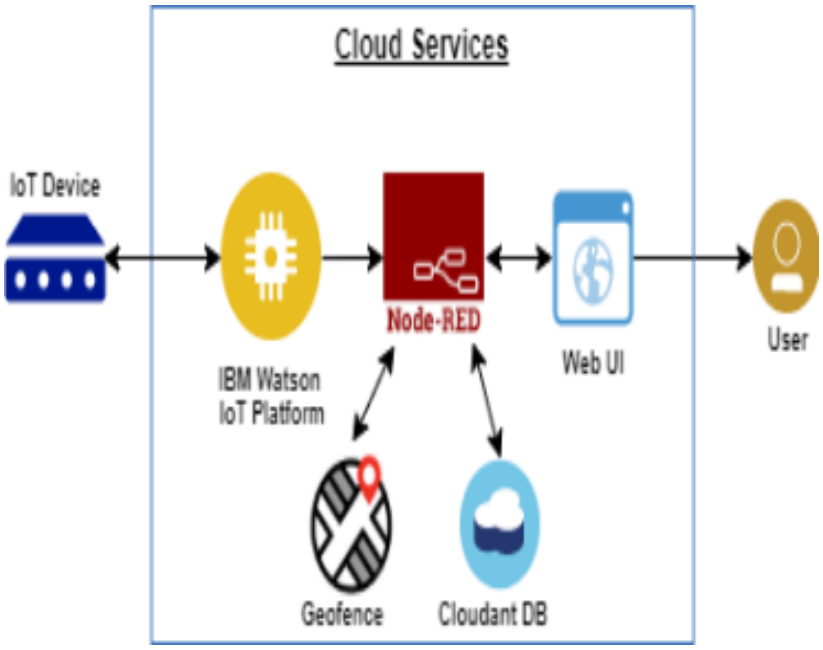
S. No	Component	Description	Technology
1.	User Interface	The communication protocol being used in the proposed solution might act as an interface the way like WiFi, Bluetooth and ZigBee	MIT app
2.	Application Logic	The data to be collected and sent to the authenticator's(parent) via GSM providing the 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
6.	External API-1	To access the children location	GPS location monitoring etc
7.	Infrastructure (Server / Cloud)	Application Deployment on Local System	Cloud Foundry

Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The proposed solution being framed in the form an android application providing the end user an easy surveillance of their children	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	Not yet determined

		tends to be available in the market at any time	
5.	Performance	Highly proper and betterment functionalities are to be ensured in the designed solution	Not yet determined



TECHNICAL ARCHITECTURE

5.3 USER STORIES

User Type	*Functional Requirement (Epic)*	*User Story Number*	*User Story/Task*	*Acceptance criteria*	*Priority*	*Release*
Customer (parents Mobile user)	Registration	Usn-1 (father)	I can access the location of my children Using the credentials provided as a father	I can access my account / dashboard and Receive confirmatio	High	Sprint-1

				n Email & click confirm		
		USN-2 (MOTHER)	I can access the location of my children Using the credential provided as a mother	I can access my account / dashboard and receive Confirmation mail & click Confirm	High	Sprint-1
		USN-3 (GUARDIAN	I too can monitor the children's Activities using safety gadget Monitoring system	I can access my account / dashboard and receive Confirmation email & Click confirm	Medium	Sprint-2
	Login	USN-4 (If required	Same function to be performed as In previous case	Same function to be Performed as in previous Cases	Not yet Determined	—
	Dashboard	USN-5 (if required	Same function to be performed as In previous cases	Same function to be Performed as in previous Cases	Not yet Determined	—

6.PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Sprint planning is an essential process that an organization needs to adapt to be successful. It indicates the roadmap for the next two to four weeks when stakeholders and team members decide as a group what they need to complete and deliver before the next sprint review meeting. Sprint planning is the first step in an agile project and is crucial to project success. A high level view of the sprint backlog is created where the scrum team discusses, creates a plan for completing their work, dependencies, and identifies risks that need to be addressed. Sprint planning is an open forum where everyone comes together, appreciates each other's work, and gets more clarity about the sprint goals and objectives. That makes every member of the team accountable and reenforces healthy communication This article will explain and help you understand the concepts and provide tips for successful sprint planning meetings. Additionally, we'll show you how it's not just about the tasks themselves. It's also about helping your team to reach their full potential. The members who take part in the sprint planning meeting include• Product Owner The product owners ensure all the items in the product backlog are set before they start the meeting. Therefore, they have to prepare adequately and know the objective of each item. Moreover, the member ask them questions concerning the case and acceptance criteria, and they have to clarify to them• The Scrum Master The scrum master is in charge of facilitating the sprint planning meeting and ensures that the rooms are set, people are prepared, suppliesare available, and the video conferencing and other connectivity are set accordingly. He/she time boxes the meeting according to the length of the sprint. For example, the duration of a two weeks' sprint should be 2-4 hours. He keeps time and ensures they attain their goal at the end of the sprint planning meeting

6.2 SPRINT DELIVERY SCHEDULE

Product Backlog, Sprint Schedule, and Estimation: Use the below template to create product backlog and sprint schedule

Sprint	Functiona lRequirement (Epic)	User Story Number	UserStory/Task	StoryPo ints	Priority	Team Members
Sprint-1	Registration	USN-1	As a end user/parent of the child.I can register it through	2	High	D.SWETHA

			Email..			
Sprint-1		USN-2	As a Parent/Guardian,I can register for the applicatio n By entering my mail id and password.	1	Medium	DURGA. B
Sprint-1	User Confirmation	USN-3	As a parent/en d user can reach my child location by entering the mail id and password	1	High	KEERTHI.P
Sprint-1		USN-4	As a parent/guardian , I can login to the application by my Gmail ID	2	Medium	V.SAVITHA

SPRINT DURATION

Sprint	**TotalStoryPoints**	**Duration**	**SprintStartDate**	**SprintEndDate (Planned)**	**StoryPoints Completed (as onPlanned End Date)**	**SprintReleaseDate (Actual)**
Sprint-1	20	4Days	24Oct 2022	27Oct 2022	20	29Oct 2022

Sprint-2	20	5Days	28Oct 2022	01Oct 2022	20	04Oct 2022
Sprint-3	20	8Days	02Oct 2022	10Oct 2022	20	12Oct 2022
Sprint-4	20	9Days	10Oct 2022	18Oct 2022	20	19Oct 2022

7.CODING & SOLUTIONING

7.1 FEATURES

Feature 1 :

Log into the website by using email and password.

Feature 2 :

Used to find out the location of the child.

Feature 3 :

Monitor the child's pressure and temperature.

Feature 4 :

Sends the message to the parents or their guardian.

Other Features:

The system also consists of wi-fi module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring on parental phone. Panic alert system is used during panic situations alerts are sent to the parental phone, seeking for help also the alert parameters are updated to the cloud.

Coding:

```
package com.example.geofence;

import
android.content.BroadcastReceiver; import
android.content.Context; import
android.content.Intent; import
android.location.Location; import
android.os.CountDownTimer; import
android.util.Log; import android.widget.Toast;

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

public class GeofenceBroadcastReceiver extends BroadcastReceiver {

   private static final String TAG = "GeofenceBroadcastReceiv";
   @Override      public void onReceive(Context context, Intent
intent) {
      // TODO: This method is called when the BroadcastReceiver is receiving      // an
Intent broadcast
      //.
    /*Toast.makeText(context, "GEOFENCE_ENTERED",
Toast.LENGTH_SHORT).show();

      final Toast mToastToShow;
```

```
    int toastDurationInMilliSeconds = 1200000;          mToastToShow = Toast.makeText(context,
"GEOFENCE_EXITED", Toast.LENGTH_LONG);


    // Set the countdown to display the toast        CountDownTimer toastCountDown;          toastCountDown = new
CountDownTimer(toastDurationInMilliSeconds,
100000) {              public void onTick(long millisUntilFinished) {
mToastToShow.show();
        }

        public void onFinish() {              mToastToShow.cancel();
}
    };

    // Show the toast and starts the countdown        mToastToShow.show();
toastCountDown.start();*/


  NotificationHelper notificationHelper = new
NotificationHelper(context);

notificationHelper.sendHighPriorityNotification("GEOFENCE_TRANSITION_ENTER" , "", MapsActivity.class);

   GeofencingEvent geofencingEvent = GeofencingEvent.fromIntent(intent);

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

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

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


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


  }
}
```

```
package com.example.geofence;

import android.app.Notification; import
android.app.NotificationChannel; import
android.app.NotificationManager; import
android.app.PendingIntent; import android.content.Context;
import android.content.ContextWrapper; import
android.content.Intent; import android.graphics.Color; import
android.os.Build;

import androidx.annotation.RequiresApi; import
androidx.core.app.NotificationCompat;   import
androidx.core.app.NotificationManagerCompat;

import java.util.Random;

public class NotificationHelper extends ContextWrapper {

   private static final String TAG = "NotificationHelper";

   public NotificationHelper(Context base) {       super(base);
     if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {           createChannels();
     }
   }
   private String CHANNEL_NAME = "High priority channel";
   private String CHANNEL_ID = "com.example.geofence" + CHANNEL_NAME;




   @RequiresApi(api = Build.VERSION_CODES.O)    private void createChannels()
```

```
{
    NotificationChannel notificationChannel = new
NotificationChannel(CHANNEL_ID, CHANNEL_NAME, NotificationManager.IMPORTANCE_HIGH);
notificationChannel.enableLights(true);       notificationChannel.enableVibration(true);
notificationChannel.setDescription("this is the description of the channel.");
notificationChannel.setLightColor(Color.RED);

notificationChannel.setLockscreenVisibility(Notification.VISIBILITY_PUBLIC) ;       NotificationManager manager =
(NotificationManager) getSystemService(Context.NOTIFICATION_SERVICE);
manager.createNotificationChannel(notificationChannel);    }
  public void sendHighPriorityNotification(String title, String body, Class activityName) {

    Intent intent = new Intent(this, activityName);
    PendingIntent pendingIntent = PendingIntent.getActivity(this, 267, intent,
PendingIntent.FLAG_UPDATE_CURRENT);
    Notification notification = new NotificationCompat.Builder(this, CHANNEL_ID)
//            .setContentTitle(title)
//            .setContentText(body)
          .setSmallIcon(R.drawable.ic_launcher_background)
          .setPriority(NotificationCompat.PRIORITY_HIGH)              .setStyle(new
NotificationCompat.BigTextStyle().setSummaryText("summary").setBigContentTi tle(title).bigText(body))
          .setContentIntent(pendingIntent)
          .setAutoCancel(true)
          .build();

    NotificationManagerCompat.from(this).notify(new Random().nextInt(), notification);
}
}
```

8.TESTING

8.1 TEST CASES

✓ Login website with email

✓ GPS Tracking

✓ Send Message to Parents or Guardian

✓ Monitoring the location of the child

8.2 USER ACCEPTANCE TESTING

User Acceptance Testing (UAT) checks whether a product is the right one for the end users. It has other names, e.g., end-user testing, operational, application, beta testing, or validation but they describe the same thing. In quality assurance, it's important to distinguish between validation and verification. Verification refers to general QA processes aimed at testing the technical aspects of a product to ensure it actually works. Validation (or user acceptance testing) is conducted to make sure that the product corresponds with business requirements and can be used by the end user. Alpha testing is the initial stage of acceptance testing, typically performed by internal testers, to ensure that the product functions correctly and meets business requirements. Beta testing, the second type of acceptance testing, aims at meeting user acceptance criteria.If the child is missed in the not available internet connection then it is very difficult to find the child.

9.RESULTS

1.User Registration :

Users get 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 .

2. User Login:

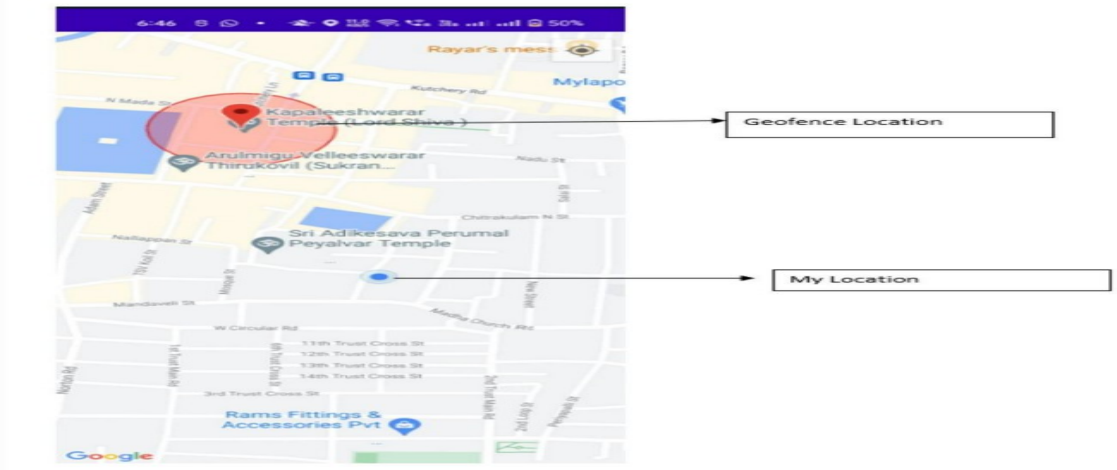
Users with their registered mail and password will login to the account . As the details are stored in firebase, when invalid email or password is entered a message say invalid email or password occur .

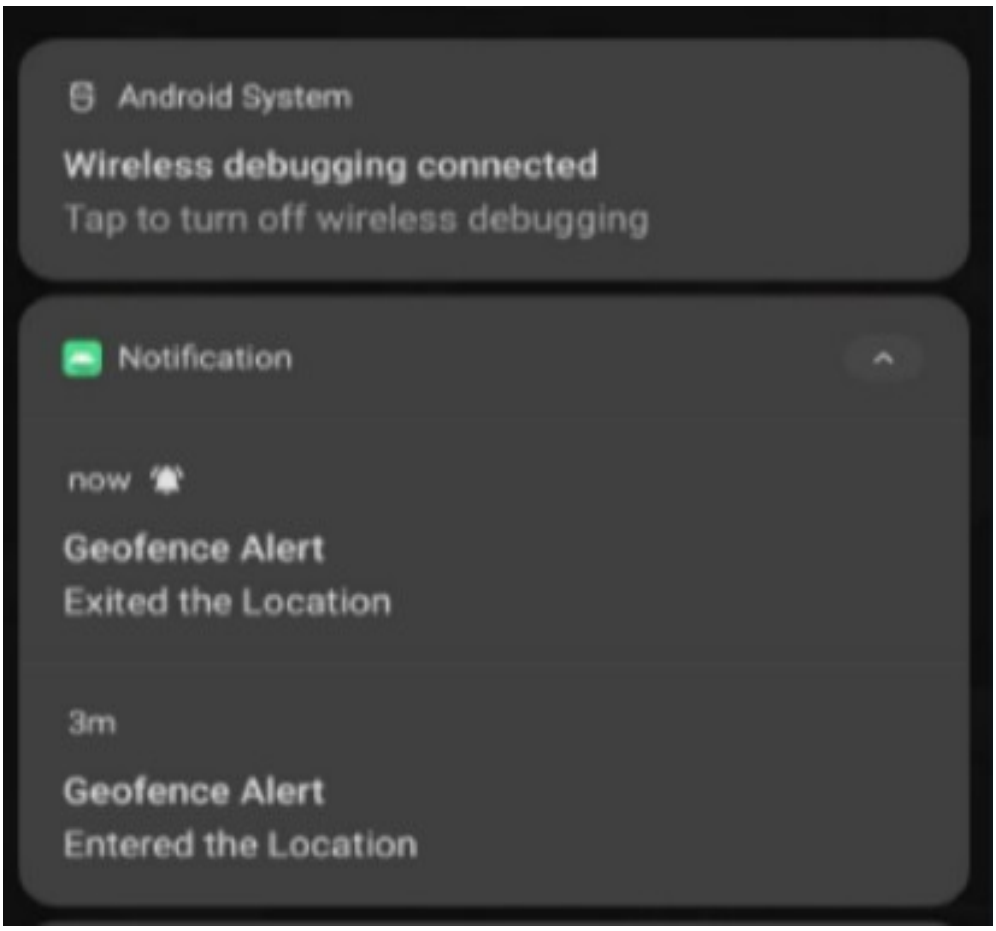
3.Adding Geofence and Alert Notification :

Users can add geofence in the location where they want to add or where their child is going to 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 be display.

Output

NOTIFICATION




Android System
Wireless debugging connected
Tap to turn off wireless debugging
Notification
now
Geofence Alert
Exited the Location
3m
Geofence Alert
Entered the Location

10.ADVANTAGES & DISADVANTAGES

ADVANTAGES

The parent can monitor their child from anywhere at any time, and also get a notification when the child goes away from the permitted radius.

It also allows the parent to know if their child is in any dangerous situation.

DISADVANTAGES

This system are that the child could not produce the exact alert command during a panic condition.

The command produced may not match the previously stored command. This project requires manual intervention.

11.CONCLUSION

➢ Throughout the research , it is clearly explained the IoT concept, child safety issues and the need of using child security system

➢ It assists parents to monitor their children remotely .

➢ In case situation happens , notifications will be send to the parents so the action can be taken

➢ Though this child safety can be ensured and crime rate will be reduced .

➢ However, the proposed method is not robust enough and does not contain sufficient functions to operate like a mobile phone.

➢ Hence the future enhancement will be adding some more future , software apptication , and hardware to make the proposed system cable of working more intelligently, and guarantee the safety of the children.

12.FUTURE SCOPE

In future, the currently proposed system can be improvised by addin other parameters that is required for children .The system can be developed further by implementing additional health monitoring sensors like, blood pressure, respiration rate, sleep cycles of REM&NREM and EEG analysis.

The system accuracy can also be improved by increasing the trustworthiness of the device to avoid any discrepancies, as in medical and healthcare, a minute error may cost a life. In addition we can also add different zones such as bus section, along with wireless camera which ensures the safety .In bus section we also can implement the fire detecting concept.

In our system, we use the Internet of Things, GPS, GSM, and Raspberry Pi to automatically monitor the youngster in real time. When we utilize a web camera and GPS to actively monitor, this system needs network connections, satellite communication, and a high-speed data connection.It is challenging to keep an eye out for any network problems or satellite connection problems. Additionally, there is a lag when streaming videos through the server. The Zigbee concept or accessing the system without the internet and employing high-speed server transmission can therefore be used in the future to solve these problem.

13.APPENDIX

Alert Notification code

```
packagecom.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;

importandroid.widget.Toast;
importcom.google.android.gms.location.Geofence;
import
com.google.android.gms.location.GeofencingEvent;imp
ortjava.util.List;

importandroid.os.Handler;
publicclassGeofenceBroadcastReceiverextendsBroadcastReceiver
{
private static final String TAG =
"GeofenceBroadcastReceiv";@Override

publicvoidonReceive(Contextcontext,Intentintent)
  {
//TODO:Thismethodiscalled whentheBroadcastReceiverisreceiving
//anIntent broadcast
//.
/*Toast.makeText(context, "GEOFENCE_ENTERED",
Toast.LENGTH_SHORT).show();finalToastmToastToShow;
```

```
inttoastDurationInMilliSeconds=1200000;
mToastToShow=Toast.makeText(context,"GEOFENCE_EXITED",Toast.LENGTH_LONG);
// Set the countdown to display the
toastCountDownTimertoastCountDown;
toastCountDown=newCountDownTimer(toastDurationInMilliSeconds,100000)
  {
publicvoidonTick(longmillisUntilFinished)
  {
mToastToShow.show();
}
publicvoidonFinish()
  {
mToastToShow.cancel();
}
};
// Show the toast and starts the
countdownmToastToShow.show();toastC
ountDown.start();*/
NotificationHelper notificationHelper = new
NotificationHelper(context);notificationHelper.sendHighPriorityNotification("GEOFENCE_TRA
NSITION_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(Geofencegeofence:
geofenceList)
  {
Log.d(TAG,"onReceive:"+geofence.getRequestId());
}
// Location location =
geofencingEvent.getTriggeringLocation();int transitionType
=
geofencingEvent.getGeofenceTransition();switch(transitionT
ype)
  {
caseGeofence.GEOFENCE_TRANSITION_ENTER:
notificationHelper.sendHighPriorityNotification("Entered the Location",
"",MapsActivity.class);
break;
case
Geofence.GEOFENCE_TRANSITION_EXIT:notificationHelper.sendHigh
PriorityNotification("Exited the Location ", "",MapsActivity.class);
break;
}
}
```

Geofence:

Package

```
com.example.geofence;import
android.app.PendingIntent;import
android.content.Context;

import
android.content.ContextWrapper;import
android.content.Intent;

importandroid.widget.Toast;
import
com.google.android.gms.common.api.ApiException;imp
ortcom.google.android.gms.location.Geofence;

import
com.google.android.gms.location.GeofenceStatusCodes;imp
ort
com.google.android.gms.location.GeofencingRequest;import
com.google.android.gms.maps.model.LatLng;

publicclassGeofenceHelperextendsContextWrapper
  {
private static final String TAG =
"GeofenceHelper";PendingIntentpendingIntent;

publicGeofenceHelper(Contextbase)
{
super(base);
}
public GeofencingRequest
getGeofencingRequest(Geofencegeofence){

returnnewGeofencingRequest.Builder()
.addGeofence(geofence)
```

```
.setInitialTrigger(GeofencingRequest.INITIAL_TRIGGER_ENTER)
.build();
}
public Geofence getGeofence(String ID, LatLng latLng,
floatradius,int transitionTypes)
  {
returnnewGeofence.Builder()
.setCircularRegion(latLng.latitude,
latLng.longitude, radius)
.setRequestId(ID)
.setTransitionTypes(transitionTypes)
.setLoiteringDelay(5000)
.setExpirationDuration(Geofence.NEVER_EXPIRE)
.build();
}
publicPendingIntentgetPendingIntent()
{
if(pendingIntent!=null)
{
returnpendingIntent;
}
Intent intent = new
Intent(this,GeofenceBroadcastRec
eiver.class);
pendingIntent = PendingIntent.getBroadcast(this,
```

```
2607,intent,PendingIntent.FLAG_IMMUTABLE);

returnpendingIntent;

}

publicStringgetErrorString(Exceptione)

  {

if(einstanceofApiException)

  {

ApiException apiException = (ApiException)

e;switch(apiException.getStatusCode())

  {

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";

}

}

returne.getLocalizedMessage();

}

}
```

13.2 GitHub Link

https://github.com/IBM-EPBL/IBM-Project-31526-1660201570

Project Demo Link

https://drive.google.com/file/d/16ZkG9wibfHhqYJf3Ob9cIyDJ tGTsHhw/view?usdrivesdk