IOT BASED SAFETY GADGET FOR CHILDSAFET MONITORING&NOTIFICATION

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report **" IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING & NOTIFICATION "** is the bonafide work of " **CHANTHIKA T [21019106010], KEERTHANA.J [210519106038], KAYALVIZHI K [210519106037],REVATHI S [210519106055] "** who carried out the project work under my supervision.

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ABSTRACT

Nowadays, crime rate associated with children keeps increasing due to which draws peoples' attention regarding child safety. This project **"IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING & NOTIFICATION "** 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

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1.INTRODUCTION

Internet of Things (IOT) is the latest technology that connects entire world. It establishes connectivity (through internet) among the various devices or services or systems in order to little by little make automation development in all areas. IoT involves extending internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally "dumb" or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the internet. They can also be remotely monitored and controlled.

Technology is the best way to solve this problem. That’s the reason to develop this project that can act as a rescue device and protect at the time of danger. The motivation behind this project is an attempt to focus on a security system that is designed merely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges.

An advanced system can be built that can detect the location and health condition of person that will enable us to take action accordingly based on electronic gadgets like GPS receiver, GSM, pulse rate sensor, flex sensor, MEMS accelerometer, body temperature sensor. We can make use of number of sensors to precisely detect the real time situation of he or she child in critical situations. The heartbeat of a person in such situations is

normally higher which helps make decisions to detect the abnormal motion of the child.

1.1.PROJECT OVERVIEW

IoT Based Safety Gadget for Child Safety Monitoring & Notification

Child safety and tracking is a major concern as more number of crimes on children are reported nowadays. With this motivation, a smart IoT device for child safety and tracking is developed to help the parents to locate and monitor their children. The system is developed using Link It ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules.

The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency. The parameters such as touch, temperature &heartbeat of the child are used for parametric analysis and results are plotted for the same.

The above system ensures the safety and tracking of children.

So, IoT devices are applied in different fields such as agriculture, medical, industrial, security and communication applications[1]. IoT systems are useful within a system to do deeper automation, analysis, and integration. IoT contributes to technology by advances in software, hardware and modern tools. It even uses existing and upcoming technology in the fields of sensing, networking and robotics. IoT brings global changes by its advanced elements in the social, economic, and political impact of the users.

1.2.PURPOSE

The purpose of this project is to have an SMS Content empowered Correspondence medium between the Children wearable and the parent as nature for GSM portable that correspondence is practically present all over the pear. The parent can send a content with particular catch phrase. For example: Area, temperature, UV, Alarm Buzz will ensure back with a content containing the continuous exact area of the youngster which after will gives applications.

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 a CPU and are used to detect exact signals such as heart rate, temperature, and other dangers and alert the parents.

Child and women 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 and women.

Smart phones are playing major role for ensuring the safety, where some mobile based applications provide alert systems. During the emergency, mobile apps 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.

2.LITERATURE SURVEY

2.1.EXISTING PROBLEM

Topic: RFID based System for School Children Transportation Safety Enhancement

Abstract:

A device to monitor pick-up and drop-off of kid to enhance the wellbeing during daily transportation from school and to school. In this system there are two main units, a bus unit, and a school unit. The bus unit is the system which is used to determine when a child is boarding or leaving the bus. The information from bus unit is then sent to the school system that identifies the students that haven't board or leave the bus. It then issues an alert message. In this paper author has a developed a web-based and database-driven application for controlling of the device. This application provides beneficial details about the children to caregiver's personnel.

Topic: Smart IoT Device for Child Safety and Tracking

Abstract:

It provides guardians with the real-time tracking of location, UV radiation index, surrounding temperature, and SOS light with a Distress alarm buzzer for their kids to make people near child to know that child is in panic. It provides feature to locate their kid or alert bystanders so that they can act to comfort the child or rescue the child. In this device they have used Thing Speak, Micro Electro Mechanical Systems (MEMS), Node MCU, GPS, GSM and

Various sensors. This device gives the result for the parent in two different ways. The first one is they get an alert message (SMS) for the registered phone number. The next one is they receive a graphical representation which shows the Latitude,
Longitude, MEMS Sensor and Vibration sensor of the child's activities through "Thing Speak".

Topic: Child Safety Wearable Device

Abstract:

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 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.

Topic: A Smart Security for Child Safety

Abstract:

Child tracking is mainly based on two units GPS watch and Android monitoring unit. This wearable device unit consist of a GPS receiver, Flexi Force Sensor, Temperature Sensor and MEMS accelerometer. This security Wearable Device will keep the child safe. The parent will get the continuous update about their child temperature and various other factors, so that they not afraid about their child well-being when they are not with their kid. This would create some fear in the persons mind who are involved in child trafficking and harassment. As a well-known proverb "Prevention is better than cure", this application will act as a prevention for the child safety from harassment and kidnapping.

Topic: Safety Gadget

Abstract:

Child safety device consists of inbuilt Wi-Fi, GSM, GPS and Bluetooth modules. The link it one board is similar to the Arduino board and it is termed as all-in-one prototyping board for safety and IoT devices. The link it one is a robust development board for the hardware and also used for industrial applications. Different components such as temperature sensor, heartbeat sensor, panic button, contact switch are connected to the link it ONE board along with built in GSM, GPS modules. Safety gadget

consists of BEACON and BLE packet is transmitted through it, this packet is received by binding gadget which has BLE receiver module, the packet usually contains information such as identification number, signal strength etc. Temperature is one of the most commonly measured variables. For measuring body temperature of the child DS18B20 temperature sensor is used. The heartbeat sensor is used in the proposed system for measuring the pulse rate. There is a heartbeat/pulse sensor which is combined to simple optical heart rate sensor with amplification and nullification circuitry making it is fast and easy to get reliable pulse reading. The GSM/GPRS block is activated with a SIM card on the board. They mainly differ based on bandwidth and RF carrier. frequency. GSM network consists of mobile station, base station subsystem network and operation subsystem. The GPS module is provided for identifying the location of the child. GPS module receives the signals from satellites. The latitude and longitude of the location can be identified by the GPS module. The device sends the monitored parameters data such as temperature and pulse rate to cloud. If any abnormalities occurs in temperature or pulse rate readings, a SMS and call triggers to the parent/caretaker mobile phone immediately and also updated to the mobile app only for the registries mobile no. We can use mobile application, cloud and database as the back end of storing and retrieving information and also a device for monitoring.

2.2.REFRENCES

M Nandini Priyanka, S Murugan, K. N. H. Srinivas,T. D. S. Sarveswararao,

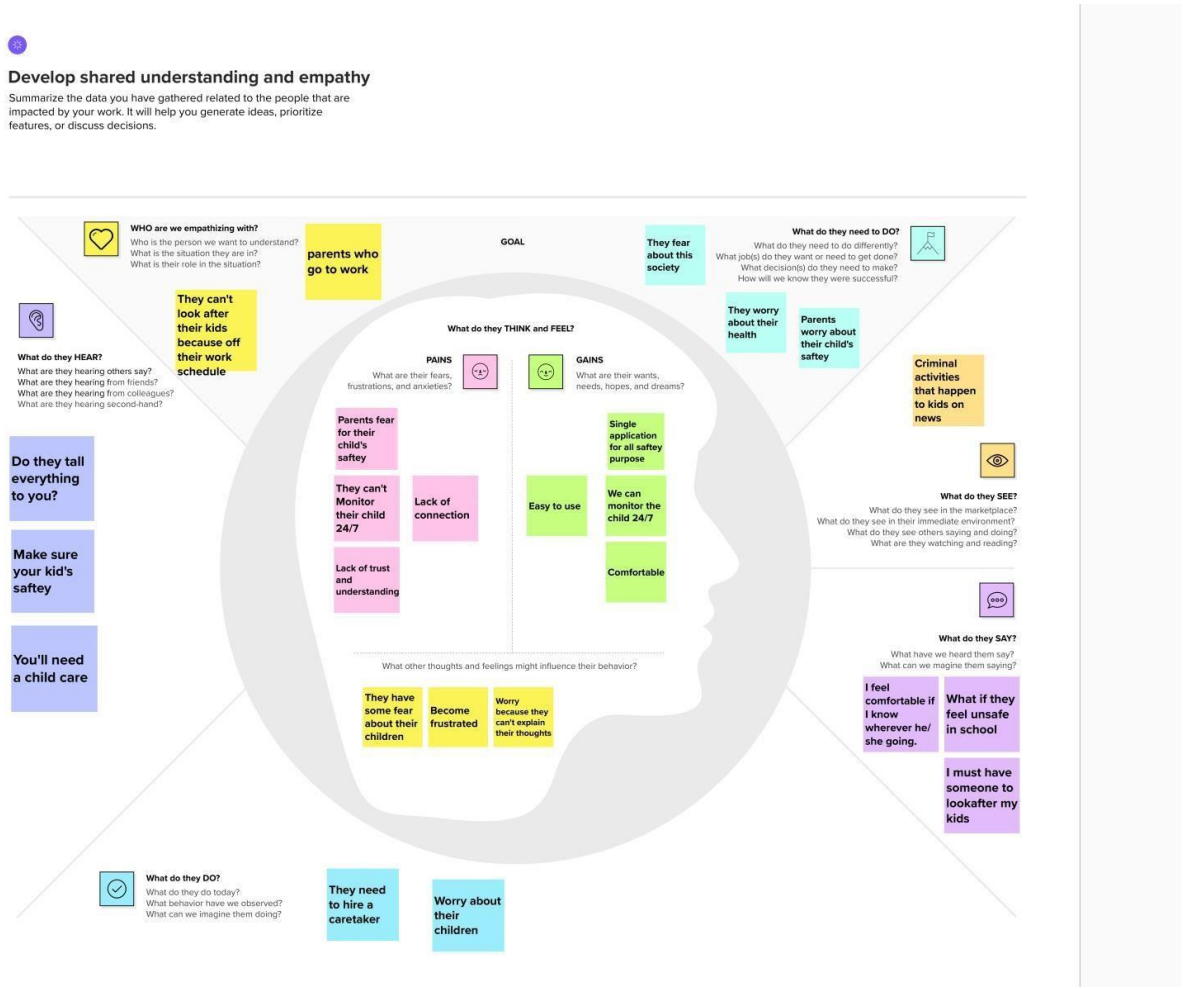
Kusuma Kumari, ‘Smart IoT Device for Child Safety and Tracking’ International Journal of Innovative Technology and Exploring Engineering, Volume 8, Issue 8, June 2019.

2.3.Problem Statement Definition

Problem Statement (PS)	I am(Customer)	I’m trying to	But	Because	Which makes me feel
PS-1	Parent-1	To take good care of my child	I’m a working person, I can’t able to look after my child 24/7	Of my work schedule	Frustated
PS-2	Parent-2	To ensure my child's safety	I can’t be there always	Of my profession	Worried
PS-3	Parent-3	Explain the good and bad about the society	they are innocent in nature	they trust everyone blindly	Unpleasant
PS-4	Parent-4	Listening to child’s problem seriously	Don't have enough time to do it	of my busy schedule	Pressurized
PS-5	Parent-5	To provide them a safe environment to live	I have to do it	It’s my responsibility	Responsible

3.IDEATION & PROPOSED SOLUTION

3.1.EMPATHY MAP CANVAS



Reference:

https://app.mural.co/t/premkumar1589/m/premkumar1589/1665765339558/168

53465544c64b7b0519a

f22776bcf1e9acc4d6?sender=udcb55bbd60239f8286

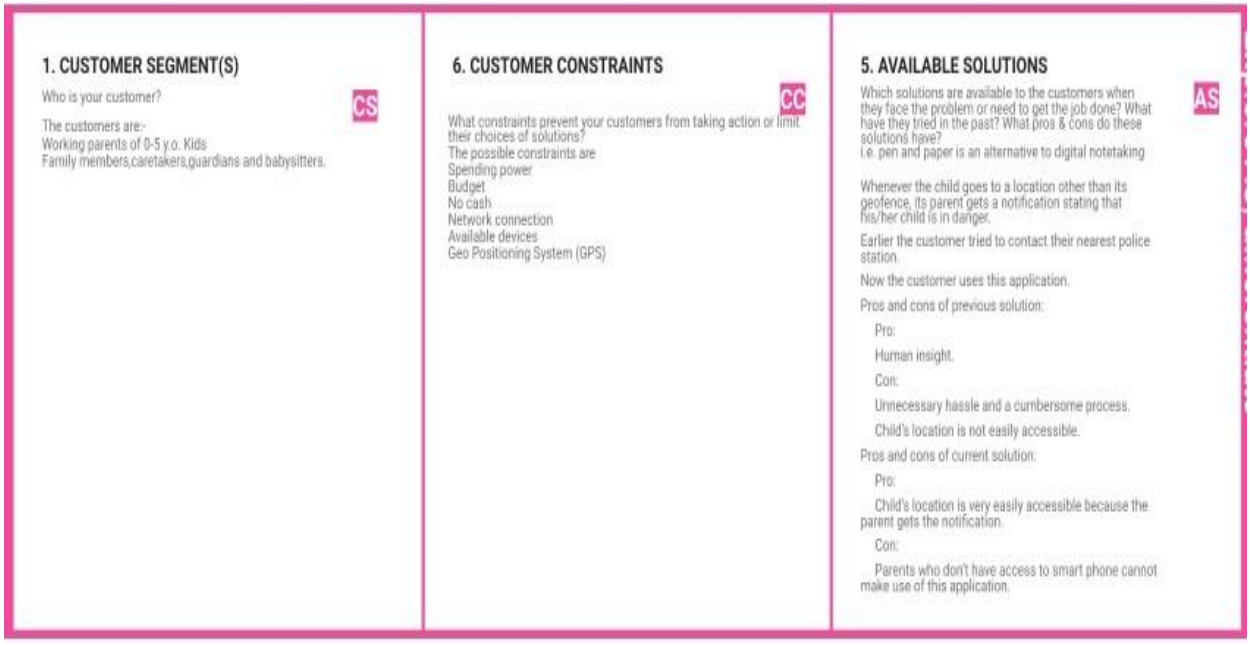
3.2.IDEATION & BRAINSTORMING

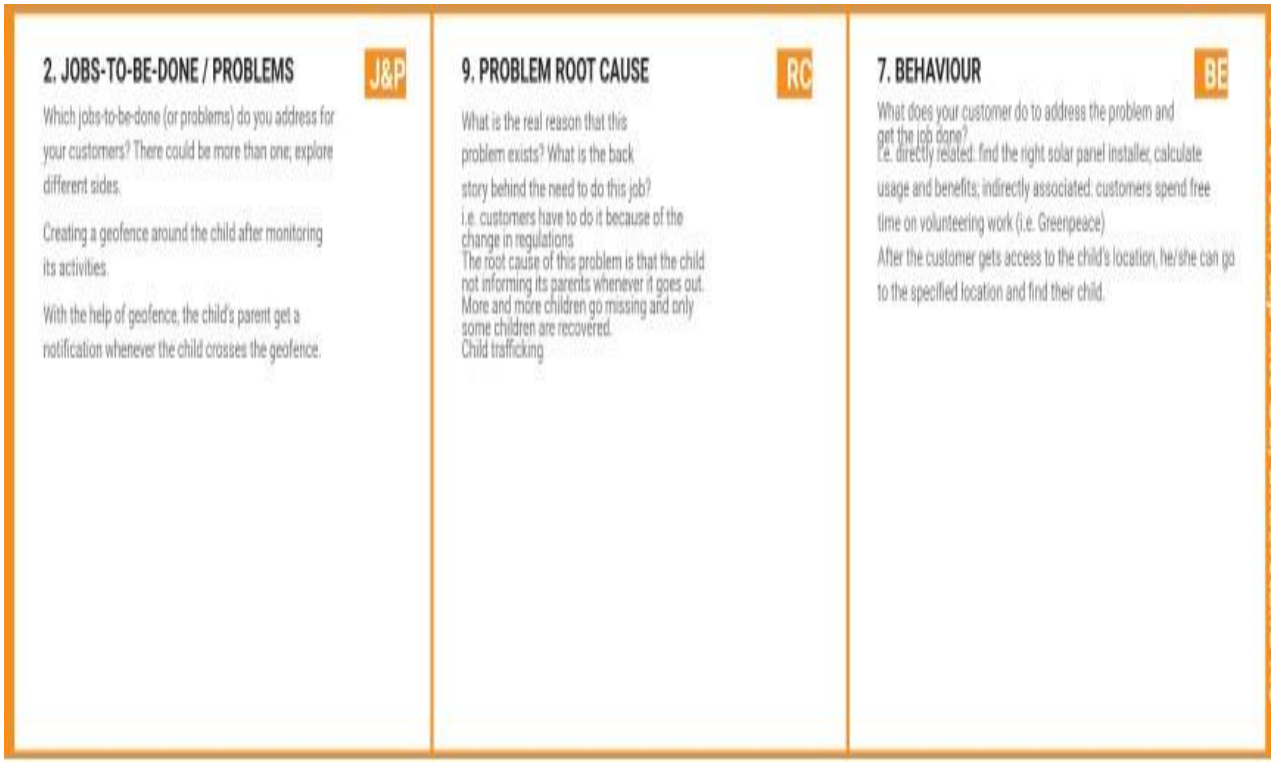
3.3.PROPOSED SOLUTIONS

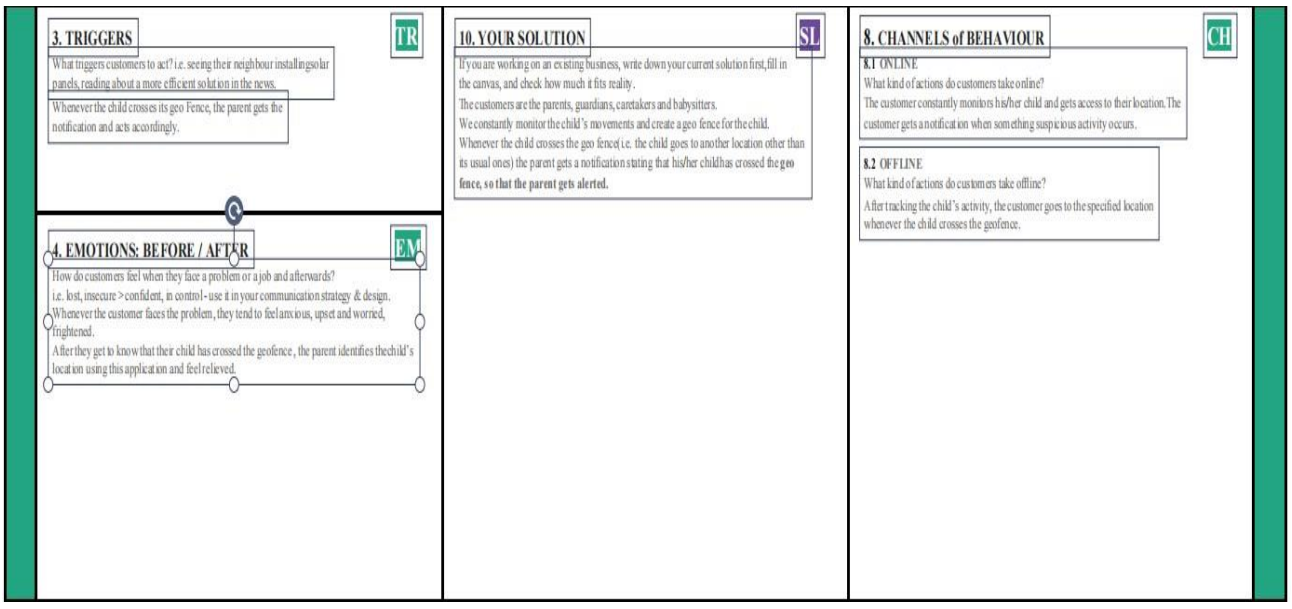
S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Parents who are engaged with with busy lifestyle who have no time to monitor their children and nowadays the misbehaviours against children are increasing at an exponential rate. They are under the threat of easily being kidnapped. So the parents needs a way to monitor their children continuously and detect early if there is any abnormal behaviour in their children surroundings so that they can do their duties efficiently rather than worrying about their children, This will indeed reduce the worries of the parents and create a safe environment
2.	Idea solution description	Parents need a way to monitor their children continuously and detect early if there is any abnormal behaviour in their children's surroundings so that they can do their duties efficiently rather than worrying about their children. This will indeed reduce the worries of the parents and create a safe environment.
3.	Novelty / Uniqueness	Even though there are many existing solutions for this problem they failed to satisfy the needs of customer .Some of the solutions are only detecting some particular issues where some other failed to alert the parents and other solution with some delays .Our solution not only notify the parents but also notify the persons who are nearer to the childlike teachers so that they can take control over the situation and our solution will alert the persons who are closer to the child's parents.
4.	Social impact /customer satisfaction	Our solution will be very helpful for the society and the people who are worrying about their child’s safety. Our solution will prevent many problems which are faced by children and we can able to stop crime. Through this project the parents mental pressure will be reduced and it is very helpful to provide a safer environment for the children.
5.	Business model (revenue model	The main target of our solution is Parents who are worrying about their children so we planned to visit workplaces and explain about the positives of our product. So that they can be aware of the importance of this solution and use it.

6.	Scalability of the solution	Our solution can be integrated for further future use because the solution we have provided will be lay on the basics or initial stage of any upgraded version

3.4.PROBLEM SOLUTION FIT




2. JOBS-TO-BE-DONE / PROBLEMS
J&P
Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.
Creating a geofence around the child after monitoring its activities.
With the help of geofence, the child's parent get a notification whenever the child crosses the geofence.
9. PROBLEM ROOT CAUSE
RC
What is the real reason that this problem exists? What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations
The root cause of this problem is that the child not informing its parents whenever it goes out. More and more children go missing and only some children are recovered.
Child trafficking
7. BEHAVIOUR
BE
What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)
After the customer gets access to the child's location, he/she can go to the specified location and find their child.


3. TRIGGERS
TR
What triggers customers to act? i.e. seeing their neighbour installingsolar panels, reading about a more efficient solution in the news.
Whenever the child crosses its geo Fence, the parent gets the notification and acts accordingly.
4. EMOTIONS: BEFORE / AFTER
EM
How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.
Whenever the customer faces the problem, they tend to feel anxious, upset and worried, frightened.
After they get to know that their child has crossed the geofence, the parent identifies thechild's location using this application and feel relieved.
10. YOUR SOLUTION
SL
If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
The customers are the parents, guardians, caretakers and babysitters.
We constantly monitor the child's movements and create a geo fence for the child.
Whenever the child crosses the geo fence(i.e. the child goes to another location other than its usual ones) the parent gets a notification stating that his/her childhas crossed the geo fence, so that the parent gets alerted.
8. CHANNELS of BEHAVIOUR
CH
8.1 ONLINE
What kind of actions do customers take online?
The customer constantly monitors his/her child and gets access to their location. The customer gets a notification when something suspicious activity occurs.
8.2 OFFLINE
What kind of actions do customers take offline?
After tracking the child's activity, the customer goes to the specified location whenever the child crosses the geofence.

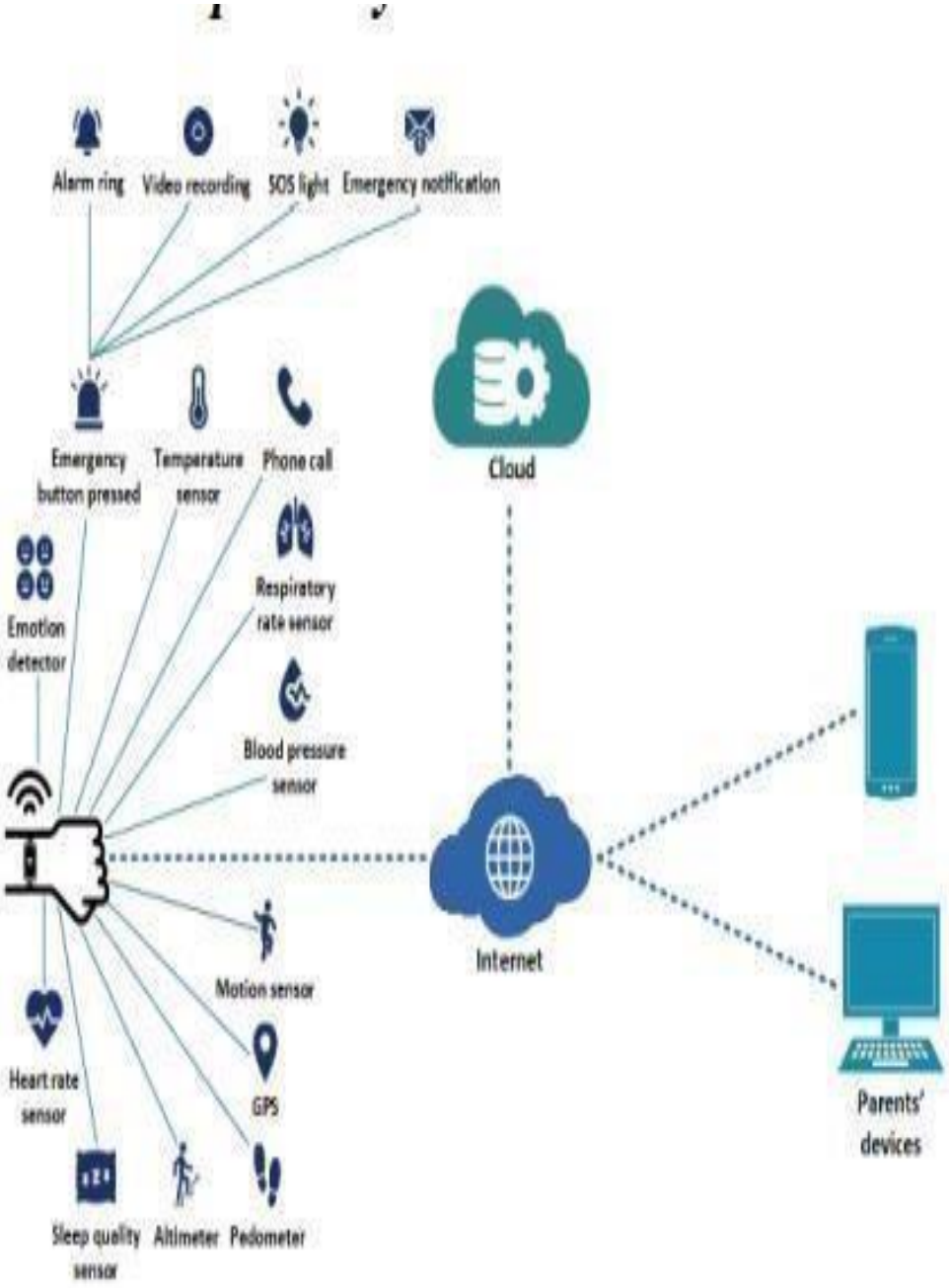
4. REQUIRMENT ANALAYSIS

4.1Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Communicate and exchange information to provide server for user	To monitor the children's location continuously in schools or parks. Alert the parent if the child crosses the geofence through SMS.
FR-2	Continuous monitoring	Create the geofence around child location. Continuously monitoring the child location. Notifications send when child cross the geofence and chid face any issues.
FR-3	User requirement	Easily upgrade to any environments. Easy to handle. Gives more accuracy. Low power consumption.

FR-4	Mandatory	The system will send the detail of location information the system via 3G network or Wi-Fi. Accuracy of location is important. The system should be scalable. The entire location data will be stored
FR-5	Testing Set the geofence.	The device is kept together with the children. Create geofence around the child location in school or parks, if child crosses the geofence notify to the parents Notifications sent in the form of SMS.
FR-6	Architecture	(Image)


Alarm ring
Video recording
SOS light
Emergency notification
Emergency button pressed
Temperature sensor
Phone call
Cloud
Emotion detector
Respiratory rate sensor
Blood pressure sensor
Internet
Motion sensor
Heart rate sensor
GPS
Sleep quality sensor
Altimeter
Pedometer
Parents' devices

4.2 Non-functional Requirements:

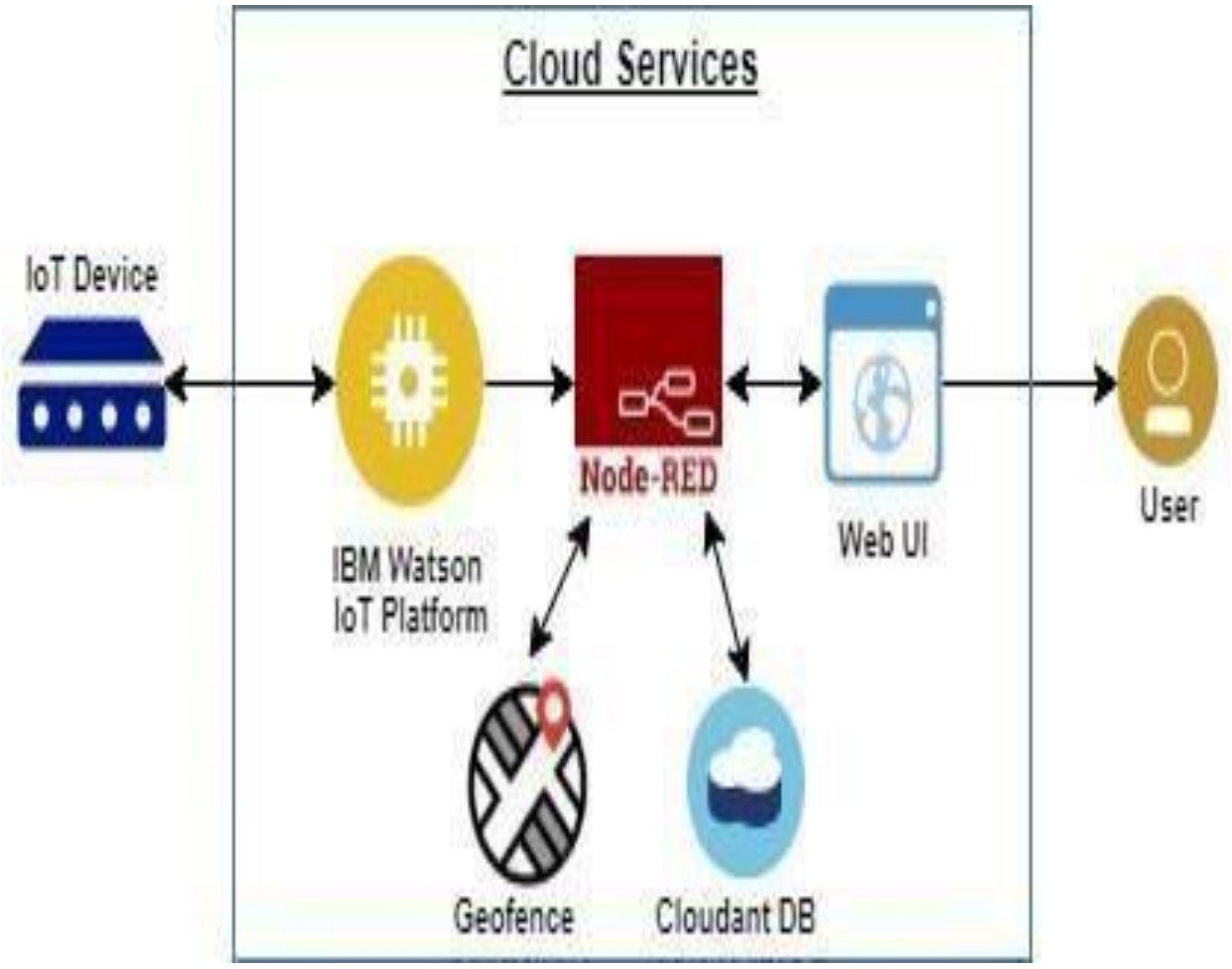
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	High usability of user experience design for user, Which is usable for finding the children if they lost.
NFR-2	**Security**	The system can accessed by authorized persons only.
NFR-3	**Reliability**	Monitoring the location continuously and easy to upgrade the system .
NFR-4	**Performance**	The performance should be more effective and efficient. The location data will be stored.
NFR-5	**Availability**	If we are going to upgrade the system or make any changes in the system it will not take much time to recovery.
NFR-6	**Scalability**	The website traffic limit must be scalable enough to support users at a time.

5.1.Data Flow Diagram

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is store



5.2 SOLUTION & TECHNICAL ARCHITECTURE

Introduction:

Solution architecture is an architectural description of a specific solution with many data sources that bridges the void between industrial obstacles and technology solutions.

Its aims to

- Find out the finest tech solution to decipher subsisting business crises.
- Also Outlines the composition, attributes, behaviour, and other aspects of the software to project stakeholders.
- Defines the properties, development chapter, and quick fix essentials.
- And also produce the stipulation in accord to which the solution is interpreted, controlled, and dispatched. It is comprised of many sub processes that draw the guidance from various enterprise Architecture viewpoints.

REQUIREMENTS:

The requirements of this project are

- Embedded C
- Python framework For AVR,ARM and in addition for Wiring as Device Boot Loader.
- IBM Cloud workspace for depository and APIs.
- The front end by XML for android.

DESIGN:

All the requisite are used to draft the Application. The layout and architecture of the software are done in a distinctive approach so the software can be employed and developed imminently. The Arduino acquires the region from the GPS equipment and consigns it to the cloud to inspect if the end user is within the confined zone. If the user is further away from the confined zone, an alert is sent to the catalogued mobile through the cloud. When the requisition is opened, the locality is obtained from the cloud and unveiled on the mobile.

IMPLEMENTATION:

The implementation is done and executed by progressing the logic and coding. Where the vital packages are imported and for each router specific logic is developed in accordance to the usage. Development of a safety device for kids to guarantee their security in the absence of understated examination of their parents.

The various aspects involve:

- GPS
- Signal by Notification

INDIVIDUAL TESTING:

- Every portion of the software is to be designed by discreet team members.
- Also tested individually by the python unit testing IOT.

INTEGRATION AND TESTING:

After individual testing, all the software sections were integrated and tried out ultimately, so the flask program could be run on any platform. The testing progression encompasses Alpha testing and Beta testing.

DEPLOYMENT:

- The flask application in the long run is distributed in the IAAS rostrum like IBM cloud assistance, so it can be run in HTTPS protocol alongside SSL.
- In the deployment process, a real-time database is fastened on the edge of real time file storage.

MAINTENANCE:

After deployment, if there is any conglomeration refurbish, it is accomplished in the software.

SOME CATASTROPHIC FEATURES IN THE DEVICE:

1. ALARM RING:

The safety system redirects a warning to the phone at any occasion, it determines any pursuit. Arming methodology decides which category of alerts to get.

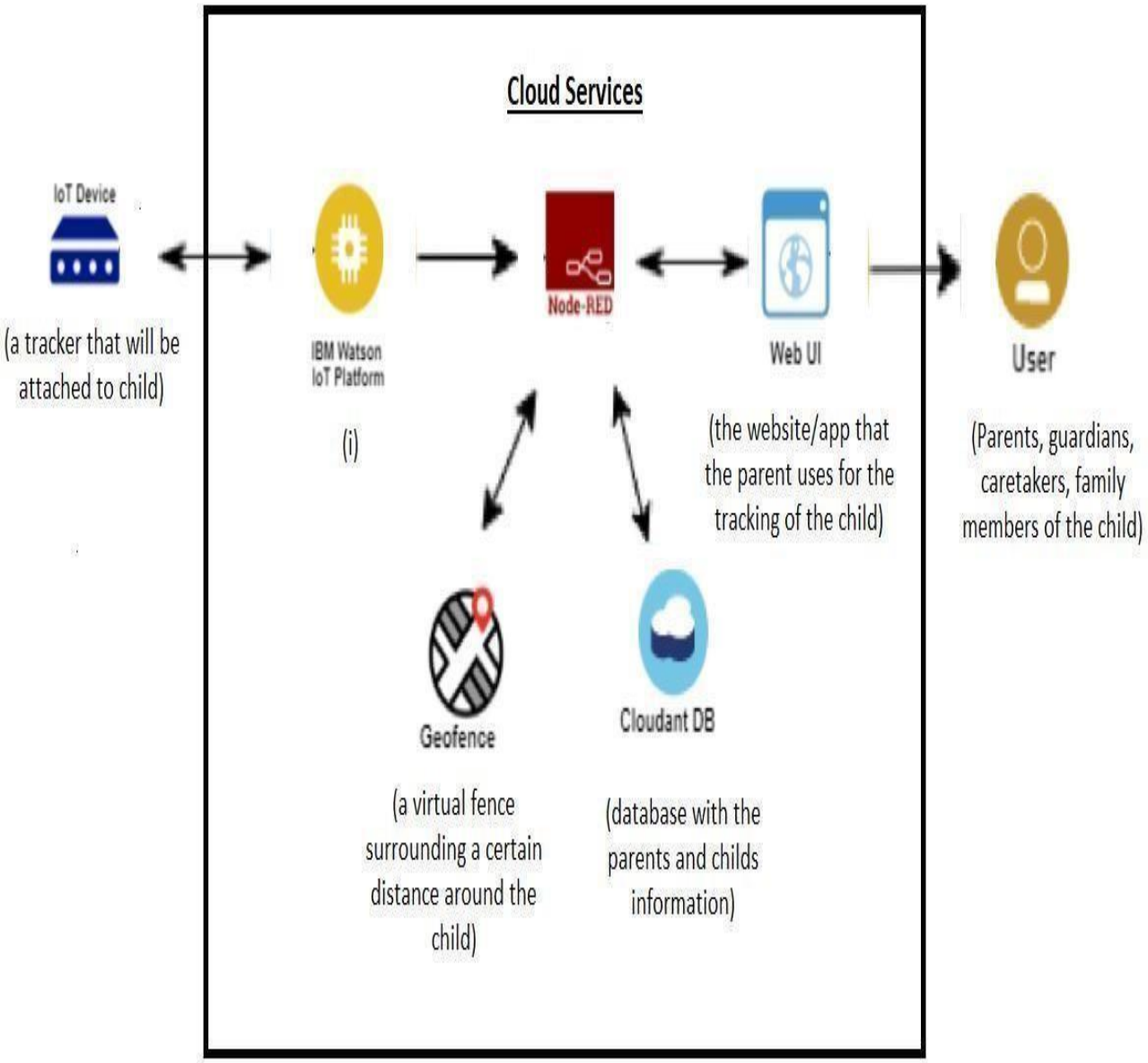
2. EMERGENCY NOTIFICATION:

An emergency notification system is a labour-saving mechanism to get in touch with group of people within a corporation and assign salient information during a crisis.

3.GPS:

The GPS helps to escalate the protection and fitness characteristics on the device. Depending on the device, it can alert parents about their child's location in case of any crisis and helps to trace their route duration and distance.

SOLUTION ARCHITECTURE DIAGRAM:



5.3 USER STORIES

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Parent/Guardian)	Registration	USN-1	As a user, i can login my email	Now i can get the confirmation from login credentials	Low	Sprint-2
		USN-2	As a user, I will connect to the application	With the login id ,I access to the device	High	Sprint-1
		USN-3	As a user my location gets automatically detected and updated from database	Now I can monitor the child's location using the device	Medium	Sprint-2

		USN-4	As a user, if the device crosses the geo fencing area	Now I can receive the alert message from the device	High	Sprint-1

6.1 SPRINT PLANNING &ESTIMATION

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a Parent/Guardian,I can register for the application by entering my email, password, and confirming my password.	2	High	CHANTHIKA, KAYALVIZHI, KEERTHANA, REVATHI
Sprint-1		USN-2	As a Parent/ Guardian, I can register for the application through Gmail	1	Medium	CHANTHIKA, KAYALVIZHI, KEERTHANA, REVATHI
Sprint-1	User Confirmation	USN-3	As a parent I will receive connection , location in sms / mail once I have entered this application	1	High	CHANTHIKA, KAYALVIZHI, KEERTHANA, REVATHI
Sprint-1	Login	USN-4	As a parent/ guardian , I can log into the application by entering mail and password.	2	High	CHANTHIKA, KAYALVIZHI, KEERTHANA, REVATHI

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	27-Oct-2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	03-Nov-2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	08-Nov-2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	15-Nov-2022

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

6.2 SPRINT DELIVERY SCHEDULE

Milestone Name	Activities	Description	Date
Prerequisites		Create the IBM account and download the necessary software for your chosen category of the project	27/08/22
Ideation Phase	Literature Survey	Literature survey on the selected project by gathering and referring research paper and publications	29/08/22

	Empathy Map	Create an empathy map list the user's pains and gains	19/09/22

	Problem Statement	Summarize the problem that customer needs to be solved	19/09/22

	Brainstorming	Gather many different ideas from the team mates and prioritize the idea based on feasibility and innovative	19/09/22
Project Design Phase -1	Proposed Solution	Prepare the proposed solution document that you proposed to solve the problem statement which should include feasibility, business model … etc.	23/09/22
	Solution Architecture	Prepare Solution architecture diagram for the proposed solution	22/09/22
	Problem Solution Fit	Prepare Solution Fit Document for the proposed solution	19/09/22
Project Design Phase -2	Customer Journey Map	Prepare a customer journey map to understand how the user interact and experience your product	22/10/22

	Data Flow Diagram	Draw the data flow diagram for you proposed solution	22/10/22
	Solution Requirement	Create a solution requirement document for the proposed solution	07/10/22
	Technology Stack	Prepare the technology stack diagram for the proposed solution	23/10/22
Project Planning	Milestone And Activity List	Create a document to show your milestones as well as activity in your development cycle	17/10/22
	Sprint delivery plan	Create a sprint plan for the project	20/10/22
Project Development Phase	Sprint-1	Delivery of the sprint-1	27/10/22
	Sprint-2	Delivery of the sprint-2	03/11/22
	Sprint-3	Delivery of the sprint-3	08/11/22
	Sprint-4	Delivery of the sprint-4	15/11/22

7.CODING & SOLUTIONING

7.1 FEATURE 1 (ADDING GEOFENCE)

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

```
package com.example.geofence;  import
android.app.PendingIntent;  import
android.content.Context;  import
android.content.ContextWrapper;  import
android.content.Intent;import android.widget.Toast;
import
com.google.android.gms.common.api.ApiException;
import com.google.android.gms.location.Geofence;
import
com.google.android.gms.location.GeofenceStatusCodes;
import
com.google.android.gms.location.GeofencingRequest;
import com.google.android.gms.maps.model.LatLng;
public class GeofenceHelper extends ContextWrapper {
private static fifinal 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,
flfloat  radius,int transitionTypes) {  return new
Geofence.Builder()
.setCircularRegion(latLng.latitude,
latLng.longitude,  radius)  .setRequestId(ID)
.setTransitionTypes(transitionTypes)
.setLoiteringDelay(5000)
.setExpirationDuration(Geofence.NEVER_EXPIRE)
.build();
}  public PendingIntent
getPendingIntent() {  if
(pendingIntent != null) {  return
pendingIntent;
}
Intent = 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) e;
switch
(apiException.getStatusCode()) {
case GeofenceStatusCodes
```

.

```
GEOFENCE_NOT_AVAILABLE:
return "GEOFENCE_NOT_AVAILABLE"; case
GeofenceStatusCodesGEOFENCE_NOT_AVAILABL
E:
return
"GEOFENCE_NOT_AVAILABLE"; case
GeofenceStatusCodes
.GEOFENCE_TOO_MANY_GEOFENCES:
return "GEOFENCE_TOO_MANY_GEOFENCES";
case GeofenceStatusCodes
.GEOFENCE_TOO_MANY_PENDING_INTENTS:
return
"GEOFENCE_TOO_MANY_PENDING_INTENTS";}}
```

7.2 FEATURE 2 (ALERT NOTIFICATION)

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

```
package com.example.geofence; import
android.content.BroadcastReceiver;import
android.content.Context; import
android.content.Intent; import
android.location.Location;import
android.os.CountDownTimer;import
android.util.Log; import
android.widget.Toast; import
com.google.android.gms.location.Geofenc
```

```
e;  import
com.google.android.gms.location.Geofenci
ngEvent  import java.util.List;  import
android.os.Handler;
public class GeofenceBroadcastReceiver
extends  BroadcastReceiver {  private
static fifinal String TAG =
"GeofenceBroadcastReceiv";
@Override     public   void   onReceive(Context
context, Intent intent) {
// TODO: This method is called when theBroadcastReceiver is receiving
// an Intent broadcast
//.
/*Toast.makeText(context,
"GEOFENCE_ENTERED",
Toast.LENGTH_SHORT).show();  fifinal 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.ca
ncel();
}
};
// Show the toast and starts the countdown
mToastToShow.show();
toastCountDown.start();*/NotifificationHelper = new
NotifificationHelper(context);
notificationHelper.sendHighPriorityNotification("GEOFENCE_TRANSITIO
N
_EN
TER",
"", MapsActivity.class);
GeofencingEvent = GeofencingEvent.fromIntent(intent);
If (geofencingEvent.hasError())
Log.d(TAG, "onReceive: Error receiving geofence event...");
return;
}
List<Geofence> geofenceList =
geofencingEvent.getTriggeringGeofences
();  for (Geofence: geofenceList) {
Log.d(TAG, "onReceive: " + geofence.getRequestId());
}
//
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_EXI
T:
notificationHelper.sendHighPriorityNotification("Exited the
Location ", "",  MapsActivity.class);  break;} } }
```

7.3 DATABASE SCHEMA

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

Moto X play Mobile Device	1	Communication Hardware	OS:Android Qualcomn Snapdragon 615 Octa-core Memory:32GB
Google\Asus Table	1	Communication Hardware	OS:Android Quad-core 1.2GHZ Cortex-A9 Bluetooth 3.0 Memory:1GB
Sony Xperia D5803	1	Communication Hardware	OS:Android Qualcomm MSM8974AC

			snapdragon RAM:2GB Memory:16GB Bluetooth 4.0
Cloud Storage Amazon EC2	1	Communication Hardware	OS:Ubuntu Memory:1GB RAM:2GB

8.TESTING

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage_TC_001	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button		1.Enter App 2.Verify login\signup popup displayed or not		Login/Signup popup should display	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
LoginPage_TC_002	UI	Home Page	Verify the UI elements in Login/Signup popup		1.Enter App 2.Verify login\signup popup with below UI elements: a.email text box b. password text box c.Login button d.New customer?Register		Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Create account link e.Last password? Recovery	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with Valid credentials		1.Enter App 2.Enter Valid usernamememail in Email text box 3.Enter valid password text box 4.Click on login button	Username: abcd@gmail.com password: Testing123	User should navigate to user account homepage	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter App 2.Enter In Valid username/email in Email text box	Username:abcd@gmail.com password:Testing123	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter App 2.Enter In Valid username/email in Email text box 3.Enter Invalid password in password text box	Username: sec19ec020@sairamtap.edu.in password: Testing1236786867868768	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass				Chanthika Kayalvizhi Keerthana Revathi
LoginPage_TC_005	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter App 2.Enter In Valid username/email in Email text box 3.Enter Invalid password in password text box	Username: abcd password: Testing1236786867868768 76	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
Dashboard	Functional	Dashboard	Adding geofence in the location need		1.Enter App 2.Enter the valid username and password		Application show a red circle around the location	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi
Alert Notification	Functional	Notification	Notification when the user entered the geofence		1.Enter App 2.Enter the valid username and password 3.Add the geofence		Application sent the notification" Entered the location"	Working as expected	Pass		Y		Chanthika Kayalvizhi Keerthana Revathi

8.2 USER ACCEPTANCE TESTING

8.2.1. DEFECT ANALYSIS

Resolution	**Severity 1**	**Severity 2**	**Severity 3**	**Severity 4**	**Subtotal**
By Design	11	4	2	2	19
Duplicate	1	1	2	0	4
External	2	3	0	1	6
Fixed	10	2	3	20	35
Not Reproduced	0	0	2	0	2
Skipped	0	0	2	1	3
Won't Fix	0	5	2	1	8
Totals	24	15	13	25	77

8.2.2.TEST CASE ANALYSIS

Section	Total Cases	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

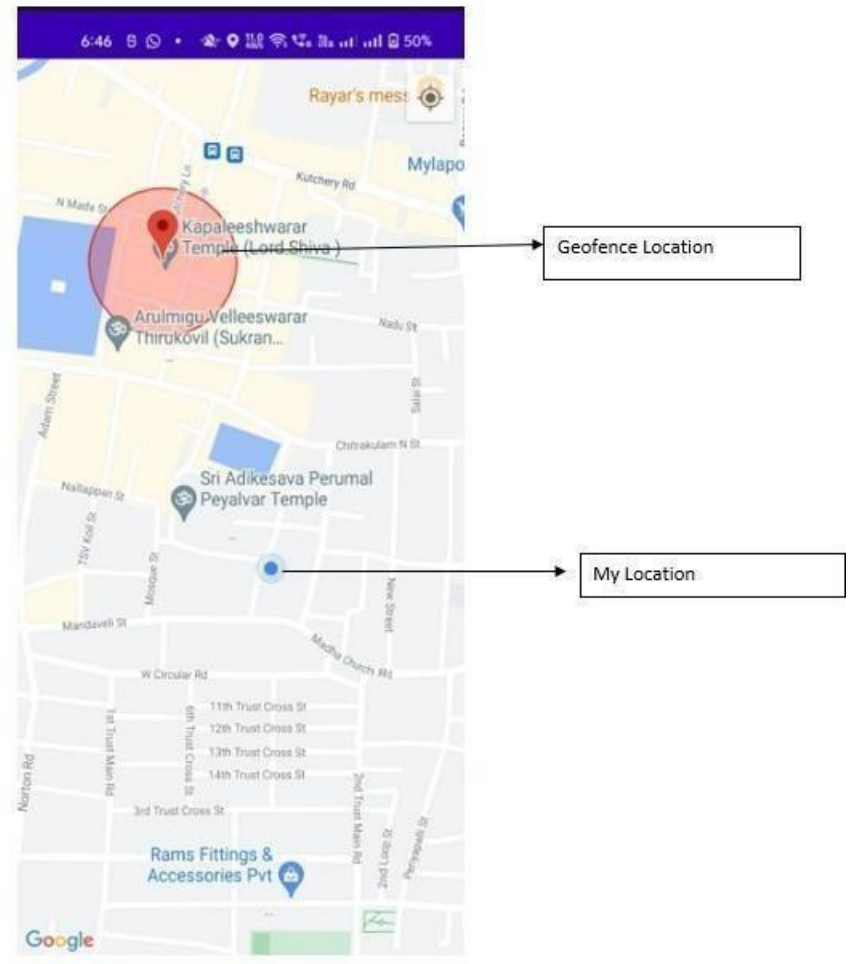
9.RESULTS

9.1 PERFORMANCE METRICS

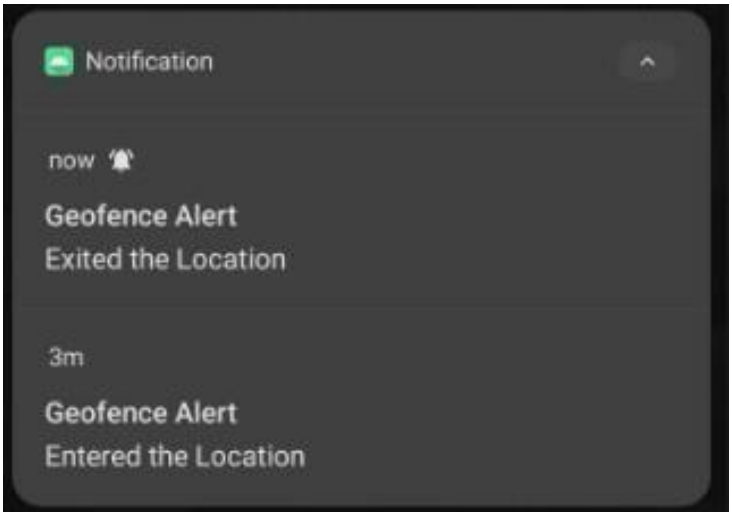
ADDING GEOFENCE AND ALERT NOTIFICATION

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

Geofence:



NOTIFICATION:



10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

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

DISADVANTAGES:

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

11.CONCLUSION:

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

12.FUTURE SCOPE :

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

13.APPENDIX

SOURCE CODE

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
#Provide your IBM Watson device credentials
organization ="1tjvme" #replace it with organization ID
devicetype ="abcd" #replace it with device type
deviceId ="1002" #replace with device id
authMethod ="token"
authToken ="1234567890" #replace with token
def mycommandCallback(cmd):
        prin("command received: %s" % cmd.data)
        if cmd.data['command']=='lighton':
                        print("LIGHT ON")
        elif cmd.data['commamnd']=='lightoff':
                                print("LIGHT OFF")
try:
deviceoptions = {"org":organization, "type": deviceType, "id":deviceId,
"auth-method": authMethod,"token": authToken}
deeviceCli = ibmiotf.device.clint(deviceoptions)
#.....
except Eception as e:
print("Caught exception connecting device: %s" % str(e))
```

```
sys.exit()
deviceCli.comment()
while True:
        L1=19.1712;
        L2=83.4163;
        #send Latitude & Longitude to IBM Watson
        data ={'d':{ 'lat' :L1, 'lon':L2}}
        #print data
        def mtOnPublishCallback():
                print ("published Latitude =%s C" % L1, "Longitude = %s %%" % L2, "to IBM watson")
        success = deviceCli.publishEvent("event", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not sucess:
                print("Not connect to IoTF")
        time.sleep(1)
        deviceCli.commandCallback = mycommandcallback
# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

GitHub link: https://github.com/IBM-EPBL/IBM-Project-53842-1661501064.git

Demo video link : https://youtu.be/EW13a_ix0yw