IoT-Based Safety Gadget for Child Safety Monitoring &Notification

1. INTRODUCTION:

1.1: PROJECT OVERVIEW:

The child abusements are now a days increasing rapidly. In the world every 40 seconds kids are getting kidnapping and missing. To overcome the problem the safety gadget which is going to be very helpful for the Parents/ Guardians to monitor their children this safety monitoring gadget is going to be helpful for the children's and children's to protect them from unwanted cause.

1.2: PURPOSE :

The main purpose of this project is providing safety the child where parents fell very uncomfort to the child this device will be very helpful for the parents . even children's feel very free and comfort . the main aim and purpose of this project is making the safety and security to the children's with the help of internet of things . this phase and gadget is not only useful for the children's even the aged people can also use this gadget for their safety and security.

2. LITERATURE SURVEY:

2.1: EXISTING PROBLEM:

The method terminated with determining and analysing the child's heart rate, temperature and the activities of the child and it also combined with the error signal button it is defined as the button where when the student feels insecure and other negativity aspects if the child press the button the message and the signal will be directly delivered to the parental device. The panic button is connected with the board so that it can able to make signal faster and easier.

2.2: REFERENCES :

2.2.1: IOT Based Smart Gadget for Child Safety and Tracking

AUTHOR : N.KOMAL
YEAR: 2020

the block diagram of the proposed child safety device. It 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.

2.2.2: Design and implementation of wireless IoT device for women's Safety

AUTHOR: JANNATUL FEDRAUS KHAN

YEAR: 2022

As daily newspapers and telecast media gets flooded with rape and murder of young children and women, it becomes a national duty to safeguard their safety at all times. According to a statistic, more than a thousand children and women were raped from between January and October 2020 in Bangladesh. More than 2,700 cases of violence against women and children have been reported, including rape.

According to the World Health Organization (WHO), one in three women is a lifelong victim of sexual violence. With the number of atrocities increasing every year, the need to alert someone for help using an advanced system becomes a necessity.

2.2.3: Be Safe: IoT-Based Safety Band

AUTHOR: Ganesh Jambuka

YEAR: 2022

Women nowadays do not feel safe, either inside or outside of their homes. The crime rate is high, and accidents happen on every other route for various reasons. As a result, we proposed the idea of a safety band to help women and victims in critical situations. Given the circumstances, we devised a method for a woman to obtain administrative assistance on time. The Bluetooth module will help to connect hardware with software. We used a band for hardware and a mobile software application. Our technology will help women who have been sexually harassed, as well as victims of accidents or other crises, by tracking and communicating their real-time location, to the family and the police via Short Message Service (SMS) using the Global System for Mobile Communications (GSM) module and Global Positioning System (GPS) module while the victim is in the process of being tracked.

2.3: PROBLEM STATEMENT DEFINATION:

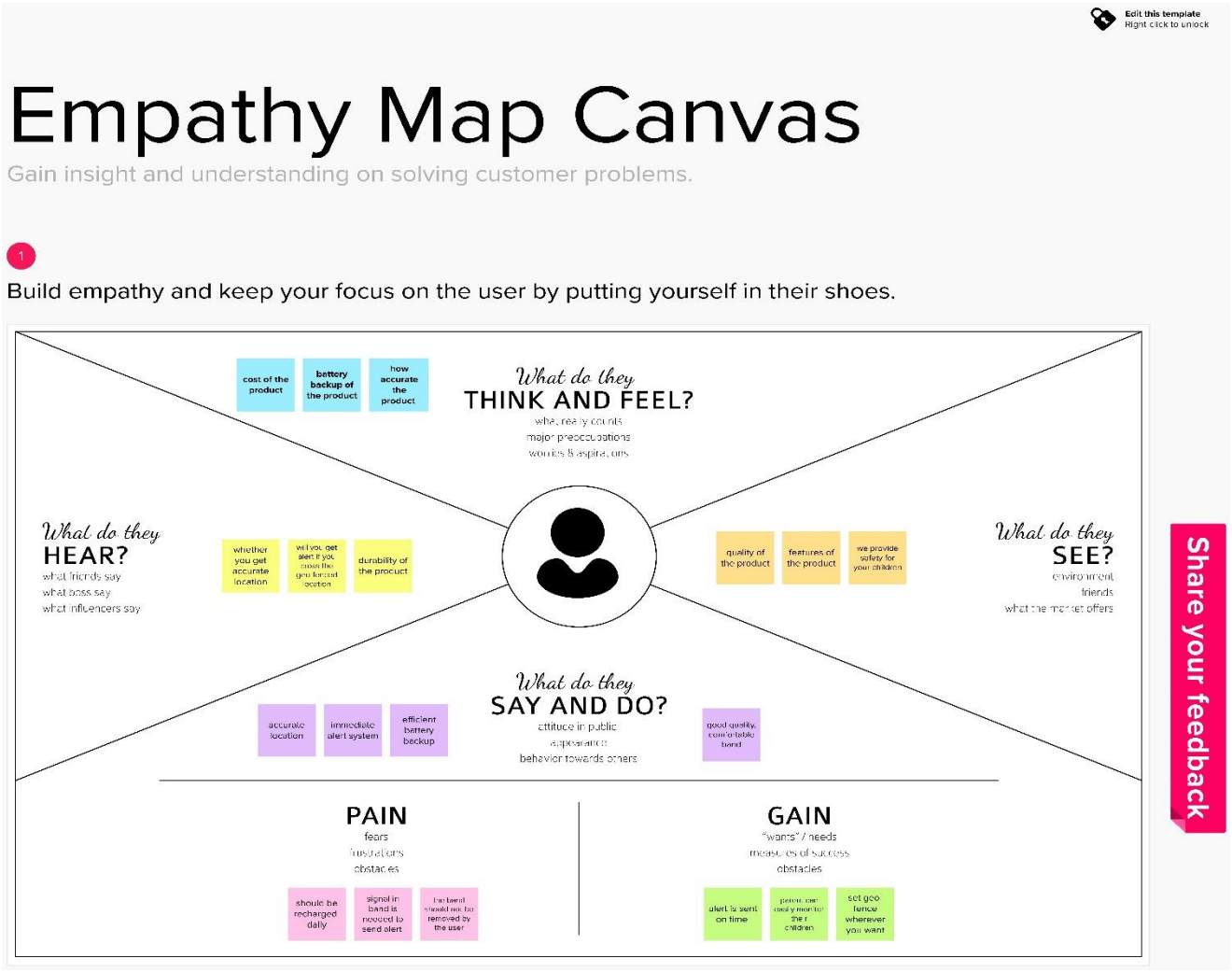
Most of the parents in the home used to go for office so they can't take more care about their children's . In this scenario this device will be very helpful for the parents to monitor their children's. Since children's don't have much consciousness about their limit from home. So the monitoring process is very important for them . There are many member of students studying in the school's So the management cannot maintain all the students the care will be must less as compared as home. Even some students travel to school in the private transportation. So at this case scenario parents need not to get panic at this case. Students facing personal issues and disturbed in minds . This device will be more important for that students to take care of their

belongings. Some students even play even in the parks and playground . So the parents need not to get panic of their belongings. They can monitor their exact locations.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:

Empathy map simply implies design phase. We and assign and share our demonstration idea's through empathy map. Empathy map focus and says about all the aspects of the project or assignment . It generally deals with the idea logy of our as well as the environment deliverables. It also defines all the role that is going to play in the design phase. Empathy map also defines the pros and cons of the developing application.



3.2IDEATION & BRAINSTROMING:

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 can easily understand and use.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A mother	Look after my child	I can't be with him all the time	Having lot of be done	Worried about his safety
PS-2	A child	Give information about my location frequently	I can't achieve	I tend to forget	worried

BRAINSTROMING:

It is a problem solving technique mainly used for creating and solving technique we can evaluate creatively and innovatively . It is used for improving and analysing the industries ideation phase project and implement the project phase in the real time entity. The main motto and aim of this objective is it will withstand all the ideas and implementation phase in the table represented manner. In brain shell the nutshell is one of the important phase of the Brainstorming because it will be represented as the table represented manner. We can also develop our idea with the table format and solve the existing system and we can propose the proposed system.

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

ADHITHYAN

CHILD SAFETY | INSIDE THE REGION | EASY TO UNDERSTAND

THE PRODUCT USED BY CHILDREN | NO INTERSTION FOR CHILD | PARENTS SHOULD EASILY MONITOR CHILDREN

DHUVARAKESH

PARENT MONITOR DATA | IF THERE IS PROBLEMS, PROBLEM FOR CHILD CAN GET VERIFIED | PARENTS SHOULD CAREFULLY MONITOR RANDOMLY

PROPER USER INTERFACE | SHOULD NOT BE DIFFICULT TO OPERATE | THE PARENT DEVICE GETS AFFECTED

HEMANT SARANRAJ

SOME CONNECTIVITY ISSUES MAY OCCUR FROM THE SATELLITES | THE PRODUCT MUST BE PERFECTLY MAINTAINED | IF SIGNALS SURROUNDS AGAIN AND AGAIN IN SAME DIRECTIONS

ALERT WHILE CHILD TRIES TO REMOVE THE PRODUCT | ALERT MESSAGE SHOULD BE POWERFUL | SIGNAL SHOULD BE FASTER TO TAKE ACTIONS

ABERNESH

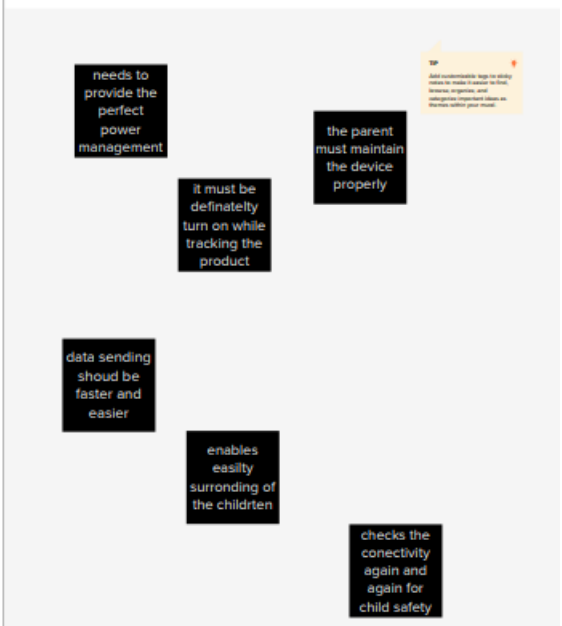
PARENT GET MORE PERIO ABOUT THE CHILDREN | THE PRODUCT SHOULD NOT BE DISCONNECTED | CHILDREN SHOULD NOT GET DISTURBED

THE GEOFENCE RANGE MUST BE LARGE | SURROUNDING AROUND THE CHILD | ENSURE THE CONNECTIVITY AGAIN AND AGAIN

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

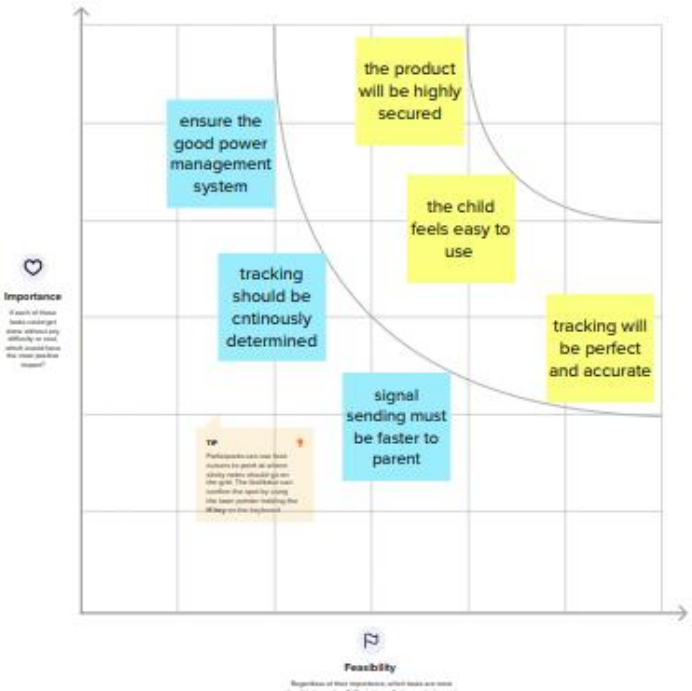
20 minutes

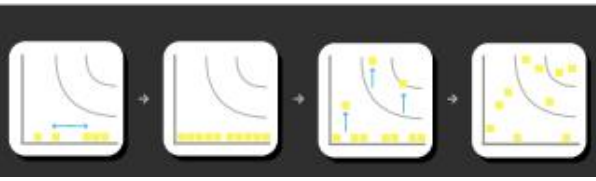


4 Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes





After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

Share the mural
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

Export the mural
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

Share template feedback

3.3 : PROPOSED SYSTEM:

The system mainly controls and it works and the concept of the geofencing . Simply the geofencing is nothing but the circle or radius being fixed by the parent device and the product will be denoted when the project gets out from the marked region then the parent will indicate the warning signal this is how the geofence concept works. So this methodology will be helpful for the people who goes to office daily and they can monitor their child easily . Now a days children kidnapping in the world increases drastically so with the help of this IOT based devices we can able to reduce this kind of non-relevant activities . The panic button in the device even help the child to protect from the kidnappers. If the child presses that button the warning message will be automatically send to the parent device. This technology here mainly uses the WIFI concept for the geofencing concept. The device can even monitor the students healthcare such as hearth rate , pulse rate, temperature sensor and it will even work as the concept of the smart watches.

The GPS which enables and helps us to locate the exact identity of the area and the child band device . The GPS and WIFI here plays a vital role in the IOT devices. Even if the device gets disconnected form the located phase then also the parent device gets the alarm indication to the parent device. If the gadget is unplugged it will store the last seen data in the parent device . Boundary monitoring system helps us to maintain and edit by the locations marking of the geofencing tool.

PROBLEM STATEMENT(PROBLEM TO BE SOLVED):

In this current world, child safety is important. Parents cannot be in the surrounding of their children and they can't be monitored always, each and every child cannot be secured by security as they are in school they can be monitored by the teachers and staffs present there but in parks and other areas, there will be no one to monitor them.

IDEA/ SOLUTION DESCRIPTION:

This is based on child safety and a gadget is developed to monitor the child's location continuously. They can leave their children in school or parks and create a geo-fence around the particular location. Notifications will be generated if the child crosses the geo-fence. Notifications will be sent according to the child's location to their parents or caretakers.

NOVELITY / UNIQUENESS:

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

SOCIAL IMPACT / CUSTOMER SATISFACTION:

The main aim of this project is to assists the parents to monitor their children remotely. In case situations happen, notifications will be sent to parents so that actions can be taken. Through this, child safety can be ensured and crime rate will be reduced.

BUSINESS MODEL(REVENUE MODEL):

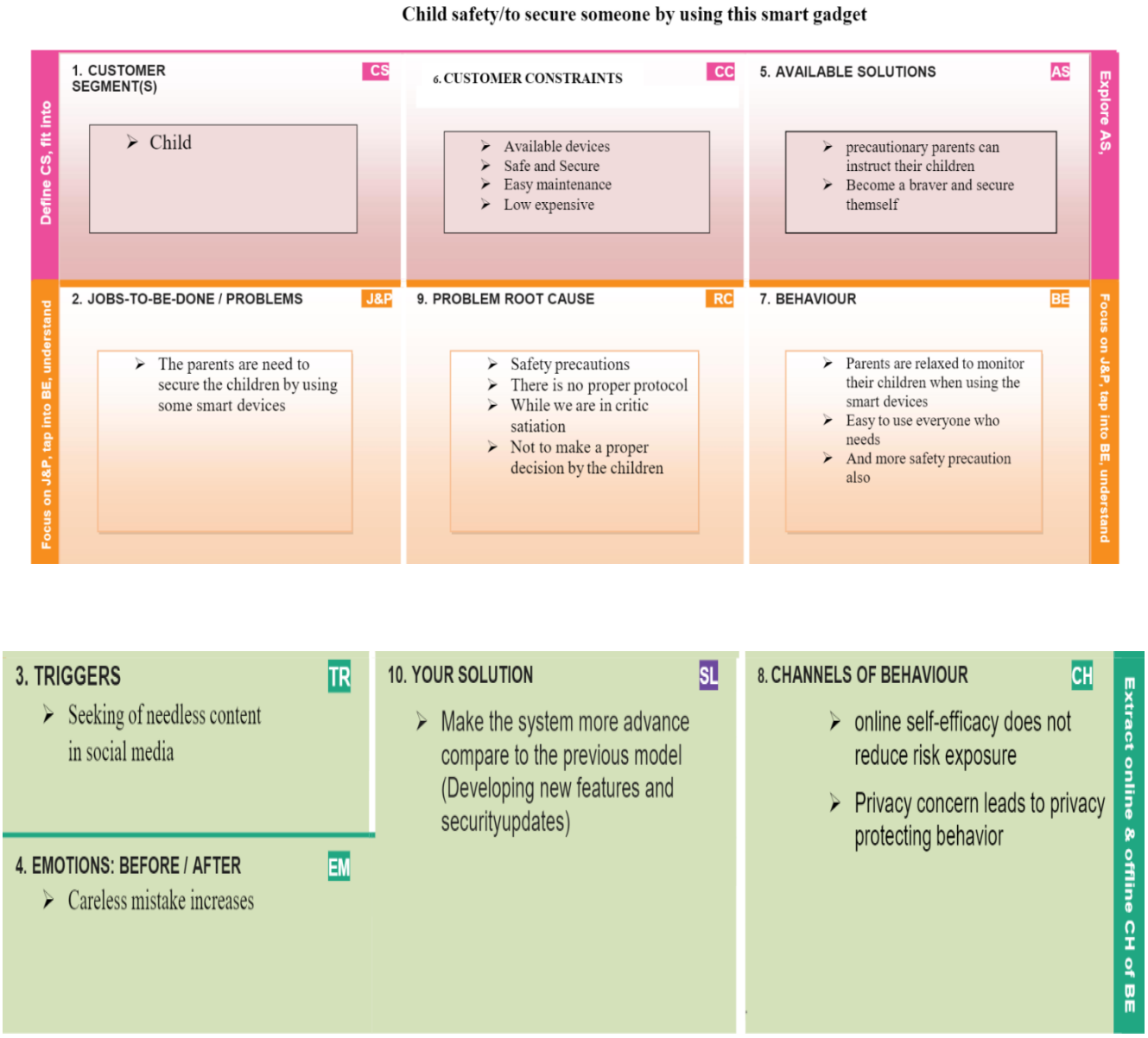
We can generate revenue by offering subscription-base applications to the people. We can notify the child using an application where they can g et the safety related notifications.

SCALABILITY OF SOLUTION:

Even if the number of users increases the system will perform well. The output is optimal and it can be accessible anywhere and anytime.

3.4: PROBLEM SOLUTION FIT:

The flow representation represents the problem solution fit this project or application.



4. REQUIREMENTS ANALYSIS:

4.1: FUNCTIONAL REQUIREMENTS:

- User Registration
- User Confirmation
- Setting Geo-Fence
- Alert Message

USER REGISTRATION:

The user can register their needs and other information activities here with the help of this phase and all the activities and data about the people will connected here. All the data will be acted here and it will work as the same phase based on the data .

USER INFORMATION:

After all the data entered here the application will ask for the conformation details and all be working as the phase after this phase. It will verify all the work process. All the terms and process will be working will be based on the following phases and will verify the work phases.

SETTING GEO-FENCE:

The geo fence is the important aspect in this program. the term defines it is a process by which it will define and fix a diameter of circle from the fixed centre point

If the receiver device or gadget gets out from the diameter circle it will intimate the alert or warming this is how the geo-fence concept works.

ALERT MESSAGE:

When the device gets out from the following fixed circle the parent device will get a alert message or the warning message to the parent device so that they can able to get alert in the following phase. this process is done with the help of the WIFI and GPS technology the wifi connects the device as well as connect the two device as set as connected. With the help of GPS the device can able to device and track the exact locations of the devices.

4.2: NON-FUNCTIONAL REQUIREMENTS:

4.2.1: USABILITY:

They are very user-friendly and easily accessible to the customer. Once the device is connected they work easier. The design phase also be user-friendly to the customer and they can be easily accessible to the users. the main concept of useability is they should be easier to the customer for the usage as well the child.

4.2.2: SECURITY:

The security development is very important in the application the user or customer has to create the following User login and fix the password for the security process because it is very important aspects for all the application as well as this application.

4.2.3:RELIABILITY:

The accuracy is much important here because the device has to give exact solution if the device gets out from the geo-fence diameter range. Here the Reliability defines the quality of the product the quality is nothing but the device has to be stronger. Because children's used in play in mud as well water all the damages should be protected based on the protection the device has to be designed or manufactured .

4.2.4: PERFORMANCE:

Performance means how the project works. the quality also comes under the category of the performance. It also includes the physic, appearance and build quality of the project. The project should also determine the aspect of the performance. The entire project represents and it comes the following category of the performance. So performance is very important for the product or gadget.

4.2.4: AVAILABILITY:

After the development phase are completed then the distribution is much needed. They device must be evenly distributed. the stock should be always available in the market. that will be the advantage for the manufacturer for the company or organization.

4.2.4: SCALABILITY:

Once the development is done it is very useful and helpful for the customers to use the application. if once the project is developed then there will be no hardware upgradation. This is very easy for the customer for no needs for the upgradation.

5. PROJECT DESIGN:

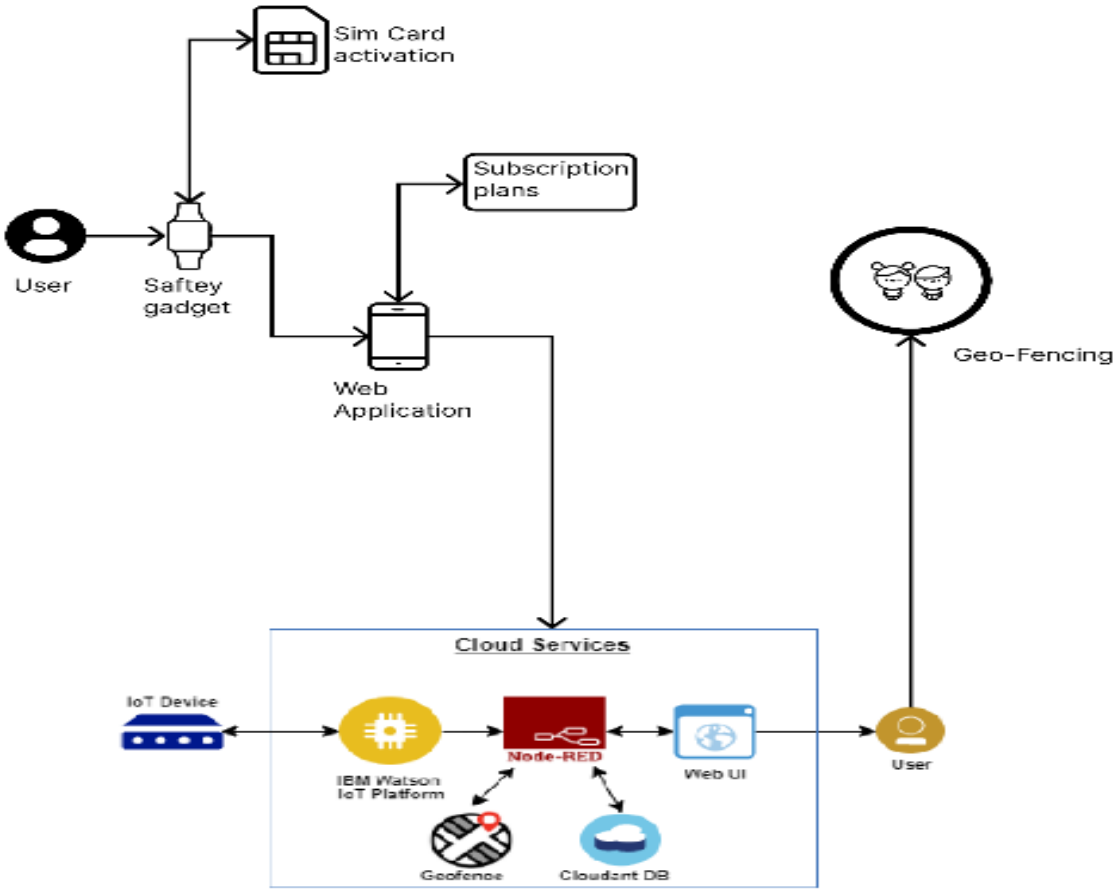
5.1 DATA FLOW DIAGRAMS:

This diagram represents the data and step by step process of the project and done while plan phase. The group of team or organization use data flow diagram to represent and plan the following project.

The subscriber identity module is directly connected with the gadget as well as with the user. and for the running module phase the web application is developed for the application environment. Then we use the IBM cloud services such as IOT platform, IOT Watson, Node Red, WebUI, geo-fence and cloud DB.

This all act together with the help of internet of things we can create the geo-fence application program with the help of cloud services we can develop the application using python. Then all the development is imported in the gadget and the gadget is ready for use.

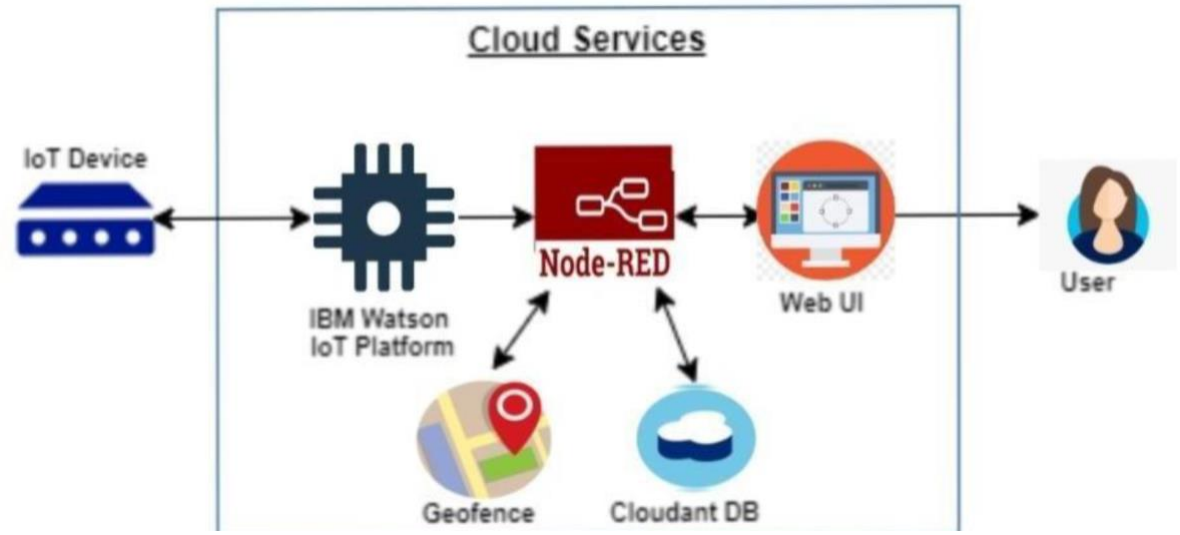
DATA FLOW DIAGRAM



5.2: TECHNICIAL ARCHITECTURE:

The technical services provided by the IBM is very useful to develop this architecture . we create IOT Watson platform and develop the root map flow in Node RED and develop the web application and user. And geofence the circle with the help of python script and cloud services is further used.

TECHNICAL ARCHITECTURE



6. PROJECT PLANNING & SCHEDULING:

6.1: SPRINT PLANNING AND ESTIMATION:

SPRINT-1:

Stimulation Creation - Create IBM Watson IoT Device

SPRINT-2:

Create and configure IoT Device with NodeRED

Workflow for IoT scenarios using local node red

SPRINT-3:

Create Web application using node-red and

Application for the project using MIT

SPRINT-4:

Deploy and check the application in real time

(In node red)

6.2: SPRINT DELIVERY SCHEDULE:

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	15	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	16	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	15	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	17	19 Nov 2022

Velocity:

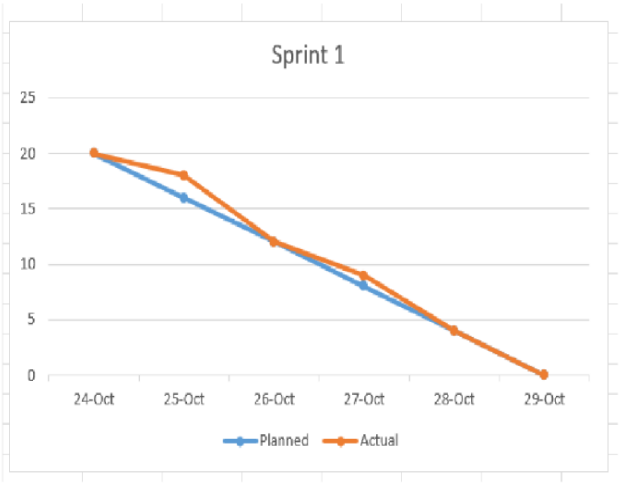
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

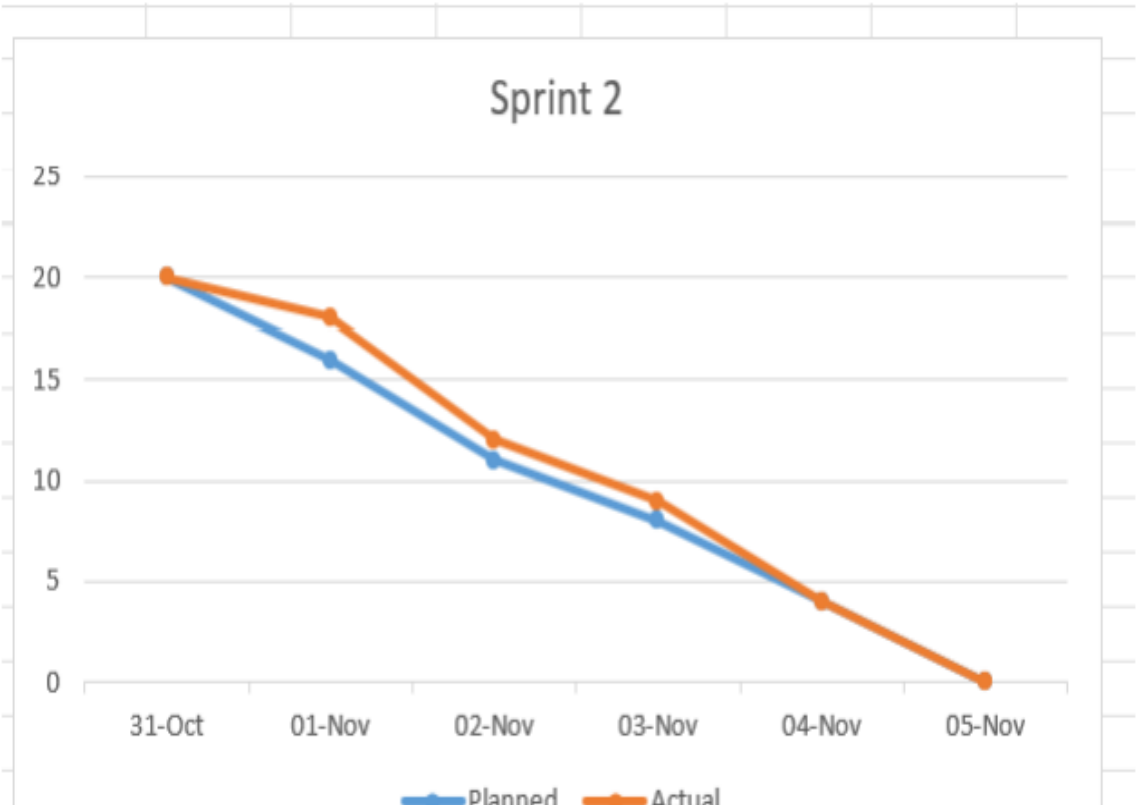
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Sprint	Total Story Points	Duration	Average Velocity
Sprint-1	20	6	20/6=3.33
Sprint-2	20	6	20/6=3.33
Sprint-3	20	6	20/6=3.33
Sprint-4	20	6	20/6=3.33

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.





7. CODING & SOLUTIONING:

7.1 Feature 1: Code for IN Area location

```
import json
import wiotp.sdk.device
import time
myConfig={
            "identity":{
            "orgId":"qo45cf",
           "typeId": "NODERED",
           "deviceId":"12345"
            },
    "auth":{
    "token":"123456789"
}
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
while True:
   name="CHILD"
   #in area location
```

```
    latitude=13.051945
    longitude=80.073990

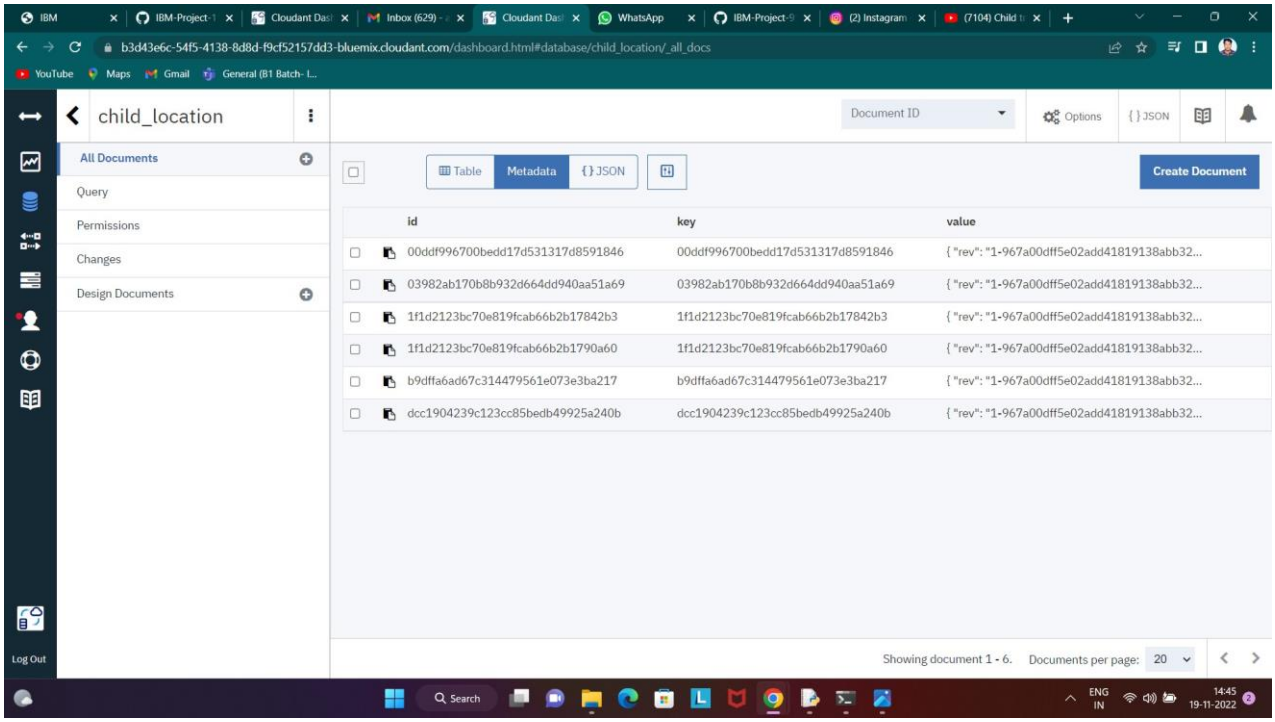
    #out area location
    #latitude=13.044020
    #longitude=80.085481
    myData={'name':name,'lat':latitude,'lon':longitude}
client.publishEvent(eventId="status",msgFormat="json",data
=myData,qos=0)
    print("Data published to IBM IOT platform:",myData)
    time.sleep(5)
client.disconnect()
```

7.2 Feature 2: Code for OUT Area location:

```
  import json
  import wiotp.sdk.device
  import time
  myConfig={
              "identity":{
              "orgId":"qo45cf",
             "typeId": "NODERED",
```

```
                "deviceId":"12345"
                 },
        "auth":{
        "token":"123456789"
}
}
client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
while True:
    name="CHILD"
    #in area location
    #latitude=13.051945
    #longitude=80.073990
    #out area location
    latitude=13.044020
    longitude=80.085481
    myData={'name':name,'lat':latitude,'lon':longitude}
client.publishEvent(eventId="status",msgFormat="json",data
=myData,qos=0)
    print("Data published to IBM IOT platform:",myData)
    time.sleep(5)
client.disconnect()
```

7.3 Database Schema:



8. TESTING:

8.1: USER-ACCEPTANCE TESTING:

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	9	4	6	29
External	4	5	0	2	11
Fixed	10	5	5	10	30
Not Reproduced	0	0	0	0	1
Skipped	3	3	1	1	8
Won't Fix	0	3	2	1	6
Totals	27	25	12	20	85

8.2:TEST CASE ANALYSIS:

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Cloudant	8	0	0	8
Node red flow	18	0	1	17
Node red application	20	0	1	19
Web UI	7	0	0	7
Geo fence area	3	0	0	3
Alert system	3	0	0	3

9. RESULTS:

We have developed a app using node-red web application IoT Based Safety Gadget for Child Safety Monitoring & Notification that is successfully deployed and executed as a web application in node-red using IBM IOT device and cloudant database.

Because of web application the user can access wherever they want

With the help of this cloud services we can able use and further we can develop it.

10. ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- By using this device child can be monitored by the parent /guardian whenever they want.
- This device can also be used by women also.
- This device can be modified and can be turned into a smart watch which will not fell uncomfortable for the children.

DISADVANTAGES:

- This device needs internet connection to function
- Power management
- Further the geo-fence diameter is short we must expand the diameter.

11. CONCLUSION:

Most of the parents in the home used to go for office so they can't take more care about their children's . In this scenario this device will be very helpful for the parents to monitor their children's. Since children's don't have much consciousness about their limit from home here because of this device the students can feel very safe and secure.

12. FUTURE SCOPE:

This is already an advanced IoT development project . May be in future we can develop like increasing the accuracy, speed of response and perfect accuracy in working. We need to use this for other users also we can even develop the same process for mentally -disabled people as well for the older peoples based on their requirements this project can be developed.

13.APPENDIX:

SOURCE CODE:

```
<!DOCTYPE html>
<html>

<!-- manifest="dashboard.appcache">

 <head>

<meta charset="utf-8"> <meta name="viewport"
content="width=device-width,initial-scale=1">

 <meta name="apple-mobile-web-app-capable" content="yes">

<meta name="apple-mobile-web-app-status-bar-style"
content="black-translucent"> <meta name="apple-mobile-web-app-
title" content="Node-RED">

 <meta name="mobile-web-app-capable" content="yes"> <meta
name="theme-color" content="#097479"> <meta http-equiv="X-UA-
Compatible" content="IE=edge"> <link rel="manifest"
href="manifest.json" crossorigin="use-credentials">

 <link rel="icon" sizes="192x192" href="icon192x192.png"> <link
rel="shortcut icon" type="image/png" href="icon64x64.png"> <link
```

rel="apple-touch-icon" href="icon120x120.png"> <link rel="stylesheet" href="css/app.min.css"> <link rel="stylesheet/less" href="css/app.min.less">

<title>

</title>

</head>

<body id="nr-dashboard" ng-app="ui" ng-controller="MainController as main" ng-cloak layout="column" style="background: {{main.backgroundColor}}" class="nr-dashboard-theme" ng-swipe-right="onSwipeRight();" ng-swipe-left="onSwipeLeft();" ng-attr-ng-swipe-disable-mouse="{{main.allowSwipe !== 'mouse' ?" : undefined}}"> <md-content ng-if="main.loaded" ng-include="'partials/main.html'" layout="column" flex> </md-content>

<table><tr><td> <img src="icon120x120.png">

</td></tr> <tr><td>

<h2>Welcome to the Node-RED Dashboard</h2>

</td></tr> <tr><td>

Please add some UI nodes to your flow and redeploy. </td></tr></table>

 <script src="socket.io/socket.io.js"></script>

<script src="js/app.min.js"></script> <script src="i18n.js">

</script>

</body></html>

SOURCE CODE:

IN- AREA LOCATION:

```
import json
import wiotp.sdk.device
import time
myConfig={
"identity":{
"orgId":"qo45cf",
"typeId": "NODERED",
"deviceId":"12345"
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"auth":{
"token":"123456789"
}
}
client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
while True:
   name="CHILD"
   #in area location
```

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    latitude=13.051945
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a=myData,qos=0)
    print("Data published to IBM IOT platform:",myData)
    time.sleep(5)
client.disconnect()
```

OUT-AREA LOCATION:

```
import json
import wiotp.sdk.device
import time
myConfig={
"identity":{
"orgId":"qo45cf",
"typeId": "NODERED",
```

```
"deviceId":"12345"
 },
"auth":{
"token":"123456789"
}
}
client = wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None)
client.connect()
while True:
   name="CHILD"
   #in area location

   #latitude=13.051945
   #longitude=80.073990

   #out area location
   latitude=13.044020
   longitude=80.085481
   myData={'name':name,'lat':latitude,'lon':longitude}

client.publishEvent(eventId="status",msgFormat="json",dat
a=myData,qos=0)
```

```
    print("Data published to IBM IOT platform:",myData)
    time.sleep(5)
client.disconnect()
```

GitHub & Project Demo Link:

https://github.com/IBM-EPBL/IBM-Project-11375-1659323912