

# REPORT

## IoT Based Safety Gadget for Child Safety Monitoring & Notification

TEAM ID:	PNT2022TMID35083
PROJECT NAME:	IoT Based Safety Gadget for Child Safety Monitoring & Notification
TEAM MEMBERS:	T.JESHRIN REUBSIGA. I.Devika. P.Kalaiarasi. M.Gayathri.

### 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 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.

## **2. LITERATURE SURVEY**

### **2.1 EXISTING PROBLEM**

This paper presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during daily transportation from and to school. The system consists of two main units, a bus unit, and a school unit. The bus unit the system is used to detect when a child boards or leaves the bus. This information is communicated to the school unit that identifies which of the children did not board or leave the bus and issues an alert message accordingly. The system has a developed web-based database-driven application that facilitates its management and provides useful information about the children to authorized personnel. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety

### **2.2 REFERENCES**

1. Starner, T Schiele, B and Pentland, A. (1998) 'Visual contextual awareness in wearable computing', Second International Symposium on Wearable Computers, Pittsburgh, PA, IEEE Computer Society, pp. 50-57.
2. AkashMoodbidri, Hamid Shahnasser (Jan 2017) 'Child safety wearable device', International Journal for Research in Applied Science & Engineering Technology, Vol. 6 Issue II, IEEE, pp. 438- 444.
3. AsmitaPawar, PratikshaSagare, TejalSasane, KiranShinde (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. 02, Issue. 03, pp.85-94.

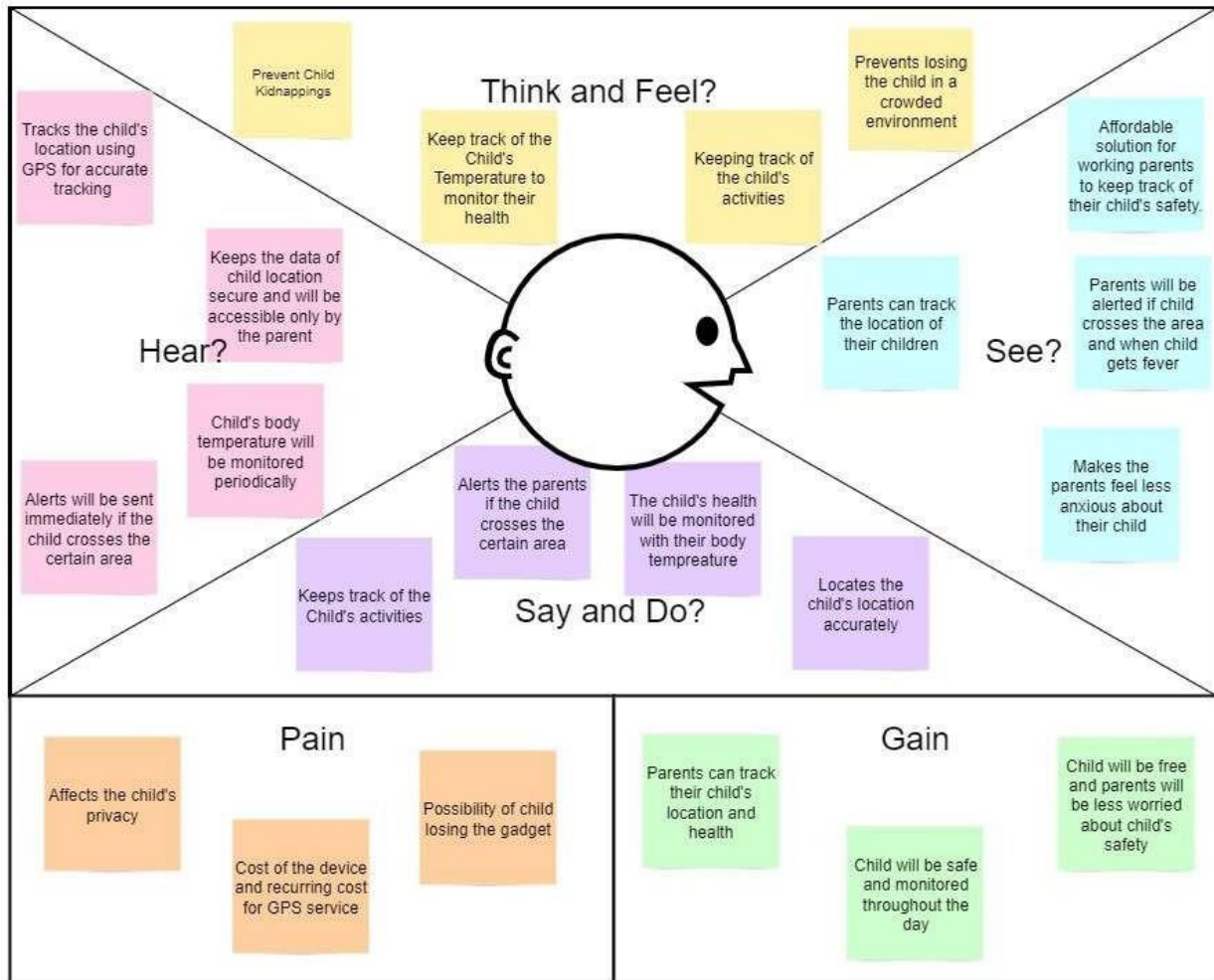
4. Nitishree, (May-June, 2016) 'A Review on IOT Based Smart GPS Device for Child and Women Safety', International Journal of Engineering Research and General Science, Vol.4, Issue. 3, pp. 159- 164. 5. Kok Sun Wong, Wei Lun Ng, Jin Hui Chong, CheeKyun Ng, AduwatiSali, Nor KamariahNoordin, (15 -17 )December 2009) 'GPS Based Child Care System using RSSI Technique', Proceedings of the Malaysia International Conference on Communications. pp. 899-904.

### **2.3 PROBLEM STATEMENT DEFINITION**

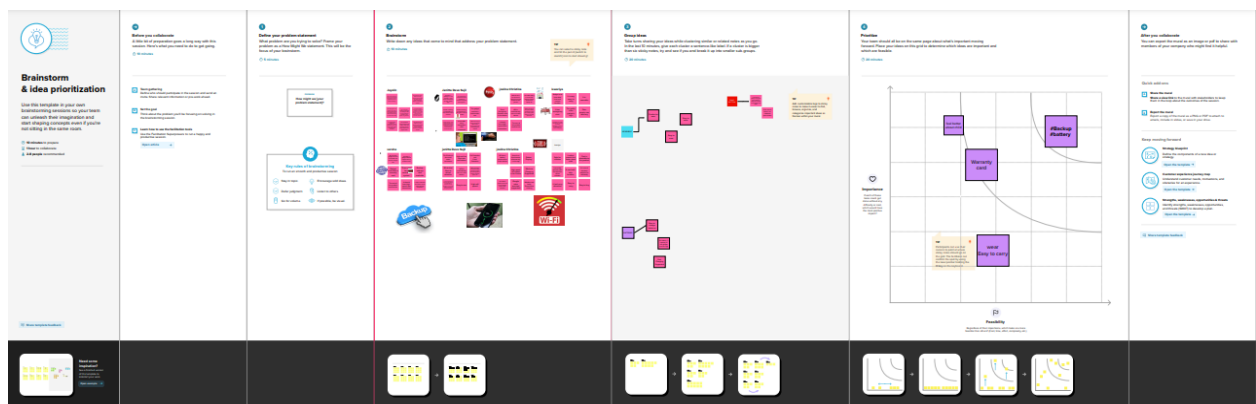
The child safety wearable system **acts as a smart device**. Child's surroundings can be located with the help of accurate and precise real-time location. Surrounding environment temperature, SOS light along with Distress buzzers are provided in this system . This helps in locating their child .

## **3.IDEATION AND PROPOSED SOLUTION**

### **3.1.EMPATHY MAP CANVAS**



## 3.2.IDEATION & BRAINSTORMING



### 3.3.PROPOSED SOLUTION

Project Design Phase-I  
Proposed Solution  
Template

Date	19 September 2022
Team ID	PNT2022TMID35083
Project Name	Project – IOT Based Safety Gadget For Child Safety Monitoring and Notification
Maximum Marks	2 Marks

**Proposed Solution Template:**

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Bullying/cyberbullying. Whether harassment takes place in person or online, the actions can have deep effects on a child's mental and physical health, Internet safety, Stress, Motor vehicle accidents, School violence, Depression, and eating unhealthy food ect....
2.	Idea / Solution description	<b>Simple support for children and parents</b> can be the best way to prevent child abuse. After-school activities, parent education classes, mentoring programs, and respite care are some of the many ways to keep children safe from harm. Be a voice in support of these efforts in your community. Teach children their rights.
3.	Novelty / Uniqueness	Home safety is about supervision in safe environments. Children also need to learn what is and isn't safe.  You can do a lot to avoid common home injuries like falls, burns and scalds, poisoning,

		drowning, strangulation and suffocation.
4.	Social Impact / Customer Satisfaction	This article reviews the origins, conceptual bases, psychometric properties, and limitations of consumer satisfaction measures in social welfare and behavioral health.
5.	Business Model (Revenue Model)	The primary challenges of building a business based on the idea of attracting kids to safe and appropriate Internet ...
6.	Scalability of the Solution	Build consensus on a child protection vision (preferably within a larger multi-year and multisectoral ‘umbrella’ development framework) . Determine what to scale . Assess scalability . Develop or revise scaling strategy and plan . Implement plan and monitor . Learn and adapt.

### 3.4.PROBLEM SOLUTION FIT

#### Project Design Phase-I

Date	01 OCT 2022
Team ID	PNT2022TMID35083
Project Name	Project - IoT Based Safety Gadget for Child Safety Monitoring and Notification
Maximum Marks	2 Marks

Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> <p>Our Customers are mainly parents who are working and do not have enough time to take care of their children. Such parents are not provided with availability at anytime to look after their children . If the case so they are in need of something to make their children under the surveillance of them.</p>	<b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span> <p>The constraints our customers facing are such connectivity issues or may be the protocols being used for communication. There may be chances of issues arised due to technical diseficiencies. Giving a second thought , price to be afforded for buying the developed solution kit might be the one they could not afford.</p>	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> <p>Of course the solutions are available readily in the market such as angel monitoring system , Child GPS Tracking System , Child Safety GSM Kit , etc ... One such constraint the customers facing are cost and inefficiencies in the working once purchased.</p>	Explore AS, differen
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <span>JBP</span> <p>To enhance the operating condition of the developed solution the way it is not supposed to deal with any fault at any point of time so that the child safety can be highly ensured . To ensure the parents that their surveillance on their children can never be taken off.</p>	<b>9. PROBLEM ROOT CAUSE</b> <span>RC</span> <p>Considering the origination of the problem , it occurs in the base of merely irrespctive persons that are no way relatable to the children but for the currency kind of thing and also the child abuse(mainly in case of girl children)</p>	<b>7. BEHAVIOUR</b> <span>BE</span> <p>The proposed solution always keens/tends to make the gadget work in an efficient way so that it is not supposed meet up with any further constraints . Also the solution tries to ensure that efficient functionalities are to be provided to the fullest to the customers</p>	

<b>3. TRIGGERS</b> <span>TR</span> <p>The trigger which induces the customers is the one that when other working parents give a try to this and comment a positive review on this , they also</p>	<b>10. YOUR SOLUTION</b> <span>SL</span> <p>Our Team has highly been intending to develop an efficient solution to overcome all the flaws that the existing solutions hold back still . We are highly on demand to ensure the efficient functionalities of the developing module the way it will not fail at anytime.</p>	<b>8. CHANNELS of BEHAVIOUR</b> <span>CH</span> <p>Our proposed solution has the modes of working in both offline and Online . In case of any disconnectivities happen the gadget which has been developed might tend to work on a plan B which includes the backup of the failure of actual working kit .</p>
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<b>4. EMOTIONS: BEFORE / AFTER</b> <span>EM</span> <p>Customers(Parents) are being frustratesd that their children are doing safe or not before using the gadget designed . Once they start to use the developed solution they might feel free to focus on their work and also the surveillance of their children would happen with ease at any point of time .</p>		
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## 4. REQUIREMENT ANALYSIS

### Project Design Phase-II

## Solution Requirements (Functional & Non-functional)

Date	16 October 2022
Team ID	PNT2022TMID35083
Project Name	Project - IOT Based Safety Gadget for Child safety Monitoring & Notification
Maximum Marks	4 Marks

### 4.1.Non-Functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	<b>Usability</b>	It can easily track and monitor the location of the child and share the information to parents
NFR-2	<b>Security</b>	The cloud database is highly secured and it prevents data from hacking issues
NFR-3	<b>Reliability</b>	Safety of the children is assured all the time.

NFR-4	<b>Performance</b>	Monitoring the child whether he/she is within the geofence
NFR-5	<b>Availability</b>	To check the presence of child within the geofence area



## 4.2.Non-functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Gmail Registration through Number
FR-2	User Confirmation	Confirmation via Email and OTP
FR-3	User Login	login through User Id and Password
FR-4	Network Connectivity	via wifi/mobile data Internet connection with at least 10 to 20 kbps
FR-5	IBM IoT Platform	Access cloud storage via internet and it givescoordinates
FR-6	Node-RED	World Map node- Coordinates are converted into map location. Geofence - ensures the child is within the geofence
FR-7	Fast2sms	used to send pop up messages.
NFR-6	Scalability	It can be adapted to both local and also larger areas based on the customer preference.

## 5.PROJECT DESIGN

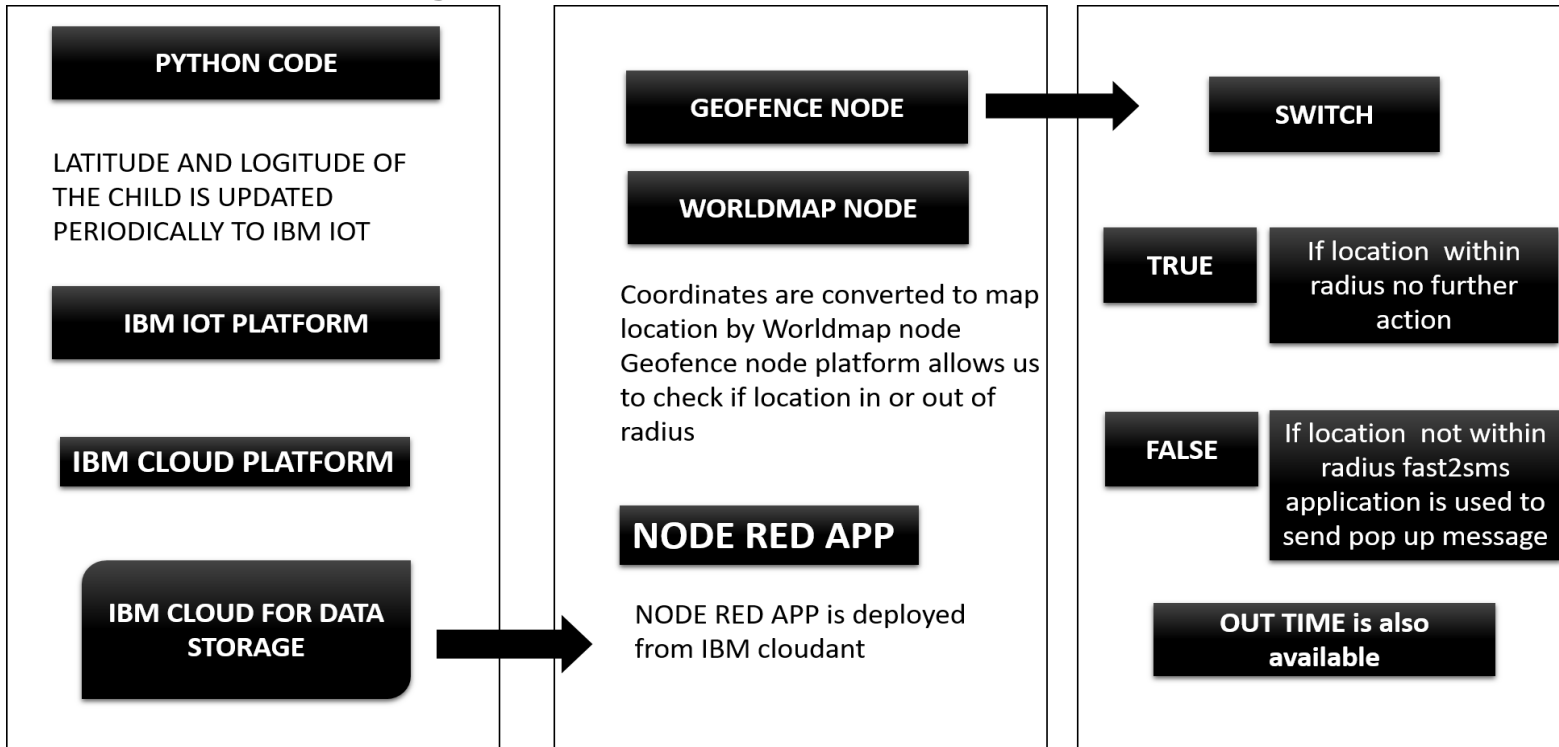
### 5.1DATA FLOW DIAGRAM

Date	16 October 2022
Team ID	PNT2022TMID35083
Project Name	IoT Based Safety Gadget for Child Safety Monitoring and Notification

Maximum Marks

4 Marks

## Data Flow Diagrams:



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
Customer	Registration	USN-1	I am able to get speed updates correctly	I can get speedconstraints
		USN-2	As a user, I can register in the application correctly	I can perfectly get syncedaccount details
		USN-3	As a user, I can increase or decrease speed based in the change in weather conditions withthe help of sign boards	Increment or decrement inspeed
		USN-4	As a user, I am able to go through an alternativedirection when traffic is ahead	Correct updates of trafficedetails ahead of time
	Login	USN-5	As a user, I can log into the application byentering email & password	I can log into theapplication
Customer (Webuser)	Generating data	USN-6	As a user I am able to utilize the web app to get information regarding child location	I can access informationfrom web app
Customer CareExecutive	Problem solving	USN-7	As an executive I am able to solve the problemsof the users with the given instructions	Easy maintenance andproblem solving
Administrator	Administering thetimely data	USN-8	As an admin I am able to get through the interface and	Easy administration whendata is timely upd

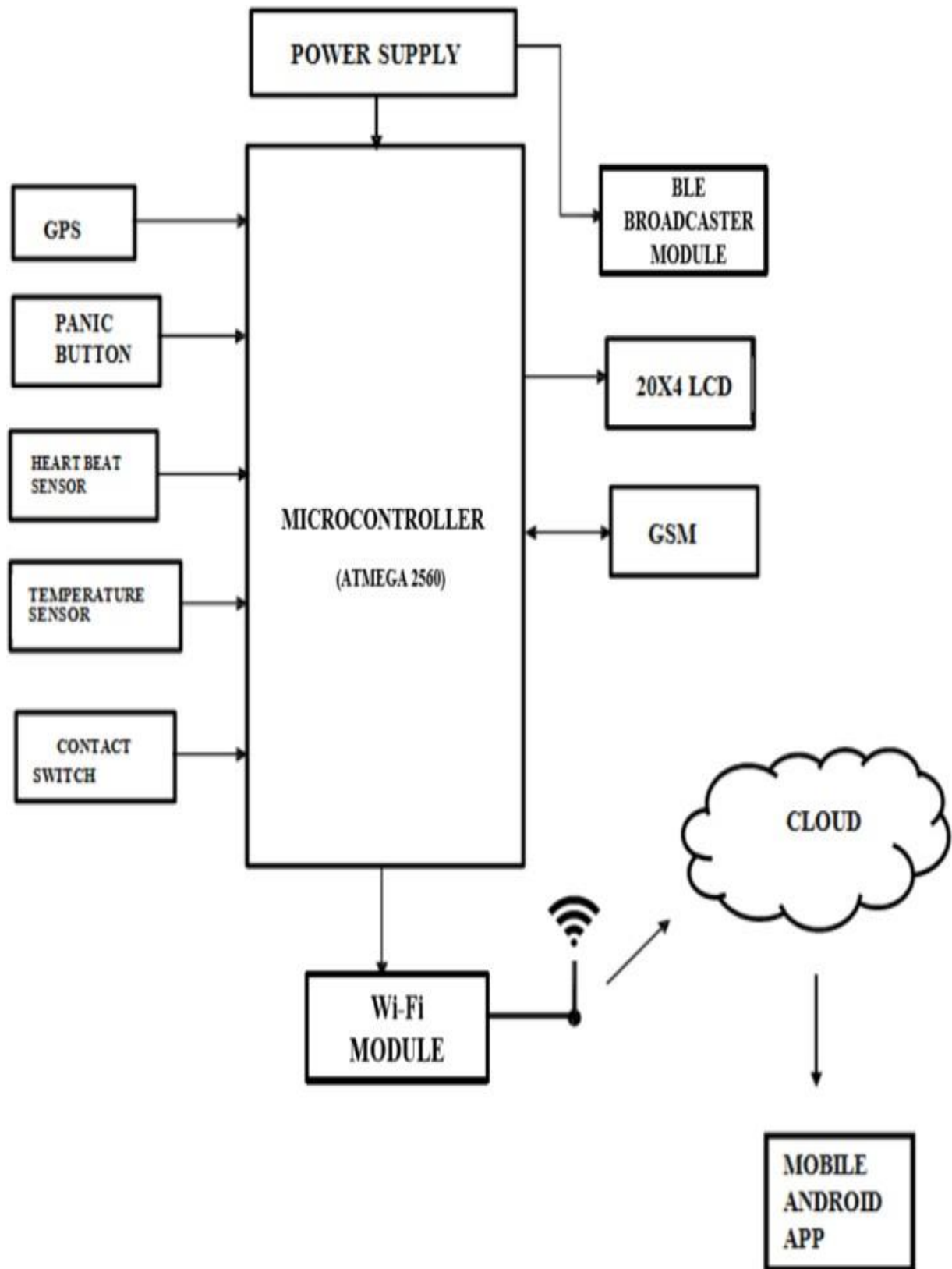
			administer the data functionality	
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## 5.2.SOLUTION ARCHITECTURE

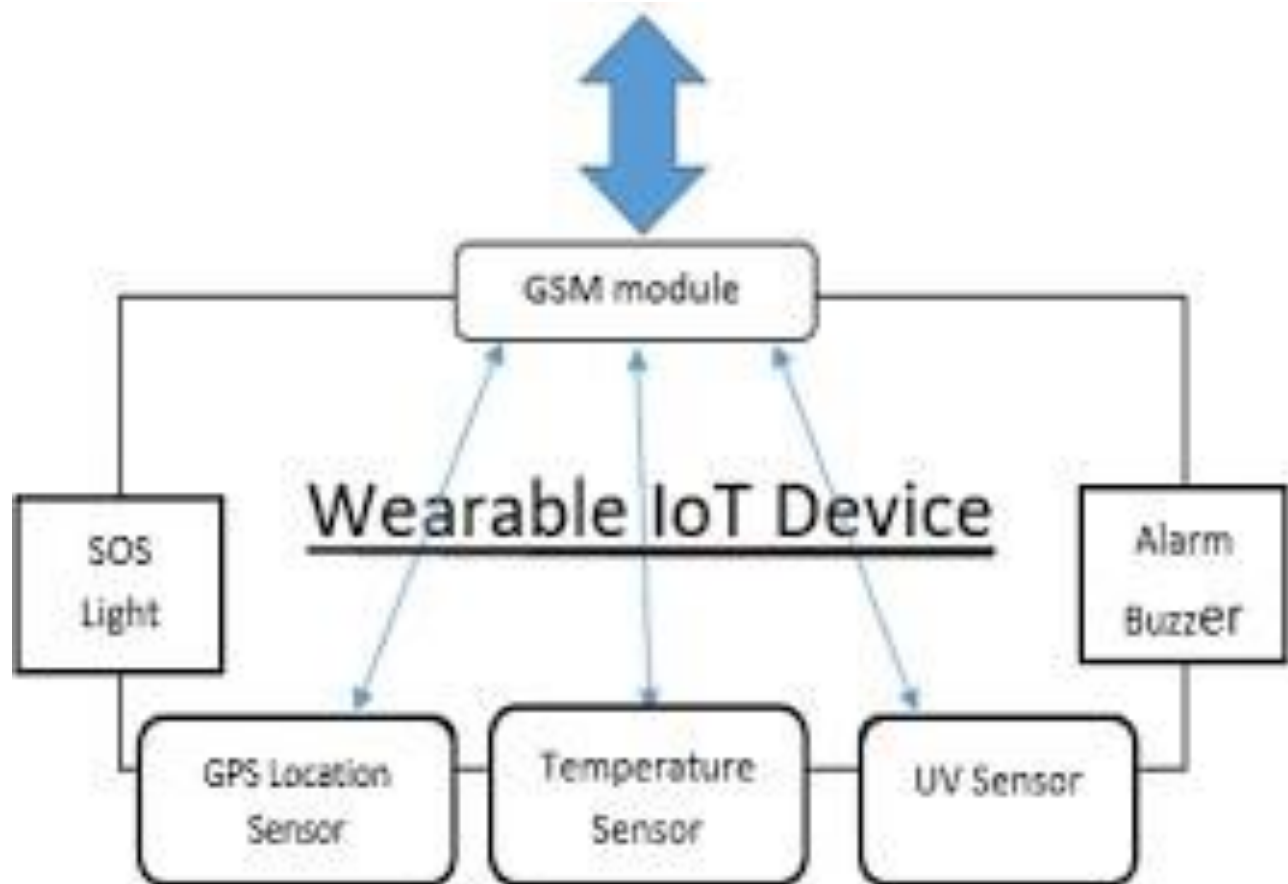
### PROJECT DESIGN PHASE – 1

Date	01` OCT2022
Team ID	PNT2022TMID35083
Project Name	Project – IOT Based Safety Gadget For Child Safety Monitoring and Notification

## SYSTEM ARCHITECTURE



## SEQUENCE DIAGRAM



## 5.3 USER STORIES

**User Stories**

Parent	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-5	As a user, I need to be able to view the functions that I can perform		High	Sprint-1
Child	Notification	USN-1	As a user, I should be able to notify my parent in emergency situations		High	Sprint-2
	Store data	USN-2	As a user, I need to continuously store my location data into the db.		Medium	Sprint-2
	Communication	USN-3	I should be able to communicate with my parents		Low	Sprint-3

## 6. PROJECT PLANNING & SCHEDULING

### 6.1 SPRINT PLANNING AND ESTIMATION

Child safety and tracking is a major concern as the 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 LinkIt ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency. The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. The above system ensures the safety and tracking of children.

### 6.2.SPRINT DELIVERY SCHEDULE

Date	09 November 2022
Team ID	PNT2022TMID35083
Project Name	IoT based safety gadget for child safety monitoring and notification
Maximum Marks	8 Marks

### Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1		US-1	Create the IBM Cloud services which are being used in this project.	6	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P



<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-2		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	5	Medium	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-2		US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-3		US-1	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-3		US-2	Create a Node-RED service.	10	High	Jeshrin Reubsiga.T Devika.I

<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
						Gayathri.M Kalaiarasi.P
Sprint-3		US-1	Develop a python script to publish random sensor data such as temperature, moisture, soil and humidity to the IBM IoT platform	7	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-3		US-2	After developing python code, commands are received just print the statements which represent the control of the devices.	5	Medium	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-4		US-3	Publish Data to The IBM Cloud	8	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-4		US-1	Create Web UI in Node- Red	10	High	Jeshrin Reubsiga.T Devika.I Gayathri.M Kalaiarasi.P
Sprint-4		US-2	Configure the Node-RED flow to	10	High	Jeshrin Reubsiga.T

<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story / Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
			receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB			Devika.I Gayathri.M Kalaiaarasi.P

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

<b>Sprint</b>	<b>Total Story Points</b>	<b>Duration</b>	<b>Sprint Start Date</b>	<b>Sprint End Date (Planned)</b>	<b>Story Points Completed (as on Planned End Date)</b>	<b>Sprint Release Date (Actual)</b>
Sprint-1	20	3 Days	31 Oct 2022	02 Nov 2022	20	02 Nov 2022
Sprint-2	20	3 Days	02 Nov 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	3 Days	05 Nov 2022	08 Nov 2022	20	08 Nov 2022
Sprint-4	20	3 Days	11 Nov 2022	14 Nov 2022	20	14 Nov 2022

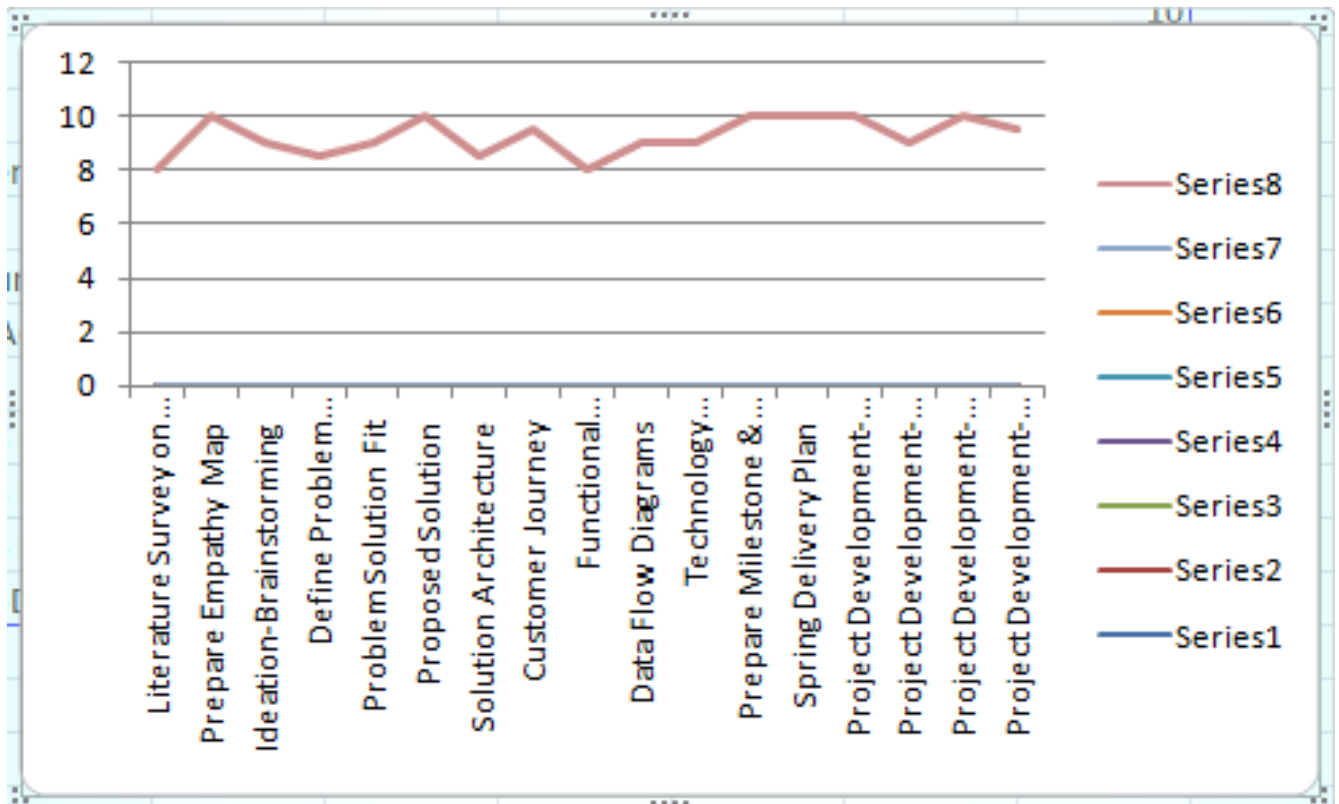
**Velocity:**

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)

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

**Burndown Chart:**

A burndown 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, burndown charts can be applied to any project containing measurable progress overtime.



## 6.3 REPORTS FROM JIRA

Reporting **helps you track and analyze your team's work throughout a project**. Jira Software has a range of reports that you can use to show information about your project, versions, epics, sprints, and issues.

**Click Projects in the navigation bar and select the relevant project.** If the project is only associated with one board, you can then click Reports. If the project is associated with multiple boards, you can select from the dropdown before clicking Reports.

## 7. CODING & SOLUTIONING

### 7.1 FEATURE 1

```
<!DOCTYPE html>
<html> <head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<title> Login Page </title>
<style> Body {
font-family: Calibri, Helvetica, sans-serif; background-color: #9FE2BF;
```

```

}
button {
background-color: #9FE2BF;
width: auto; padding: 10px 18px; margin: 10px 5px;
}
.container {
padding: 25px;
background-color: #CCCCFF;
}
</style> </head>
<body>
<center> <h1> Login Form </h1> </center>
<form>
<div class="container">
<label>Device ID/Number: </label>
<input type="password" placeholder="Enter Password" name="password" required>
<label>E-Mail : </label>
<input type="text" placeholder="Enter Username" name="username" required>
<label>Password : </label>
<input type="password" placeholder="Enter Password" name="password" required>
<button type="submit">Login</button>
<button class="loginBtn loginBtn--facebook">Login with Facebook.</button>
<button class="loginBtn loginBtn--google">Login with Google.</button>
<input type="checkbox" checked="checked"> Remember me
<button type="button" class="cancelbtn"> Cancel</button> Forgot <a href="#"> password?
</a>
</div>

</form>
</body>
</html>

```

## 7.2 FEATURE 2

```

#include<WiFi.h>//library for wifi #include<PubSubClient.h>//library for MQTT
void callback(char* subscribetopic, byte* payload,unsigned int payloadlength);
//-----credentials of IBM Account-----
#define ORG "45z3o2"// IBM ORGANIZATION ID
#define DEVICE_TYPE "ESP32_Controller"//DEVICE TYPE MENTIONED IN IOT
WATSON PLATFORM #define DEVICE_ID "bme2"//DEVICE ID MENTIONED IN IOT
WATSON PLATEFORM
#define TOKEN "OKZ+q@JfPWDOd6wBTj"//Token String data3;
float dist;
//-----customize the above value-----
char server[]=ORG ".messaging.internetofthings.ibmcloud.com";//server name
char publishtopic[]="ultrasonic/evt/Data/fmt/json";/*topic name and type of event perform and
format in which data to be send*/

```

```

char subscribetopic[]="ultrasonic/cmd/test/fmt/String";/*cmd REPRESENT Command tupe and
COMMAND IS TEST OF FORMAT STRING*/
char authMethod[]="use-token-auth";//authentication method char token[]=TOKEN;
char clientid[]="d:" ORG ":" DEVICE_TYPE":" DEVICE_ID;//CLIENT ID
//
WiFiClient wifiClient;// creating an instance for wificlient
PubSubClient client(server, 1883 , callback , wifiClient);/*calling the predefined client id by
passing parameter like server id,portand wificredential*/
int LED =4;
int trig =5; int echo=18; void setup(){
Serial.begin(115200); pinMode(trig,OUTPUT); pinMode(echo,INPUT);
pinMode(LED,OUTPUT); delay(10); Serial.println(); wificonnect(); mqttconnect();
}
char authMethod[]="use-token-auth";//authentication method char token[]=TOKEN;
char clientid[]="d:" ORG ":" DEVICE_TYPE":" DEVICE_ID;//CLIENT ID
//
WiFiClient wifiClient;// creating an instance for wificlient
PubSubClient client(server, 1883 , callback , wifiClient);/*calling the predefined client id by
passing parameter like server id,portand wificredential*/
int LED =4;
int trig =5; int echo=18; void setup(){
Serial.begin(115200); pinMode(trig,OUTPUT); pinMode(echo,INPUT);
pinMode(LED,OUTPUT); delay(10); Serial.println(); wificonnect(); mqttconnect();
}
if(dist<100)
{
digitalWrite(LED,HIGH); Serial.println("no object is near"); object="Near";
}
Else

{
digitalWrite(LED,LOW); Serial.println("no object found"); object="No";
}
String payload="{\"distance\":"; payload +=dist;
payload +=", \"object\":\":"; payload += object;
payload += "\}";
Serial.print("Sending payload: ");
Serial.println(payload);
if(client.publish(publishtopic, (char*) payload.c_str())){
Serial.println("Publish ok");/* if its sucessfully upload data on the cloud then it will print publish
ok in serial monitor or else it will print publish failed*/
} else{
Serial.println("Publish failed");
}
}
void mqttconnect(){ if(!client.connected()){

```

```

Serial.print("Reconnecting client to "); Serial.println(server);
while(!!!client.connect(clientid,authMethod, token)){
Serial.print("."); delay(500);
}
initManagedDevice();
Serial.println();
}
}
void wificonnect()//function defenition for wificonnect
{
Serial.println(); Serial.print("Connecting to ");
WiFi.begin("vivo 1816", "taetae95",6);//PASSING THE WIFI CREDIDENTIALS TO
ESTABLISH CONNECTION
while (WiFi.status() !=WL_CONNECTED){ delay(500);
Serial.print(".");
}
Serial.println(""); Serial.println("WiFi connected"); Serial.println("IP address");
Serial.println(WiFi.localIP());
}
void initManagedDevice(){ if(client.subscribe(subscribetopic)){
Serial.println((subscribetopic)); Serial.println("subscribe to cmd OK");
}else{
Serial.println("subscribe to cmd failed");
}
}
void callback(char* subscribetopic,byte*payload,unsigned int payloadLength)
{
Serial.print("callback invoked for topic: ");
Serial.println(subscribetopic); for(int i=0; i< payloadLength; i++){
//Serial.print((char)payload[i]); data3 +=(char)payload[i];
}
//Serial.println("dta: "+ data3);
//if(data3=="Near")
//{
//Serial.println(data3);
//digitalWrite(LED,HIGH);
//}

//else //{
//Serial.println(data3);
//digitalWrite(LED,LOW);//} data3="";
}

```

## 8. TESTING

### 8.1 TEST CASES



IoT testing involves executing QA tests to check IoT devices' functionality, security, and performance. It is crucial to ensure that your IoT devices can transmit sensitive information wirelessly before going to market because every IoT device sends and receives data over the Internet. Because of this, many IoT businesses rely on IoT automation, penetration, and performance testing tools to detect defects before reaching consumers.

IoT testing aims to ensure that IoT devices comply with specified requirements and work as expected.

## 8.2 USER ACCEPTANCE TESTING

User Acceptance Testing (UAT) is **a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment**. UAT is done in the final phase of testing after functional, integration and system testing is done.

## 9. RESULTS

### 9.1 PERFORMANCE METRICS

One of the module in our project is temperature sensor which is used to detect the temperature of the child as well as the surrounding temperature. If there occurs any abnormal rise or fall in temperature in the body of the child or in the surrounding it will notify the user as per the coded time delay as shown in the picture. It will show the temperature and humidity values notifies the user based on the predefined value abnormal fall or rise scenarios.

## 10. ADVANTAGES & DISADVANTAGES

### ADVANTAGE

**It assists 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.

### DISADVANTAGE

The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians. The disadvantage of this project are. **The child could not produce the exact alert command during a panic condition.**

## 11. CONCLUSION

This research demonstrates Smart IoT device for child safety and tracking, to help the parents to locate and monitor their children. If any abnormal readings are detected by the sensor,

then an SMS and phone call is triggered to the parents mobile. Also, updated to the parental app through the cloud. The system is equipped with GSM and GPS modules for sending and receiving call, SMS between safety gadget and parental phone. 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. 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 BLE listener gadget an alert is provided to itself.

## 12. FUTURE SCOPE

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

## 13. APPENDIX

### SOURCE CODE

```
<!DOCTYPE html>
<html> <head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<title> Login Page </title>
<style> Body {
font-family: Calibri, Helvetica, sans-serif; background-color: #9FE2BF;
}
button {
background-color: #9FE2BF;
width: auto; padding: 10px 18px; margin: 10px 5px;
}
.container {
padding: 25px;
background-color: #CCCCFF;
}
</style> </head>
<body>
<center> <h1> Login Form </h1> </center>
<form>
<div class="container">
<label>Device ID/Number: </label>
<input type="password" placeholder="Enter Password" name="password" required>
```

```

<label>E-Mail : </label>
<input type="text" placeholder="Enter Username" name="username" required>
<label>Password : </label>
<input type="password" placeholder="Enter Password" name="password" required>
<button type="submit">Login</button>
<button class="loginBtn loginBtn--facebook">Login with Facebook.</button>
<button class="loginBtn loginBtn--google">Login with Google.</button>
<input type="checkbox" checked="checked"> Remember me
<button type="button" class="cancelbtn"> Cancel</button> Forgot <a href="#"> password?
</a>
</div>
</form>
</body>
</html>

```

### NOTIFICATION:

This coding will make connection between IoT Device & Parent's applications. When the child cross across the geofence message will be notified on parent's application.

### Coding:

```

#include<WiFi.h>//library for wifi #include<PubSubClient.h>//library for MQTT
void callback(char* subscribetopic, byte* payload,unsigned int payloadlength);
//-----credentials of IBM Account-----
#define ORG "45z3o2"// IBM ORGANIZATION ID
#define DEVICE_TYPE "ESP32_Controller"//DEVICE TYPE MENTIONED IN IOT
WATSON PLATFORM #define DEVICE_ID "bme2"//DEVICE ID MENTIONED IN IOT
WATSON PLATEFORM
#define TOKEN "OKZ+q@JfPWDOd6wBTj"//Token String data3;
float dist;
//-----customize the above value-----
char server[]=ORG ".messaging.internetofthings.ibmcloud.com";//server name
char publishtopic[]="ultrasonic/evt/Data/fmt/json";/*topic name and type of event perform and
format in which data to be send*/
char subscribetopic[]="ultrasonic/cmd/test/fmt/String";/*cmd REPRESENT Command tupe and
COMMAND IS TEST OF FORMAT STRING*/
char authMethod[]="use-token-auth";//authentication method char token[]=TOKEN;
char clientid[]="d:" ORG ":" DEVICE_TYPE":" DEVICE_ID;//CLIENT ID
//
WiFiClient wifiClient;// creating an instance for wificlient
PubSubClient client(server, 1883 , callback , wifiClient);/*calling the predefined client id by
passing parameter like server id,portand wificredential*/
int LED =4;
int trig =5; int echo=18; void setup(){
Serial.begin(115200); pinMode(trig,OUTPUT); pinMode(echo,INPUT);
pinMode(LED,OUTPUT); delay(10); Serial.println(); wificonnect(); mqttconnect();
}
char authMethod[]="use-token-auth";//authentication method char token[]=TOKEN;
char clientid[]="d:" ORG ":" DEVICE_TYPE":" DEVICE_ID;//CLIENT ID

```

```

//
WiFiClient wifiClient;// creating an instance for wificlient
PubSubClient client(server, 1883 , callback , wifiClient);/*calling the predefined client id by
passing parameter like server id,portand wificredential*/
int LED =4;
int trig =5; int echo=18; void setup(){
Serial.begin(115200); pinMode(trig,OUTPUT); pinMode(echo,INPUT);
pinMode(LED,OUTPUT); delay(10); Serial.println(); wificonnect(); mqttconnect();
}
if(dist<100)
{
digitalWrite(LED,HIGH); Serial.println("no object is near"); object="Near";
}
Else
{
digitalWrite(LED,LOW); Serial.println("no object found"); object="No";
}
String payload="{\"distance\": "; payload +=dist;
payload +=", \"object\": \"\""; payload += object;
payload += "\"}";
Serial.print("Sending payload: ");
Serial.println(payload);
if(client.publish(publishtopic, (char*) payload.c_str())){
Serial.println("Publish ok");/* if its sucessfully upload data on the cloud then it will print publish
ok in serial monitor or else it will print publish failed*/
} else{
Serial.println("Publish failed");
}
}
void mqttconnect(){ if(!client.connected()){
Serial.print("Reconnecting client to "); Serial.println(server);
while(!client.connect(clientid,authMethod, token)){
Serial.print("."); delay(500);
}
}
initManagedDevice();
Serial.println();
}
}
void wificonnect();//function defenition for wificonnect
{
Serial.println(); Serial.print("Connecting to ");
WiFi.begin("vivo 1816", "taetae95",6);//PASSING THE WIFI CREDIDENTIALS TO
ESTABLISH CONNECTION
while (WiFi.status() !=WL_CONNECTED){ delay(500);
Serial.print(".");
}
}

```

```

Serial.println(""); Serial.println("WiFi connected"); Serial.println("IP address");
Serial.println(WiFi.localIP());
}
void initManagedDevice(){ if(client.subscribe(subscribetopic)){
Serial.println(subscribetopic); Serial.println("subscribe to cmd OK");
}else{
Serial.println("subscribe to cmd failed");
}
}
void callback(char* subscribetopic,byte*payload,unsigned int payloadLength)
{
Serial.print("callback invoked for topic: ");
Serial.println(subscribetopic); for(int i=0; i< payloadLength; i++){
//Serial.print((char)payload[i]); data3 +=(char)payload[i];
}
//Serial.println("dta: "+ data3);
//if(data3=="Near")
//{
//Serial.println(data3);
//digitalWrite(LED,HIGH);
//}

//else //{

//Serial.println(data3);
//digitalWrite(LED,LOW);//} data3="";
}

```