IOT BASED SAFETY GADGET FOR CHILD

SAFETY MONITORING AND NOTIFICTION.

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DEPARTMENT : ELECTRONICS AND COMMUNICATION ENGINEERING

COLLEGE NAME : SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE, GOBI.

1.INTRODUCTION

1.1Project Overview

The concept of a smart wearable device for little children. The major advantage of this wearable over other wearable is that it can be used in any cellphone and doesn't necessarily require an expensive smartphone and not a very tech savvy individual to operate. The purpose of this device is to help parents locate their children with ease. At the moment there are many wearables in the market which help track the daily activity of children and also help find the child using Wi-Fi and Bluetooth services present on the device. But Wi-Fi and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this paper is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication is almost present everywhere. The parent can send a text with specific keywords such as "LOCATION" "TEMPERATURE" "UV" "SOS""BUZZ", etc., the wearable device will reply back with a text containing the real time accurate location of the child which upon tapping will provide directions to the child's location on google maps app and will also provide the surrounding temperature, UV radiation index so that the parents can keep track if the temperature or UV radiation is not suitable for the child. The prime motivation behind this paper is that we know how important technology is in our lives but it can sometimes can't be trusted, and we always need to have a secondary measure at hand. The secondary measure used in this project is the people present in the surrounding of the child who could instantly react for the child's safety till the parents arrive or they could contact the parents and help locate them. The secondary measure implemented was using a bright SOS Light and distress alarm buzzer present on the wearable device which when activated by the parents via SMS text should display the SOS signal brightly and sound an alarm which a bystander can easily spot as a sign of distress. Hence this paper aims at providing parents with a sense of security for their child in today's time.

1.2Purpose

It **assists parents to monitor their children remotely**. In case situations happen, notification will be sent to parents so that actions can be taken. Through this, child safety can be ensured and crime rate will be reduced.

2.LITRATURE SURVEY

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 the bus and issues an alert message accordingly. The system has a developed web-based database-driven application that facilities its management and provides useful information about the children to authorized personnel. A complete prototype leave of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for transportation safety. The work is to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analyzed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer. Acquisition of raw data is then followed by activity recognition which is a process of employing a specialized machine learning algorithm. Real-time monitoring of data is achieved by wirelessly sending sensor data to an open source Cloud Platform. Analysis of the data is done on MATLAB simultaneously.

2.1 EXISTING PROBLEM

Real-Time Child Abuse and Reporting System In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted peoples. GPS is used to track the live location and it is used when needed. 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.

2.2REFERENCE PAPER

1. Akash Moodbidri, Hamid Shahnasser, "Child Safety Wearable Device", Department of Electrical and Computer Engineering San Francisco State University.

2. AnandJatti, MadhviKannan , **Alisha RM, Vijayalakshmi P, ShresthaSinha**, **May 20-21, 2016** " Design and Development of an IOT based wearable device for the Safety and Security of women and girl children ", IEEE International Conference On Recent Trends In Electronics Information Communication Technology, India.

3. Anwaar Al-Lawati, Shaikha Al-Jahdhami, **1-4 February 2015** " RFID-based System for School Children Transportation Safety Enhancement ", Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman,.

4. Dr. R. Kamalraj, " A Hybrid Model on Child Security and Activities Monitoring System using IoT", IEEE Xplore Compliant Part Number: CFP18N67-ART; ISBN:978-1-5386-2456-2.

5. Pooja.K.Biradar1, Prof S.B.Jamge2," An Innovative Monitoring Application for Child Safety", DOI:10.15680/IJIRSET.2015.0409093.

6. Prof. Sunil K Punjabi, Prof. Suvarna Chaure, "Smart Intelligent System for Women and Child Security" Department of Computer Engineering SIES Graduate School of Technology Nerul, Navi Mumbai, India.

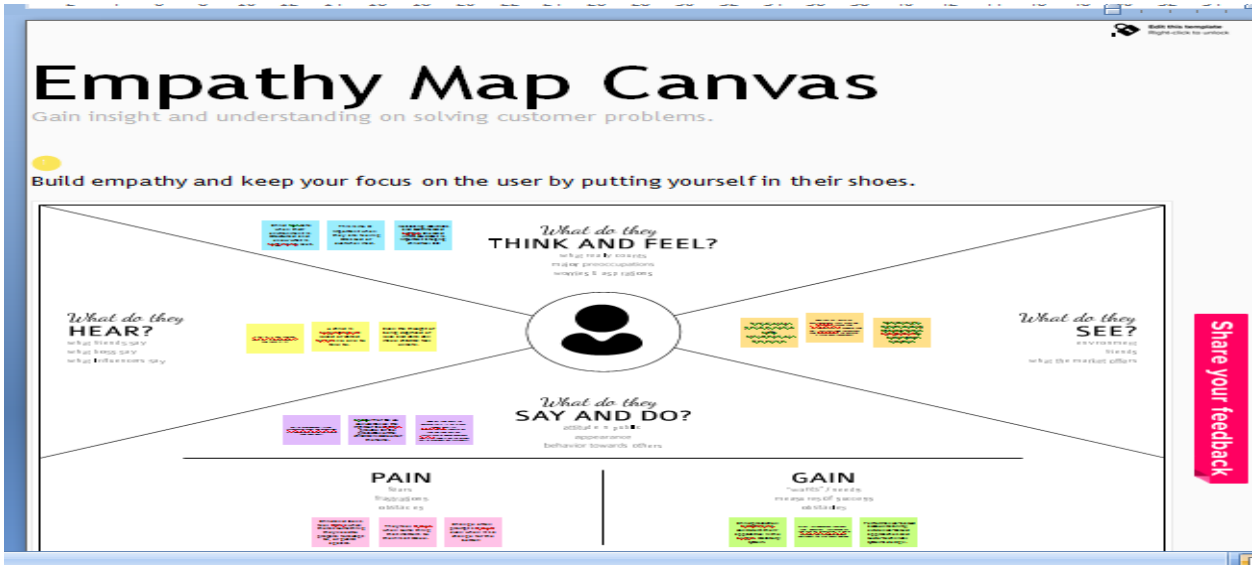
7. Sarifah Putri Raflesia, Firdaus, Dinda Lestarini, **2018.** "An Integrated Child Safety using Geo-fencing Information on Mobile Devices", INTERNATIONAL CONFERENCE ON ELECTRICAL ENGINEERING AND COMPUTER SCIENCE (ICECOS)

8. Zejun Huang1, ZhigangGao," An Mobile Safety Monitoring System for Children", 2014 10th International Conference on Mobile Ad-hoc and Sensor Networks.

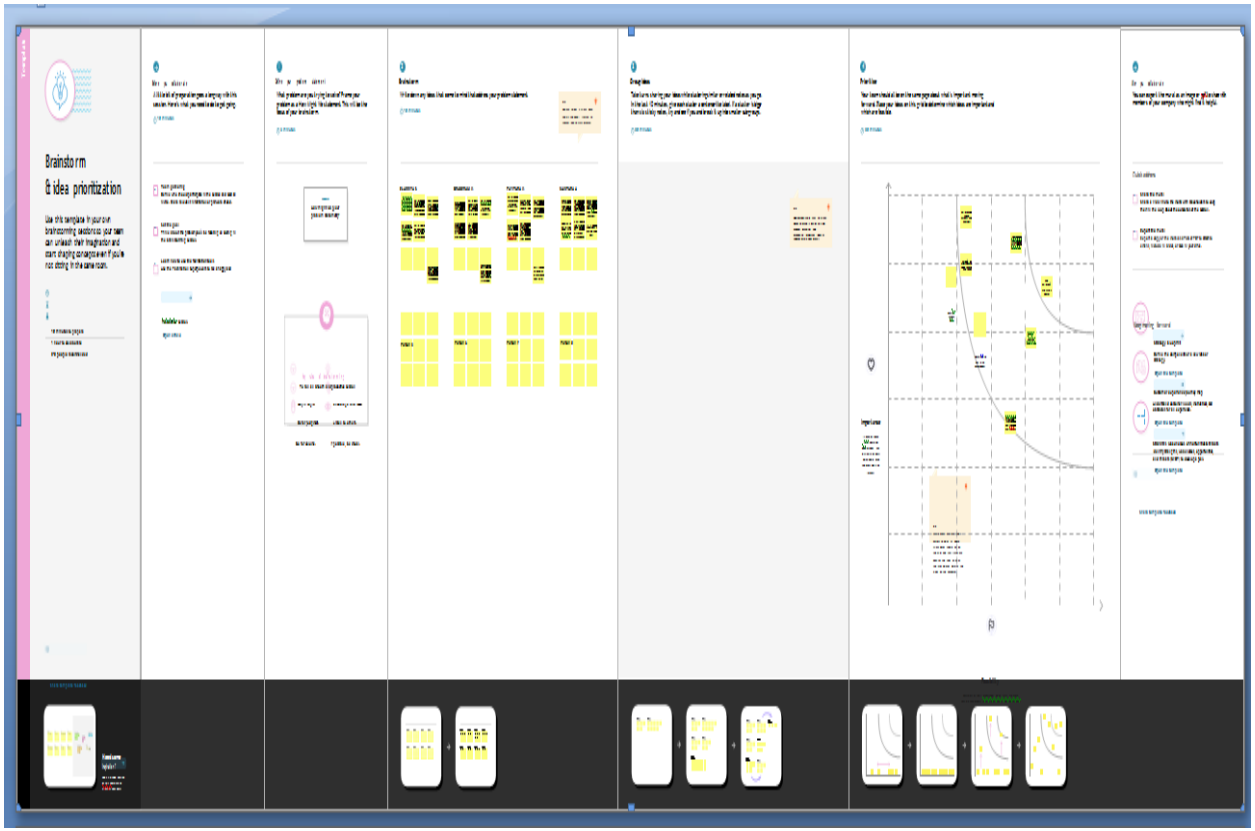
2.3PROBLEM STATEMENT

The Increasing need for protection of the child at present times and also when child can be lost in crowded areas. Using Bluetooth and Wi-Fi not possible to track longer distance. Crimes against children are increasing Year on Year. According to a study, roughly 60,000 children to missing in India every Year. Incase of an emergency, or in a situation of panic, the child must be not able to communicate with their parents without the Knowledge of mobile. Assuming the child is not found immediately, Officers and Detectives will begin following up on various leads to see if they can find the child .In many cases, community members will come together to form search parties to look for the child through out the town.

3.IDEATION &PROPOSED SOLUTIO

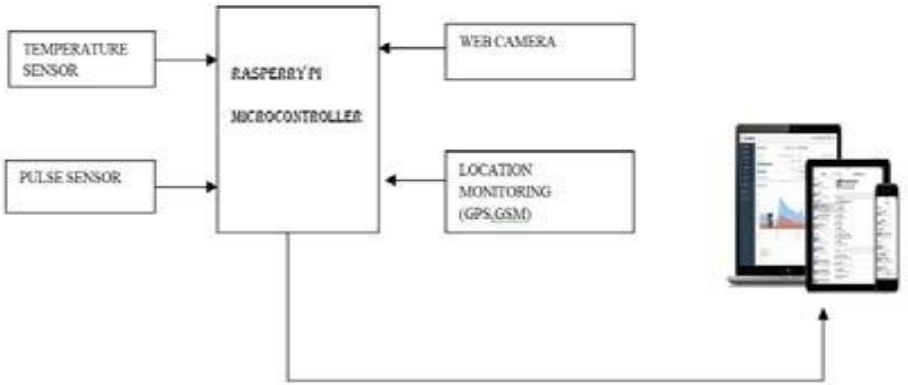


3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

In the existing system, manual intervention was required. But in the proposed system, we make every action autonomously.



Block diagram of the proposed system

We can use both web application as well as mobile application or either one of it as the front end user interface, cloud, and database as the back end for storing and retrieving information, and a device for monitoring.

GPS is used to track the live location of the child who is wearing that device. With the help of GPS, we can easily perform Geo-fencing concept, in which we will be able to feed a particular boundary to that develop.

GSM

If the child goes beyond that particular boundary specified, the respective guardians will receive an alert call using GSM. In our system, we use several components like

1.Temperature sensor.

2.Pulse sensor

3.GPS

4.GSM

3.4 PROPOSED SOLUTION FIT

ANGEL CHILD MONITORING:

- This device, which can be carried in pocket, strapped to body or worn around the neck, allows the parents to create safe zones for their child, including school, home, parks or even tuition centres.
- The moment the child moves away from these zones, an alert is send to the parents phone using an app.

KAIOTA:

- This is a GPS-enabled package which has a wearable phone and a tracker which could be installed in childrens watch.
- Parents can monitor child location and surroundings.
- It operates on an IOT platform called TRAXROOT.

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

- The system shall allow the user or family's to register phone number.
- The system shall provide report for the ongoing day to day activity bothfor the schools and families.
- The system should provide all the sensed data from each sensor send bytext message.

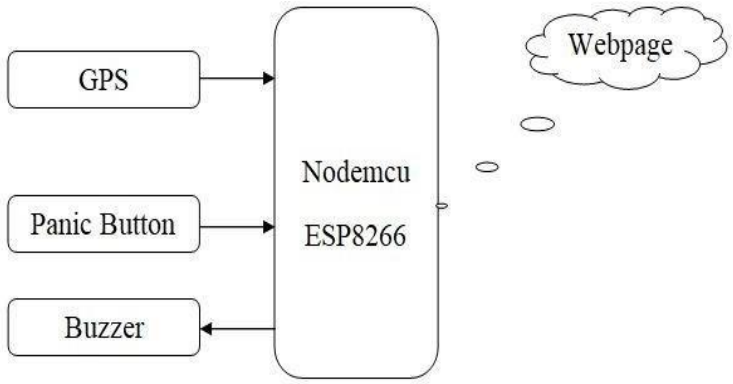
- ❖ The system shall check the sensed data with the threshold value of eachinput.
- ❖ The system shall notify the user while the input value exceed or becomebelow the threshold value.

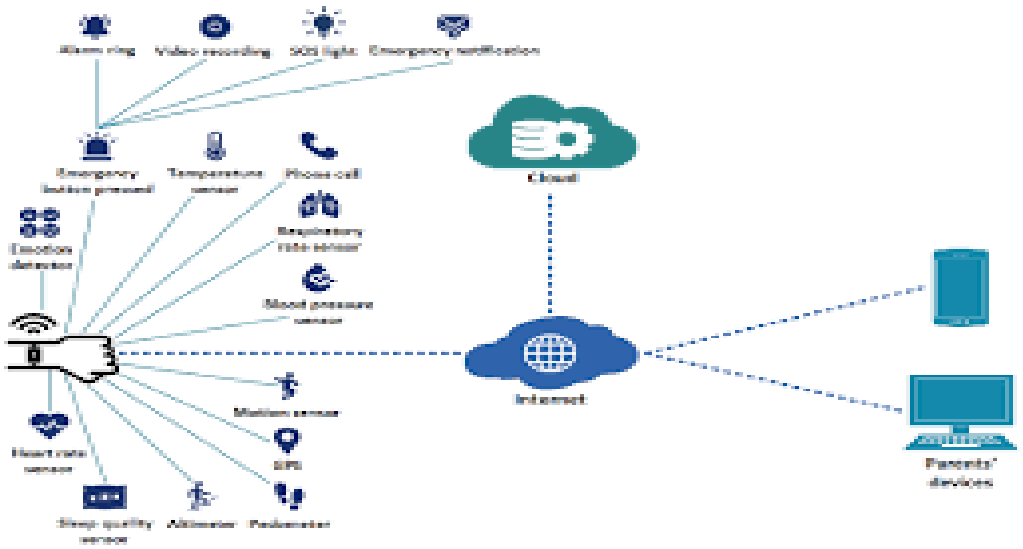
4.2 NON- FUNCTIONAL REQUIREMENTS

- ❖ The system shall give the accurate result for different factors using sensing material as a result their will not be any distractive damage.
- ❖ The system shall be maintainable whenever faller occurs.
- ❖ Sometime the GPS module works on rainy condition.
- ❖ The system is cost effective comparing to the features it provides.
- ❖ The system shall be usable within a few minutes training.

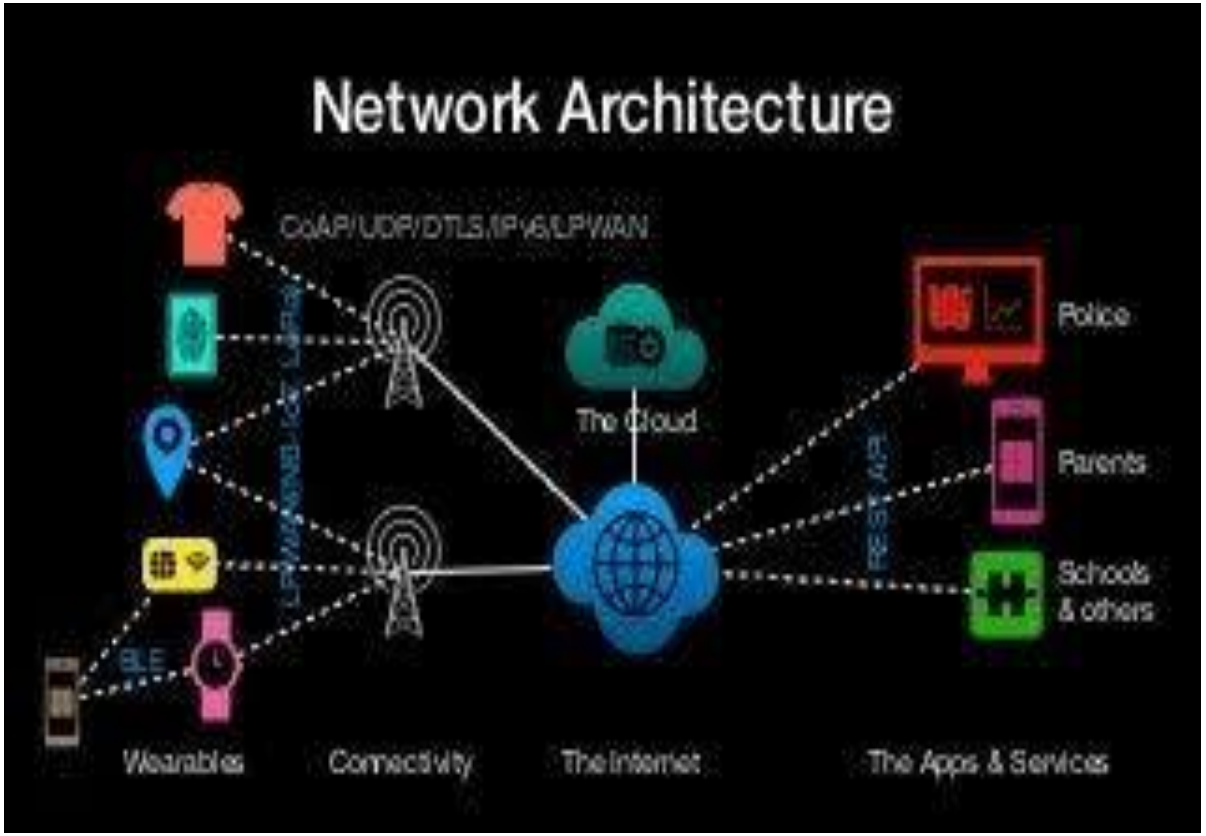
5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

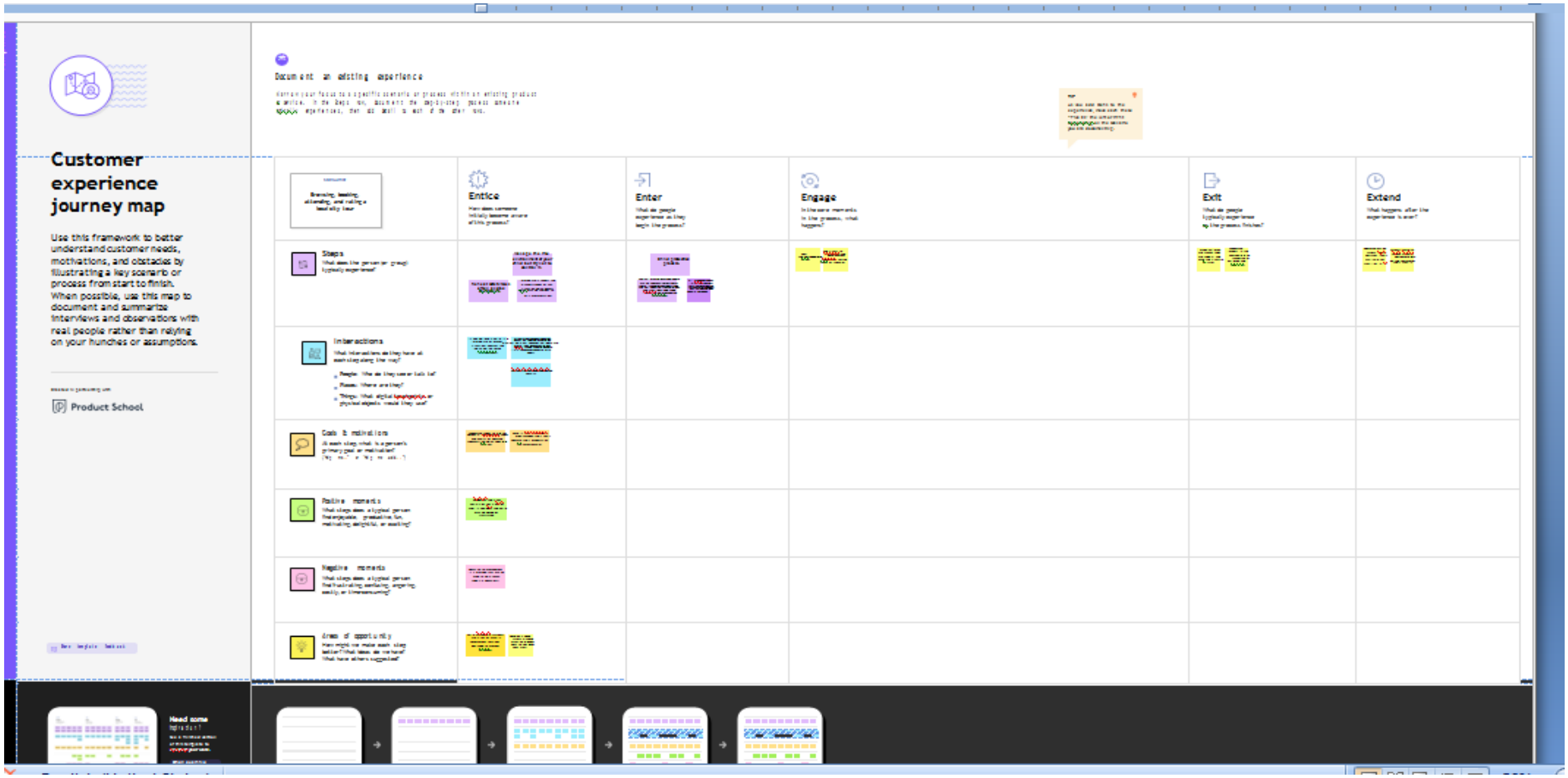



Alarm ring
Video recording
SOS light
Emergency notification
Emergency button pressed
Temperature sensor
Phone call
Cloud
Emotion detector
Respiratory rate sensor
Blood pressure sensor
Internet
Motion sensor
GPS
Heart rate sensor
Sleep quality sensor
Altimeter
Pedometer
Parents' devices

5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 USER STORIES



6. PROJECT PLANNING &SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Use the below template to create a 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 user, I can register for the application by entering my email, and password, and confirming my password.	4	High	KEERTHANA
Sprint-1	Confirmation Email	USN-2	As a user, I will receive a confirmation email once I have registered for the application	4	High	GOKULAKRISHNAN
Sprint-1	Authentication	USN-3	As a user, I can register for the application through Gmail and mobile app.	4	Medium	NAGALOGESHWARI
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	4	High	RAJA RAJESHWARI
Sprint-1	Dashboard	USN-5	As a user, I need to be able to view the functions that I can perform	4	High	KEERTHANA
Sprint-2	Notification	USN-1	As a user, I should be able to notify my parent and guardian in emergency situations	10	High	GOKULAKRISHNAN
Sprint-2	Store data	USN-2	As a user, I need to continuously store my location data into the database.	10	Medium	NAGALOGESHWARI
Sprint-3	Communication	USN-3,1	I should be able to communicate with my parents	6	Low	RAJA RAJESHWARI

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	IoT Device – Watson communication	USN-1,4	The data from IoT device should reach IBM Cloud	7	Medium	KEERTHANA, GOKULA KRISHNAN
Sprint-3	Node RED-Cloudant DB communication	USN-5,2	The data stored in IBM Cloud should be properly integrated with Cloudant DB	7	High	NAGALOGESHWARI, RAJA RAJESHWARI
Sprint-4	User – WebUI interface	USN-1,4	The Web UI should get inputs from the user	6	High	KEERTHANA, GOKULA KRISHNAN
Sprint-4	Geofencing	USN-2,3,5	The geofencing of the child should be done based on the geographical coordinates	7	High	NAGALOGESHWARI, RAJA RAJESHWARI

Project Tracker, Velocity & Burndown Chart:

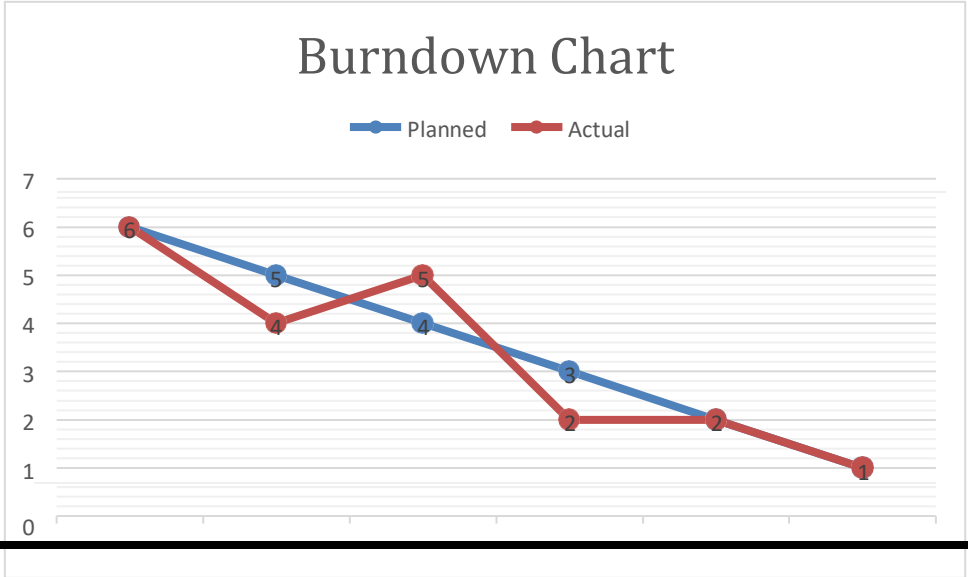
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022

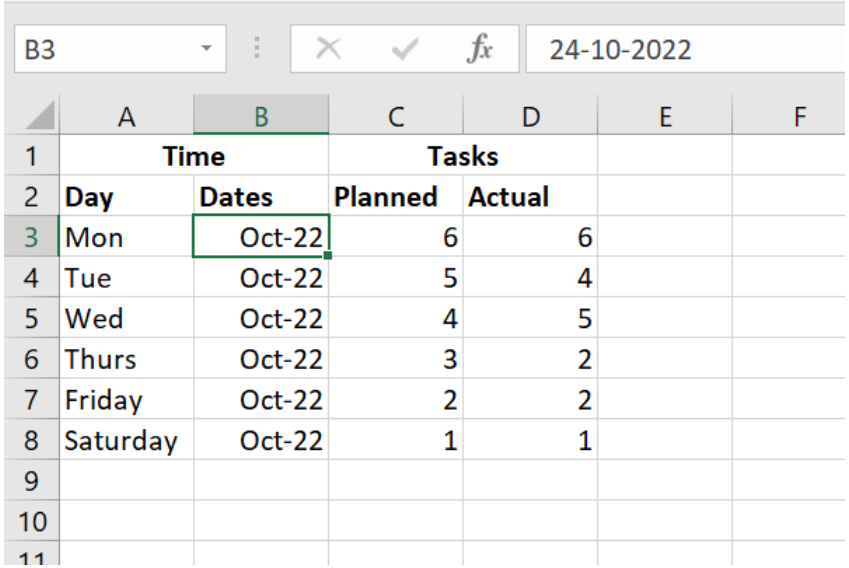
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

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)

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





B3 | 24-10-2022

	A	B	C	D	E	F
1	Time		Tasks			
2	Day	Dates	Planned	Actual		
3	Mon	Oct-22	6	6		
4	Tue	Oct-22	5	4		
5	Wed	Oct-22	4	5		
6	Thurs	Oct-22	3	2		
7	Friday	Oct-22	2	2		
8	Saturday	Oct-22	1	1		
9						
10						
11						

6.2 SPRINT DELIVERY SCHEDULE

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Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
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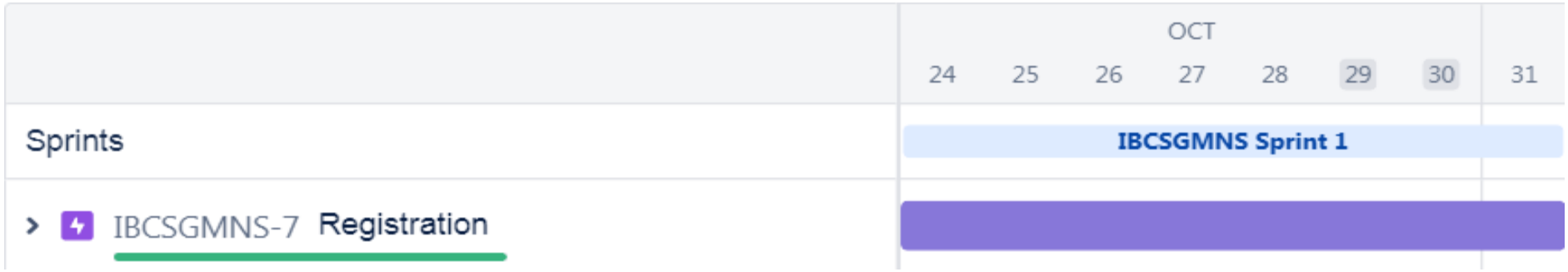
6.3 REPORTS FROM JIRA



7. CODING & SOLUTIONING

7.1 FEATURE 1

Camera Module

For surveillance of the child surroundings, to get a clearer picture of the location or place, this wearable can also be incorporated a camera module in it. The hardware that can be used would be an ad fruit TTL serial camera or any other camera module. Since the major focus of this wearable is the GSM module which is a better alternative than Bluetooth, Wi-Fi or ZigBee due to the short range and connectivity issues. Therefore, for this project using the GSM technologies is beneficial for us as the cellular range is vast and

since all the communication between the wearable and the user is taking place via SMS, therefore no internet connectivity is required. But, still, the GSM module possess the added advantage of using GPRS which enables the board to use the internet if required. Whereas for camera module which supports video streaming but due to the constraint of trying to use only SMS, therefore only four wire connections will be taking place. The red and black wires will be connected directly to +5V and GND respectively to the Arduino Uno board. Whereas for the RX pin which will be used for sending data via Arduino Uno and gsm board and for the TX pin which will be utilized for receiving incoming data via from the modules. The lO K resistor divider, the camera's serial data pins are 3.3v logic, and it would be a good idea to divide the 5V down so that its 2.5V.Normally the output from the digital 0 pin is 5V high, the wa0y we connected the resistors is so the camera input (white wire) never goes above 3.3V. To talk to the camera, the Arduino Uno will be using two digital pins and a software serial port to communicate to the camera. Since the camera or the Arduino Uno do not have enough onboard memory to save snapshots clicked and store it temporarily, therefore an external storage source microSD board will be used to save the images temporarily. The camera works on a standard baud rate of 38400 baud. The camera will be collecting information in the same manner as the GPS module does. It will be on standby conserving power waiting for the particular keyword "SNAPSHOT" or any other defined in the program to be sent from the user's smartphone to the GSM module will activate the camera by the Arduino Uno to start clicking a snapshot of the surrounding and save the file temporarily on the external microSD card. After which Arduino Uno will access the saved images from the SD storage and transfer it to the GSM module which send it to the user via SMS/MMS text.

7.2 FEATURE 2

Android App

The idea behind the Android app has been derived from having an automated bot to respond to text message responses from the user. It will provide the user with predefined response options at just the click of a button. The user doesn't need to memorize the specific keywords to send. Also, the bot will be pre-programmed to present the user with a set of predefined keyword options such as "LOCATION," "SNAPSHOT," "SOS," etc. Whereas for the future aspect of this wearable device based on what type sensor is added to it, additional specific keywords could be added such as, "HUMIDITY," "ALTITUDE," etc. This android app provides mote interface to the user which help to understand easily. The main idea in this android app is to provide keyword button i.e. that for getting location we have a specific button, by pressing this button we get the location instead of typing the keyword which ease our work.

8. TESTING

8.1 TEST CASES

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2

8.2 USER ACCEPTANCE TESTING

1 **Purpose of Document**

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2 Defect Analysis

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	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

9. RESULTS

9.1 PERFORMANCE MERTICS

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 inthe body of the child or in the surrounding it will notify the user as per the coded time delay as shownin the picture. It will show the temperature and humidity values notifies the user based on the predefined value abnormal fall or rise scenarios.

The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. Demerits: To implement the IoT device which ensures the complete solution for child safety problems.

10. ADVANTAGE & DISADVANTAGE

ADVANTAGE

- Staying Connected
- Data Accuracy
- Efficiency
- It can be used in any cell phone and doesn't necessarily require an expensive smart phone

DISADVANTAGE

- Security and privacy concerns
- Health Risks
- Limitations of wearable Technologies
- Linked Devices
- Distraction from work- related activities
- High cost but once it is implemented the expenses can be reduced0

11.CONCLUSION

The word Future resembles the word Children. As Dr. A.P.J Abdul Kalam's words "Youngsters are the future pillars of one's nation", today's children are tomorrow's youngsters, preserving their dreams and life for a better future is necessary. Therefore, each and every parent should take care of their own children, without letting them to fall into the dark world of abusements, which entirely ruin them physically, mentally and emotionally destroying our future. Hence, considering the importance of our future, our project makes it easy for parents to track their children and to visually monitor them on regular basis, which makes them ensure the safety of their children and reduces the rate of incidents of child abuse.

12. FUTURE SCOPE

In our system, we automatically monitor the child in real time using Internet of Things, with the help of GPS, GSM, and Raspberry Pi. This system requires network connectivity, satellite communication, and high-speed data connection when we use web camera and GPS to lively monitor. It is difficult to monitor when there occurs any hindrance to satellite communication or any network issue. There also occurs time delay in video streaming through the server. Hence in the future, these issues can be overcome by using Zigbee concept or accessing the system without internet and using high-speed server transmission.

13. APPENDIX

Homepage

```
<html><head><META http-equiv="Content-Type" content="text/html;
 charset=utf-8"><style></style></head>
<body>


<div class="m_container">
   <div class="m_row">
      <div class="m_form m_col-md" id="m_form1">
         <h1><font color="green">SHREE VENKATESHWARA HI TECH ENGINEERING COLLEGE</font></h1>
         <h2><font color="BLACK">IOT BASED  SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION </font></h2>
```

```
        <br>
        <form action="http:///" method="post" target="_blank">
            <input type="text" class="m_form__input" name="url" id="m_url">
            <label for="m_url" class="m_form__label"></label>
            <button class="m_button" role="button">Check here</button>
        </form>

    </div>

    <div class="m_col-md" id="m_form2">

        <br>
        <h6 class="m_right"><a rel="noreferrer"></a></h6>

        <br>
        <h3 id="m_prediction"></h3>

        <button class="m_button2" id="m_button2" role="button">Still want to Continue</button>
        <button class="m_button1" id="m_button1" role="button">Continue</button>
    </div>
  </div>
  <br>
  <h2><font color="blue">GitHub Team ID :PNT2022TMID44726</font></h2>

  </div>
  </div>

  </body></html>
```

Login.html

```
html,
body {
height: 100%;
margin: 0;
font-weight: 300;
font-family: -apple-system, BlinkMacSystemFont, "Segoe UI", Roboto, Oxygen,
Ubuntu, Cantarell, "Open Sans", "Helvetica Neue", sans-serif;
}
```

```
.wrapper {

height: 100%;
display: flex;
align-items: center;
justify-content: center;
}

.loginContainer {
display: flex;
flex-direction: column;
gap: 1rem;
min-width: 25rem;
padding: 1rem 3rem;
border: 1px solid #44444444;

box-shadow: 0px 3px 2px 1px #44444444;
border-radius: 8px;
}

.loginContainer span {
text-align: center;
font-size: 3rem;
font-weight: 500;
margin: 1rem 1rem 3rem;
}

.traditionalLoginContainer form {
display: flex;
flex-direction: column;
align-items: center;
justify-content: center;
}

.traditionalLoginContainer :is(input[type="text"], input[type="password"], input[type="email"]) {
margin: 0.3rem;
padding: 0.3em 0.5em;
border: 1px solid #44444444;
border-radius: 5px;
outline: none;
min-width: 200px;
font-size: 1.3rem;
}
```

```
.traditionalLoginContainer .loginButton {
background-color: #0070f3;

font-size: 1.6rem;
padding: 0.2em 0.8em;
color: white;
margin: 0.4rem;
border: none;
border-radius: 5px;
cursor: pointer;
margin-top: 2rem;
}

.traditionalLoginContainer .loginButton:hover {
background-color: #0071f3d6;
}

.loginWithFireContainer {
display: grid;
display: -ms-grid;
place-items: center;
}

.fire {
background-color: #f8f9fa;
border: 1px solid #3c404321;
border-radius: 4px;
color: #3c4043;
font-family: arial, sans-serif;

margin: 11px 4px;
padding: 0.4em 0.8em;
line-height: 27px;

min-width: 54px;
text-align: center;
cursor: pointer;
user-select: none;
font-size: 1.3rem;
font-weight: 500;
}
```

```
.hyperLink {
text-decoration: none;
text-align: center;
font-size: 1.2rem;
color: #0070f3;

font-weight: 400;
}

@media screen and (max-width: 480px) {
.loginContainer {
border: none;
box-shadow: none;
min-width: fit-content;
min-width: -moz-fit-content;
min-width: -webkit-fill-available;
padding: 1rem;
}
}
```

Locationsender

```
#include
<WiFi.h>
        #include <WiFiClient.h>
        #include <PubSubClient.h>
        #include <ArduinoJson.h>
        #include<TinyGPS++.h>
        #define RXD2 16
        #define TXD2 17
        HardwareSerial neogps(1);
        TinyGPSPlus gps;
        char arr[100];
        const char* ssid = "Redmi";
        const char* password = "krish@08";
        #define ID "17cmwk"
        #define DEVICE_TYPE "Tracker"
```

```
#define DEVICE_ID "gps1"
#define TOKEN "childtracker1"

char server[] = ID ".messaging.internetofthings.ibmcloud.com";
char publish_Topic1[] = "iot-2/evt/Data1/fmt/json";
char publish_Topic2[] = "iot-2/evt/Data2/fmt/json";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ID ":" DEVICE_TYPE ":" DEVICE_ID;

WiFiClient wifiClient;
PubSubClient client(server, 1883, NULL, wifiClient);
void setup() {
   Serial.begin(115200);
   Serial.println();
   wifi_init();
}
long previous_message = 0;
void loop() {
   client.loop();
   String payload = getLocationPayload();


   if(payload=="{}"){
     return;
   }

   Serial.print("Sending payload: ");
   Serial.println(payload);
   if (client.publish(publish_Topic1, arr)) {
      Serial.println("Published successfully");
   } else {
      Serial.println("Failed");
   }
   delay(2000);
}
void wifi_init(){
```

```
    WiFi.begin(ssid, password);
    neogps.begin(9600,SERIAL_8N1,RXD2,TXD2);


    while (WiFi.status() != WL_CONNECTED) {
      delay(500);


      Serial.print(".");
    }
    Serial.println("");
    Serial.println(WiFi.localIP());
    if (!client.connected()) {
        Serial.print("Reconnecting client to ");
        Serial.println(server);

while (!client.connect(clientId, authMethod, token)) {
            Serial.print(".");
            delay(500);
        }
        Serial.println("Connected TO IBM IoT cloud!");
    }
}
String getLocationPayload(){
    boolean newData = false;
    for(unsigned long start = millis();millis()-start<1000;){
      while(neogps.available()){
        if(gps.encode(neogps.read())){
          newData = true;


        }
      }
    }
    String payload;
    if(newData == true){
      newData = false;
      payload = locationPayloadGenerator();
```

```
    }
    else{
      Serial.println("No data");
      payload ="{}";
    }


    return payload;
}



String locationPayloadGenerator(){
  String payload = "{}";
  if(gps.location.isValid()){
    float lat = gps.location.lat();
    float lon = gps.location.lng();
    payload = "{\"latitude\" : "+String(lat)+",\"longitude\" : "+String(lon)+"}";
    create_json(lat,lon);
  }
  return payload;

}

void create_json(float lat,float lon){
  StaticJsonDocument<100> doc;
  JsonObject root = doc.to<JsonObject>();
  root["name"]="Child";
  root["latitude"] = lat;
  root["longitude"] = lon;
  serializeJsonPretty(doc,arr);
}
```