PROJECT REPORT

Date	**18 November 2022**
Team id	**PNT2022TMID49507**
Project name	**Project-IOT Based safety gadgets for child safety monitoring and notification**

IOT BASED SAFETY GADGETS FOR CHILD SAFETY MONITORING AND NOTIFICATION

1.INTRODUCTION

1.1 PROJECT OVERVIEW:

IOT based gadgets device is develop to monitor the children's activities who experience abuse lose their emotional and psychological stability, resulting in a negative impact on their career and future. The things that happen to these vulnerable kids are not their fault. However, due to the state of the economy and a desire to concentrate on the future and profession of their child, parents are obligated to yearn for money. Consequently, it becomes challenging for them to constantly adhere to their kids. This motivate us to develop an autonomous IOT device to monitor the children's activities and their location without any intrusion.We offer a setting in our system where this issue may be effectively handled. It enables parents to keep an eye on to their kids in real time without having to intervene manually, almost as they were standing next to them, while concentrating on their own careers. And GEO-Fencing boundary is setup and it is used to monitor the location of the child and if a child crosses the boundary alert notification will be sent to the parents mobile.

1.2 PURPOSE:

The purpose of this device is to help the parents to locate their child 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 (Wireless Fidelity) and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this project is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication. The parent can send a text as SMS with specific keywords such as "LOCATION", "TEMPERATURE", etc., to the wearable

device. The device will replay back with a text containing the real time accurate location of the child and will also provide the surrounding temperature, so that the parents can keep track if the temperature not suitable for the child. The secondary measure implemented was using a bright SOS Light and distress alarm buzzer present on the wearable device which can be activated by the parents via SMS

1. LITERATURE SURVEY:

2.1 Existing problem: This project discusses the concept of a smart wearable device for little children. The major pros 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 the parents to locate their child 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 (Wireless Fidelity) and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this project is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication. The parent can send a text as SMS with specific keywords such as “LOCATION”, “TEMPERATURE”, “SOS”, “BUZZ”, etc., to the wearable device. The device will replay back with a text containing the real time accurate location of the child and will also provide the surrounding temperature, so that the parents can keep track if the temperature not suitable for the child. The secondary measure implemented was using a bright SOS Light and distress alarm buzzer present on the wearable device which can be activated by the parents via SMS text to display the SOS signal brightly and sound an alarm which a bystander can instantly react for the child's safety till the parents arrive or they could contact the parents and help locate them. Hence this project aims at providing parents with a sense of security for their child in today's time. The motivation for this wearable comes from the increasing need for safety for children in present times as there can be scenarios of the child getting lost in the major crowded areas. This paper focusses on the key aspect that lost children can be helped by the people around the child and can play a

significant role in the child's safety until reunited with the parents. Therefore, it is intended to use the SMS as the communication type between the parent and child's wearable device, as this has fewer chances of failing when compared to Wi-Fi and Bluetooth. The platform on which this project will be running on is the Arduino Uno microcontroller board based on the ATmega328P, and the functions of sending and receiving SMS, which is provided by the Arduino GSM Module using the GSM network. Also, additional modules employed which will provide the current location of the child to the parents via SMS. The second measure added is SOS Light indicator that will be programmed with Arduino UNO board to display the SOS signal whenever the parent wants. In the scenario, a lost child can be located by the parent could send a predefined keyword as an SMS to the wearable device which would reply by sending location to the parent mobile. Additionally, the wearable equipped with a distress alarm buzzer which sets to active by sending an SMS keyword "BUZZ" to the wearable. Hence the buzzer is louder and can be heard by the parent from very considerable distance. Also, the parents via SMS can receive coordinates of the child, which can help them locate the child with maximum accuracy. Some of the existing work done on these similar lines are for example the lowcost, lightweight Wristband Vital which senses and reports hazardous surroundings for people who need immediate assistance such as children and seniors. It is based on a multi-sensor Arduino microsystem and a low¬ power Bluetooth 4.1 module. The major drawback for the Vital band is that it uses Bluetooth as the mode of communication between child and the parent. Therefore, the wearable device proposed will be communicating with the parent via SMS through GSM which would ensure that there is a secure communication link. Also, customization of the wearable can be possible as per our needs by reprogramming the Arduino system.

SYSTEM DESIGN AND ARCHITECTURE :

This section discusses the architecture and the design methodologies chosen for the development of the Child Safety wearable device.

System Overview:

An ATmega328p microcontroller controls the system architecture of the wearable device with an Arduino Uno bootloader.

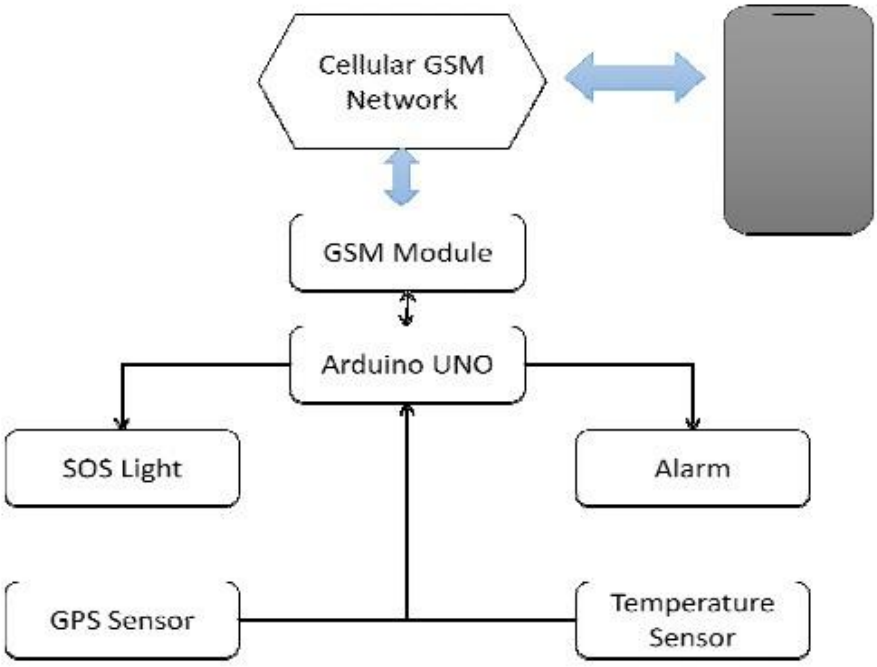


Fig. 1 System overview of the wearable device.

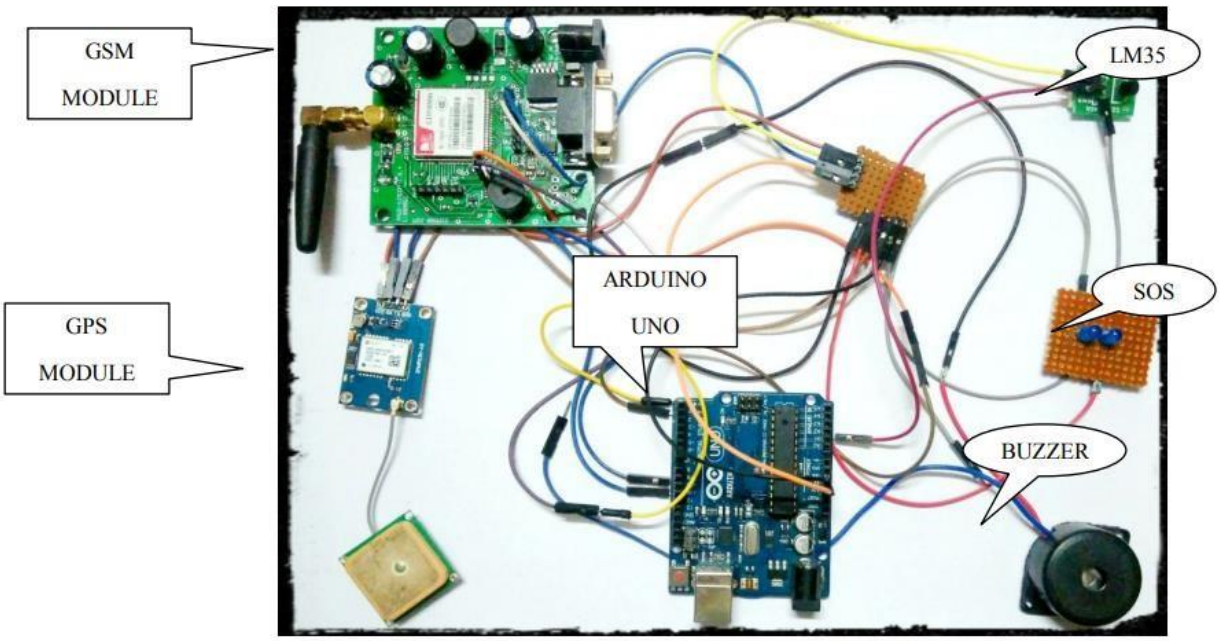
The Fig illustrates the architecture of the child safety wearable device, which depicts the various technologies and technological standards that are used. The Arduino Uno collects the data from the different modules interfaced to it, such as the GPS module upon being triggered by the Arduino Uno by receiving SMS from GSM module. The GSM module is used as an interface to send the data received by the Arduino Uno via SMS to a mobile. The GSM module functions as a trigger

for the Arduino Uno to request data from its various modules connected to it. If an SMS text with specified keyword is sent to request the current location or GPS coordinates is sent to the GSM module via the user's phone, then the GSM module triggers the Arduino Uno to request the current GPS coordinates.

Fig. 2 Arduino Uno

Wearable Device:

The wearable device, for now, is not built on a system on chip model, rather has been proposed using larger components and can later build on the SOC platform once put into manufacture



The wearable device tasked with acquiring various data from the all the different modules connected to it. It comprises of Arduino Uno based on the ATmega328P microcontroller. The Arduino Uno receives data from different modules and analysis the data and customizes the data in a user understandable format. For the moment the design is not made compact, since the focus now has been to show that this concept of smart wearables would be highly impactful for the safety of the children. The wearable system runs on a battery or any external source. In order to minimize power consumption, the wearable device has been programmed to provide GPS and other information only upon request by SMS text via GSM.

GPS location sensor :

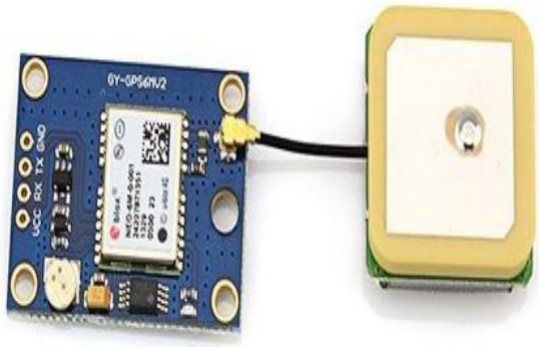


Fig. 4: GPS Sensor

For determining the real time location of the child NEO6MV2 GPS module has been used which communicates with the Arduino Uno through a 9600-bps software serial interface. The connections between the Arduino Uno and the GPS module established like the connections with GSM module. It has a low power consumption and small size, which is very compact. The GPS module output comprises of standard string information which is governed by the National Marine Electronics Association (NMEA) protocol. Once the SMS trigger text "LOCATION" is sent from the cell phone of the user, this text is received by the GSM which in turn triggers the Arduino Uno to execute the GPS code to fetch the current, accurate location of the GPS module. The location output received from the GPS module is in the following format:

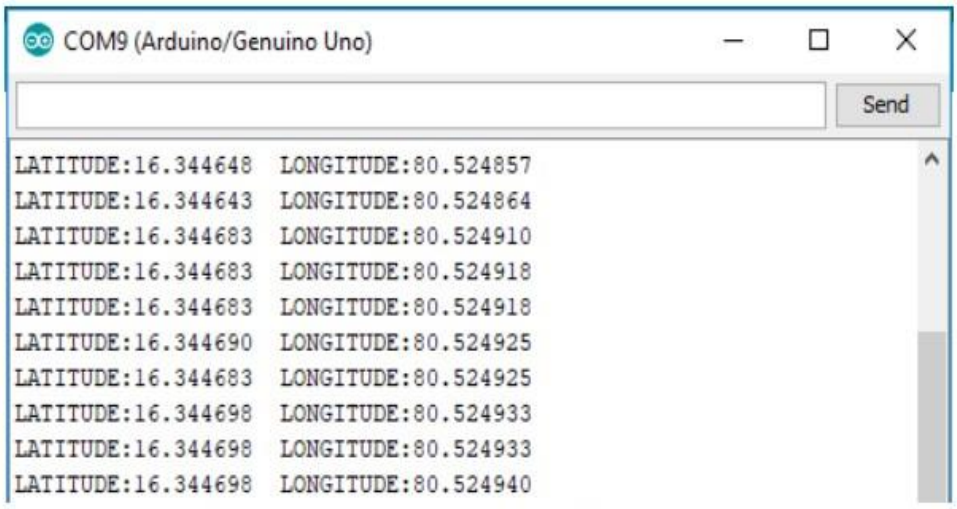


Fig 5. Output received GPS location sensor.

The latitude and longitude coordinates received are stored in variables called "latitude" and "longitude," which are then called upon when the SMS text received on the GSM module matches with the keyword "LOCATION". Once the SMS trigger text "LOCATION" is sent from the smartphone of the user, this text is received by the Arduino GSM Shield which in turn triggers the Arduino Uno to execute the GPS code to fetch the current, accurate location of the GPS module. The location output string received from the GPS module is in the following format:

```
$GPRMC,220516,A,5133.82,N,00042.24,W,173.8,231.8,130694,004.2,W*70
       1    2    3    4     5     6    7     8      9      10  11 12
```

Temperature Sensor

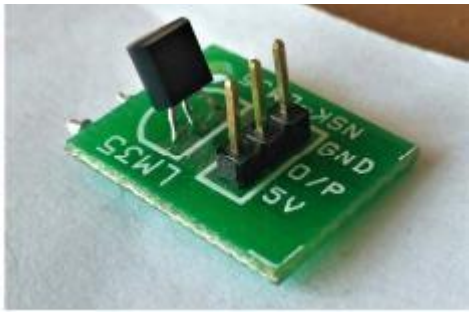


Fig. 6: LM35

In order to measure the temperature of the surroundings of the child, a LM35 sensor is used. The sensor module is equipped with a thermistor for measuring the ambient temperature and the fluctuation with maximum efficiency. The observable temperature detectability for this sensor ranges from to and the precise accuracy for this device range from to. The temperature is connected to the Arduino Uno. The temperature value is stored in a variable which may be integer or string type. Hence the temperature is called by the Arduino upon receiving the proper SMS keyword “TEMPERATURE” by the user’s smartphone.

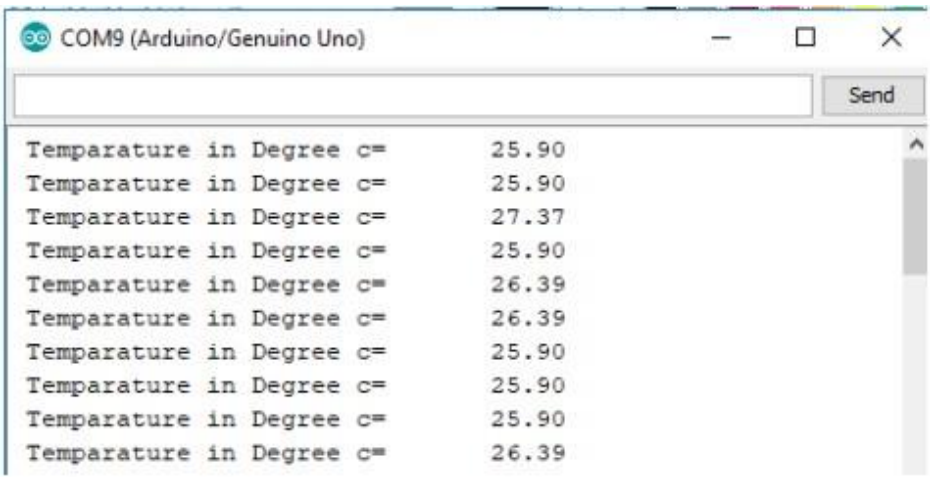


Fig 7. Output received from Temperature .

SOS light:

The another theory that this paper focuses on is that bystanders are the first mode of help for a missing child. The purpose of the SOS light is to be able to alert the people nearby that the child might be in distress since the light will be flashing the universal SOS light symbol which may people nowadays know for to be a sign for help. This can be activated by the parent itself by sending an SMS text with the keyword “SOS” to the child’s wearable which will activate the SOS light flashing. The SOS light works on the principal of Morse code in which “S” stands for three short dots and the “O” stands for three long dashes. Since a very long time the SOS signal has been universally known for being the sign of distress and help. The SOS signal is referred to by all security personals, who if find the child to be missing can act and help locate the parents with surplus resources present at their disposal. The SOS light is connected to the pin of the Arduino.

F. Alarm

In the scenario, if a child is separated from his/her parents. The parent can locate the child by sound in a very loud alarm on the wearable. To achieve this, a piezoelectric buzzer is used, which is responsible for emitting a strong tone upon the output being set to HIGH. The buzzer module is

activated upon sending an SMS text with the keyword “BUZZ” from a cell phone. Also, this buzzer works like the SOS led by alerting the people nearby with the distressed tone that the child might be lost and needs assistance. The buzzer is the child might be lost and needs assistance. The buzzer is connected to the digital pin of the Arduino.

G. Gateway

1) GSM Module: GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine-SIM900A, works on frequencies 900/1800 MHz The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet etc. through simple AT commands.

Fig 8.GSM MODULE.

It transfers the information over to the user via SMS. Arduino provides GSM libraries for GSM module as well which allows the GSM module to make/receive a call, send/receive SMS and act as a client/server. The GSM module receives 5V power supply directly from the 5V pin connection at the Arduino Uno 5V. The serial communication between the Arduino Uno and GSM module is performed between the serial pins 0,1. The Arduino has been programmed to receive SMS text messages from the parent’s cellphone via GSM module. The GSM module will constantly be

scanning the received text messages for the specific keywords such as “LOCATION”, “TEMPERATURE”, “SOS” and “BUZZ”.

RESULTS:

In this section, the experimental tests were performed to detinning the various components of the proposed wearable device.

GPS Location Sensor:

Upon testing the wearable device multiple times with repeated SMS texts. The GPS location sensor was able to respond back with precise latitude and longitude coordinates of the wearable device to the user's cellphone, which then the user would click on the received Google maps URL which would, in tum, open the gmaps app or any default browser and display location

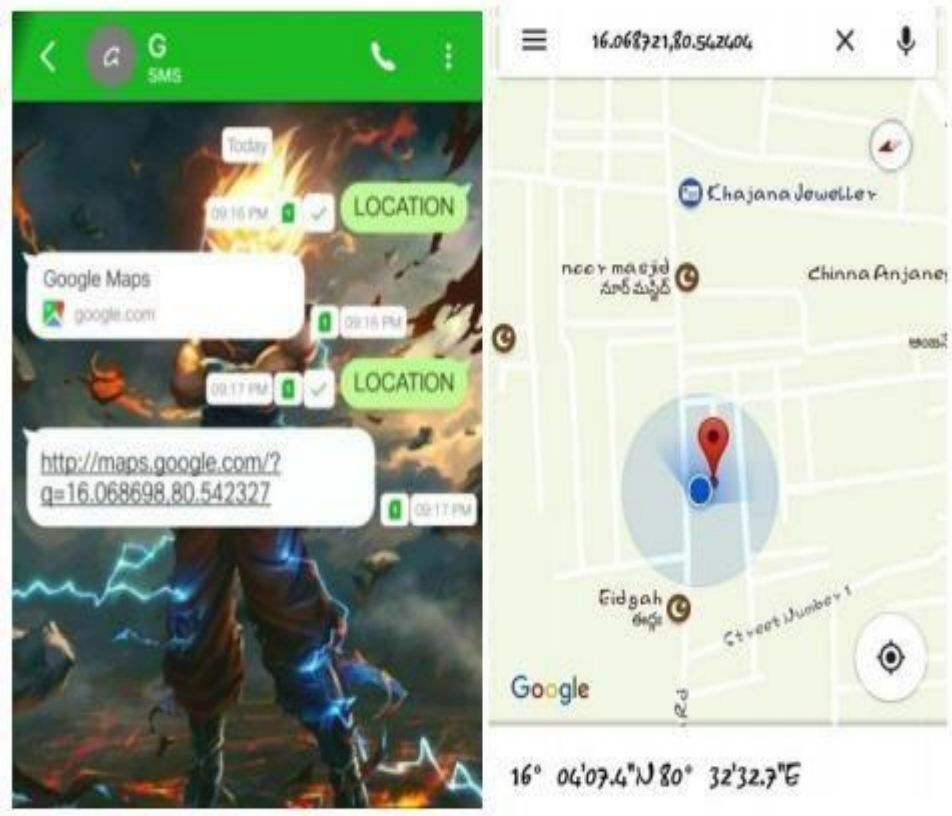


Fig 9. Left: Cellphone SMS app for LOCATION sensor and Right: Google maps with latitude and longitude coordinates displayed.

In all the scenarios the GPS module was tested, it would respond back to the user's cellphone less than a minute. As shown in the image below, the GPS module (red bubble) was able to show the current location of the wearable with pinpoint accuracy and show exactly at which side of the building it is present. Whereas for blue dot is showing the wearable to be present on the street, which is marginally off from the exact location. This marginal miss match in the pin-point location of the wearable can tum out to be fatal in a real-life scenario, where the parent may be miss lead to the wrong location of the child. Therefore, NEO6MV2 GPS module proves to be successful in providing the precise location with high accuracy and with a good response time. The only drawback that could be stated was, the GSM module could not interpret multiple valid keywords sent in a single message. For example, SMS string sent: “LOCATION”, “TEMPERATURE”, “UV”, “BUZZ” AND “SOS” it would not send a reply back to the GSM module.

Temperature Sensor:

Similar to the GPS location sensor, the Temperature sensor were tested multiple times under different temperatures. The sensor performed exceptionally well to the test performed. The response time to receive a response back to the keyword "TEMPERATURE" was under a minute. Also, the temperature sensor was subjected to higher temperatures and compared with a thermostat reading present in the room which would differ with the sensor reading by +0.5°C to -0.5°C.

Fig 10. SMS app screen of Temperature sensor

A. SOS Light and Distress Alarm Buzzer

Upon sending an SMS either "SOS" or "BUZZ," this would trigger the light or buzzer to perform an output function instead of providing measurements back to the user's mobile such as in the scenario of the other sensors. Upon receiving the proper keywords, the SOS light and Alarm Buzzer would first perform the particular task of flashing the SOS light and sounding a alarm which can take a little longer than their sensor counterparts.

Fig 11. SMS app screen Top: SOS Light and Bottom: Distress alarm buzzer.

After completion of their respective functions, the response is sent back to the user cell phone stating

2.2 References :

Akash Moodbidri, Hamid Shahnasser, "Child safety wearable device," in IEEE Xplore, June 2017

B. Dorsemaine, 1. P. Gaulier, 1. P. Wary, N. Kheir and P. Urien, "Internet of Things: A Definition and Taxonomy," Next Generation Mobile Applications, Services and Technologies, 2015 9th International Conference on, Cambridge, 2015, pp. 7277.

H. Moustafa, H. Kenn, K. Sayrafian, W. Scanlon and Y. Zhang, "Mobile wearable communications [Guest Editorial]," in IEEE Wireless Communications, vol. 22, no. 1, pp. lO-l1, February 2015

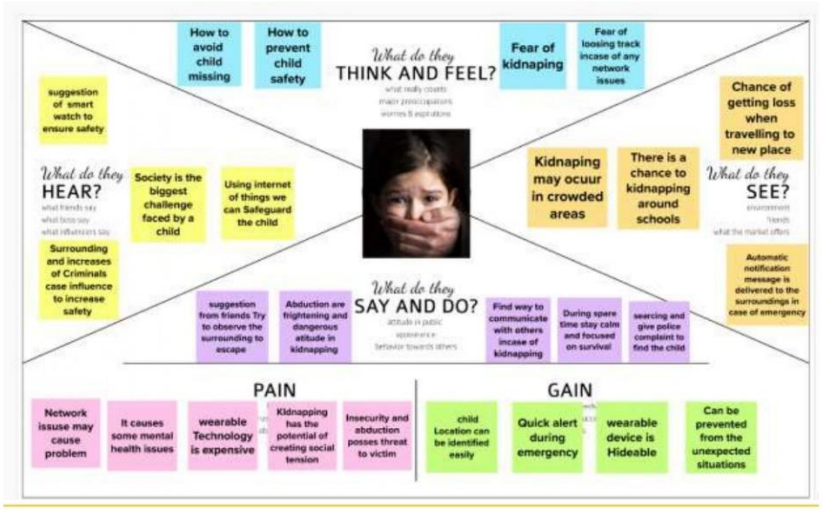
S. Nasrin and P. 1. Radcliffe, "Novel protocol enables DIY home automation," Telecommunication Networks and Applications Conference (ATNAC), 2014 Australasian, Southbank, VIC, 2014, pp212216

F. A. Silva, "Industrial Wireless Sensor Networks: Applications, Protocols, and Standards [Book News]," in IEEE Industrial Electronics Magazine, vol. 8, no. 4,

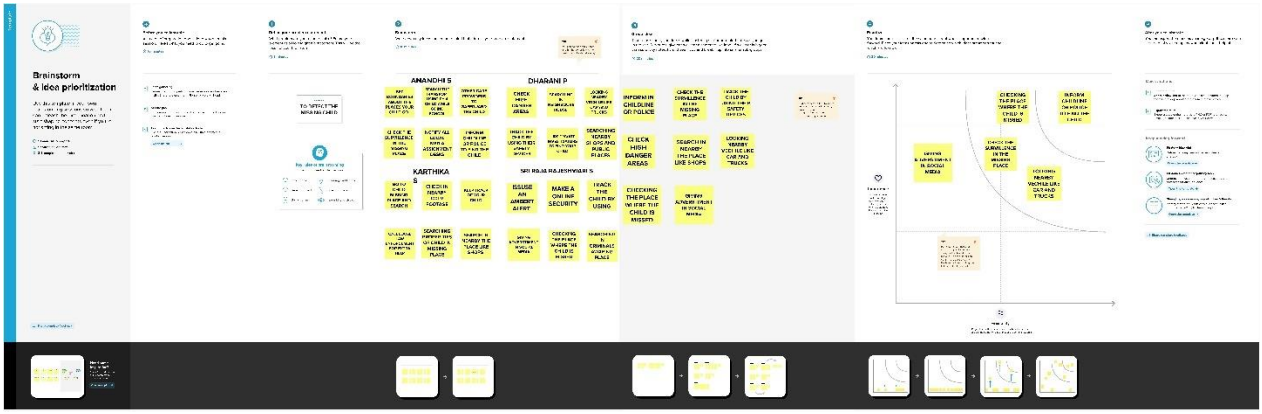
2.3 Problem Statement Definition:

3.IDEATION AND PROPOSED SOLUTION:

3.1 EMPATHY MAP:



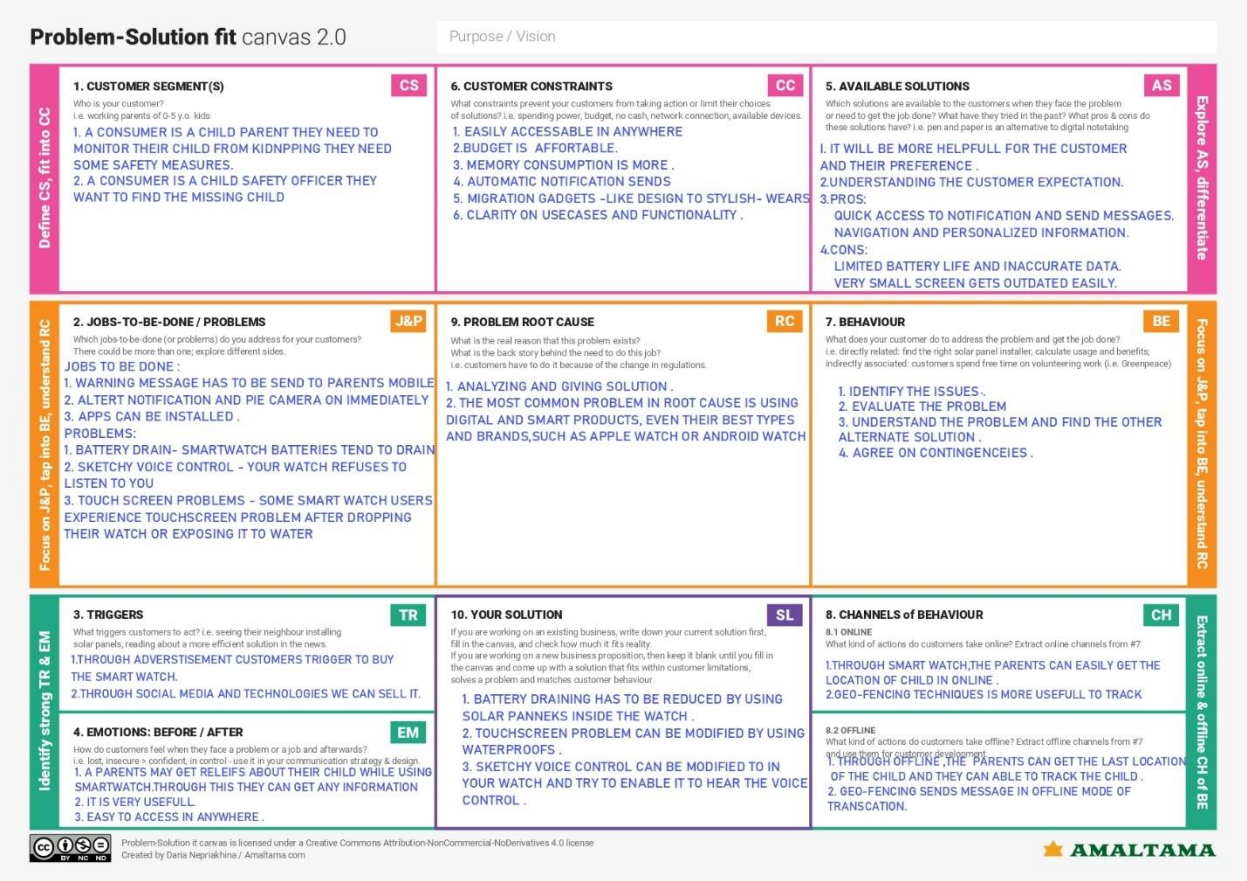
3.2 Ideation & Brainstorming :



3.3 Proposed Solution:

S.NO	PARAMETER	DESCRIPTION
1.	Problem statement(Problem to be solved)	• I am a parent of a child .I am trying to monitor my child when she is away from home but it's an difficult task because it becomes challenging to constantly adhere my child. • I am child safety officer .I am trying to find missing child but I am not able to track the child .This make me to find the alternate to solution the track the child.
2.	Idea/Solution description	• Check in High dangers area. • Geo-fencing process is installed to monitor the activity of child. • Cameras can be used to detect exact situation child. • For tracking the location GPS Module can be installed. • Pulse Sensors are able to sense current states of child and location detectors are enabled. • Alert notification Enabled with GPS module received in parent mobile.
3.	Novelty /uniqueness	• The virtual geo-fencing system will be set up utilizing the GPS module. • A warning message will be delivered to the parent smart phone if the child leaves the geo-fencing boundary and pi camera will immediately turn on capture the picture of child.
4.	Social impact/customer Satisfaction	• It helps to reduce security threats to the children.
		• Gives relief for parents.
		• Can able to reduce the kidnapping.
		• Enables to prevent the child from the unexpected situation.
		• Reducing the rate of incidents of child abuse.
		• Ensuring child safety and crime rate will be reduced.
5.	Business Model(Revenue Model)	• Smart watches has the features of tracking the location and it has the similar features like mobile phones.
		• Through this Geo-fencing techniques embedded in smart watches has able to track the missing child and cost is also moderate in prices.
		• The child safety wearable device can be directly approved by government and sell in the society.
6.	Scalability of the solution	• Instead of using batteries in wearable device we can use solar for power consumption and lifetime will be more.
		• Even if someone make changes in project automatic alert notification and camera will be turned on immediately without any delay and addition of other activities can be performed without interruption.

3.4 Problem solution fit:



4. REQUIREMENT ANALYSIS

4.1 Functional requirements:

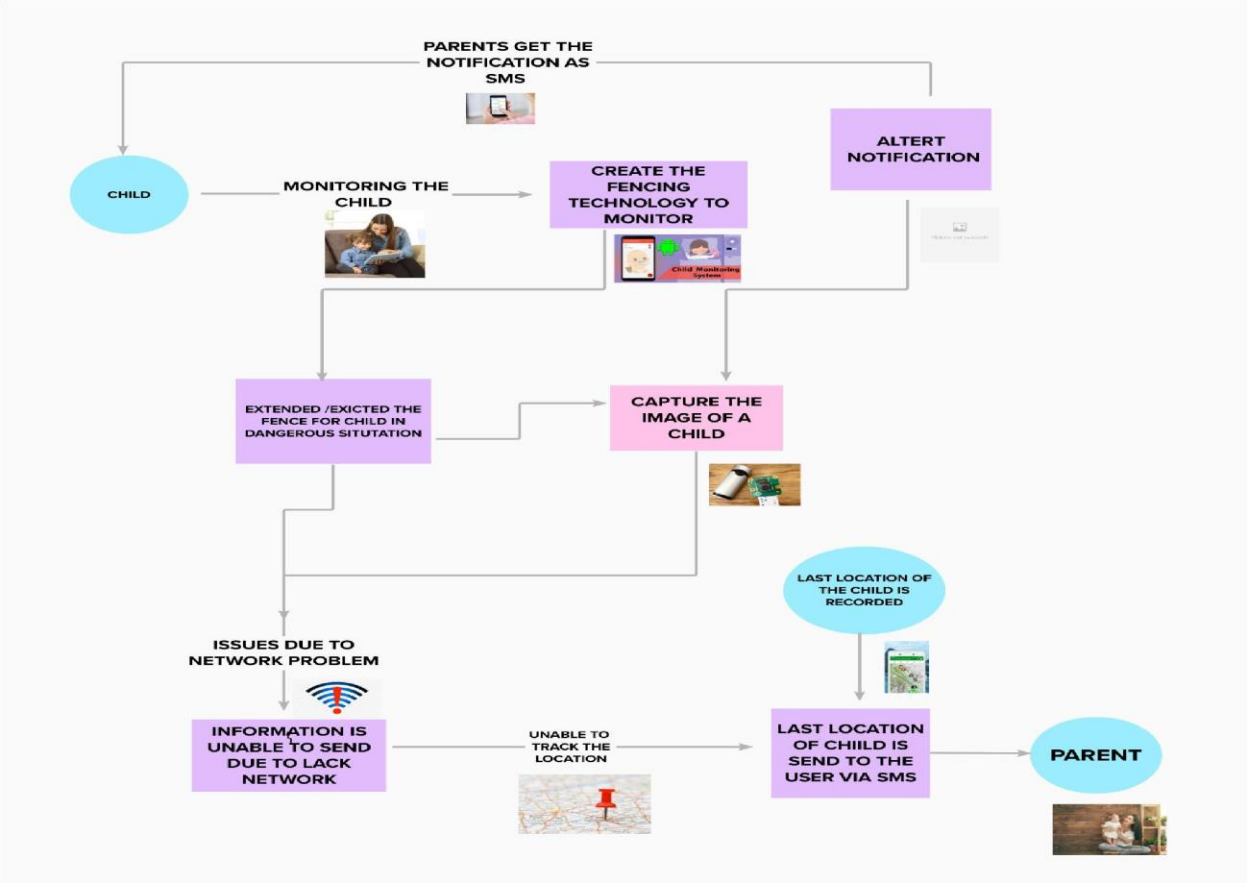
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Geo-Fencing Boundary are setup	• It is used to monitor the child activity and if the child crosses the Geo-fencing boundary immediate alert notification will be send to parents mobile.
FR-2	pie camera are fixed	• Pie-cameras are used to detect the image of the child when the child in distress situation.
FR-3	Pulse Sensors	• The pulse sensor is used to detect any abnormal feelings experienced by a child like fear, anxiety, nervousness, drowsiness and several other illness which manipulates the normal heart rate.
FR-4	GSM	• If the child goes beyond that particular boundary specified, the respective guardians will receive an alert call using GSM.
FR-5	GPS	• GPS is used to track the location of a child who is wearing that device. With the help of GPS, we can feed a particular boundary to that device.
FR-6	Data acquisition and Data collection are performed	• The data can be collected from the processor and it can be detected by using the Algorithm called Random forest algorithm and SVM are simulated and analyzed for accuracy calculation and finally the report is send to the users.

4.2 Non-Functional requirements:

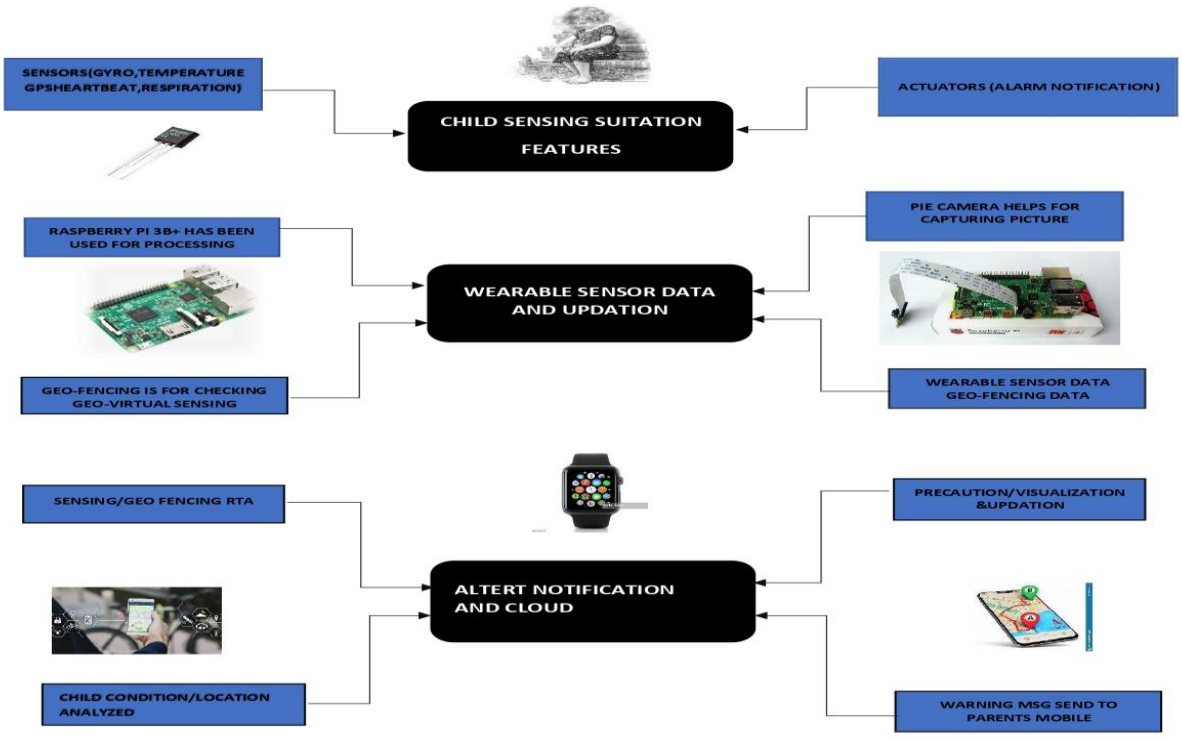
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• Enable tracking of the child's location and capturing data remotely such as temperature, pulses sensor, respiratory rate and etc.
NFR-2	**Security**	• Alert notification Enabled with GPS module received in parent mobile.
		• The private security system as an emergency response device that is useful to children in crime incidents.
NFR-3	**Reliability**	• The virtual geo- fencing system will be set utilizing the GPS module. • A warning message will be delivered to the parent smart phone if the child leaves the geo-fencing boundary and pi camera will immediately turn on capture the picture of child. • Its helps to reduce security threats to the children. • Ensuring child safety and we can able to monitor the activity of a child.
NFR-4	**Performance**	• High speed data rates. • Immediate response of pie camera for capturing image. • The Alert notification is immediately send to the parents mobile when the child Crosses the Geo-Fencing boundary. • Can able to reduce the kidnapping. • Reducing the rate of incidents of child abuse.
NFR-5	**Availability**	• Smart watches has the features of tracking the location and it has the similar features like mobile phones. • Through this Geo-fencing techniques embedded in smart watches has able to track the missing and cost is also moderate in prices. • The child safety wearable device can be directly approved government and sell in the society
NFR-6	**Scalability**	• Instead of using batteries in wearable device we can use solar for power consumption and life time will be more. • Even if someone make changes in project automatic alert notification and camera will be turned on immediately without any delay and addition of other activities can be performed without interruption.

5.PROJECT DESIGN:

5.1 Data flow diagram:



5.2 Solution architecture:



5.3 User stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (family member/parent)	Registration	USN-1	As a user, I can register for the device in the parents mobile application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
Customer (Higher official)	confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the device in the parents mobile application	I can receive confirmation email & click confirm	High	Sprint-1
Customer (child line 1098)	Safety measure register	USN-3	As a user, I can register for the device in the parent's mobile application.	I can register & access the dashboard with Facebook Login	Low	Sprint-2
Customer (mobile user)	Mobile application	USN-4	As a user, I can register for the application through mobile number	I can register for child's device with parents mobile number then the alert message will receive by SMS	Medium	Sprint-1
Customer (credential)	Login	USN-5	As a user, I can log into the device by entering email & password in parent's mobile application	Mail address and password are used as default .	High	Sprint-1
Customer (Web user)	Notification	USN-7	As a user, when there is a abnormal situation with the child notification will be received on through fencing application.	Alert message is sent to parents mobile and received if user is active in the fencing techniques.	High	Sprint-1
Customer Care Executive	Network Connectivity	USN-8	When the child goes out of fencing boundary and enter into the other areas.	GPS tracker will track the child and send the notification message to the parent.	High	Sprint-1
Administrator	Accessing	USN-9	When there is a issues in accessing of both the device (Connection of both parent's and child's device).	Through Admin/Device Operator's advice should be undertaken	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Analyzing the child is Missing	USN-1	The parents who wants to safeguard their child when they are in out and they want monitor their child.	2	High	Anandhi. S, Dharani. P Karthika. S Sri raja Rajeshwar. S
Sprint-1	To prevent the child from the distress situation	USN-2	Sensors will sense the child in distress situation and the sensors will analyze the problem of the child.	2	High	Anandhi. S, Dharani. P Karthika. S Sri raja Rajeshwari. S
Sprint-2	GEO-Fencing boundary is setup to safe guard the child	USN-3	GPS tracker will track the child location when the child is out of GEO-Fencing boundary	2	Medium	Anandhi. S, Dharani. P Karthika. S Sri raja Rajeshwari. S
Sprint-2	To detect the child situation	USN-4	When child is out of geo-fencing then immediately the pie-camera will turn on and capture the image.	2	High	Anandhi. S Dharani. P Karthika. S Sri raja Rajeshwari .S
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-3	Using the GSM Module to track the location	USN-5	GSM module is used to track the location after the child crosses the GEOFencing boundary.	2	High	Anandhi. S Dharani. P Karthika. S Sri raja Rajeshwari. S
Sprint-4	Notification is sent	USN-6	Alert message is sent to parents mobile via SMS and the child location is also being sent through mobile application.	2	High	Anandhi. S Dharani. P Karthika. S Sri raja Rajeshwari. S

6.2 Sprint Delivery Schedule

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

6.3 Reports from JIRA:

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1:Coding for child safety gadgets tracking:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials
organization = "8bchp4"
deviceType = "pdharani"
deviceId = "12345678"
authMethod = "token"
authToken = "12345678"

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11

    name="pooja"
    #latitude=8.9179987
    #longitude=98.0527826

    latitude=11.004556
    longitude=76.961632


    data = { 'name' : name, 'lat': latitude, 'lon':longitude }
    #print data
    def myOnPublishCallback():
```

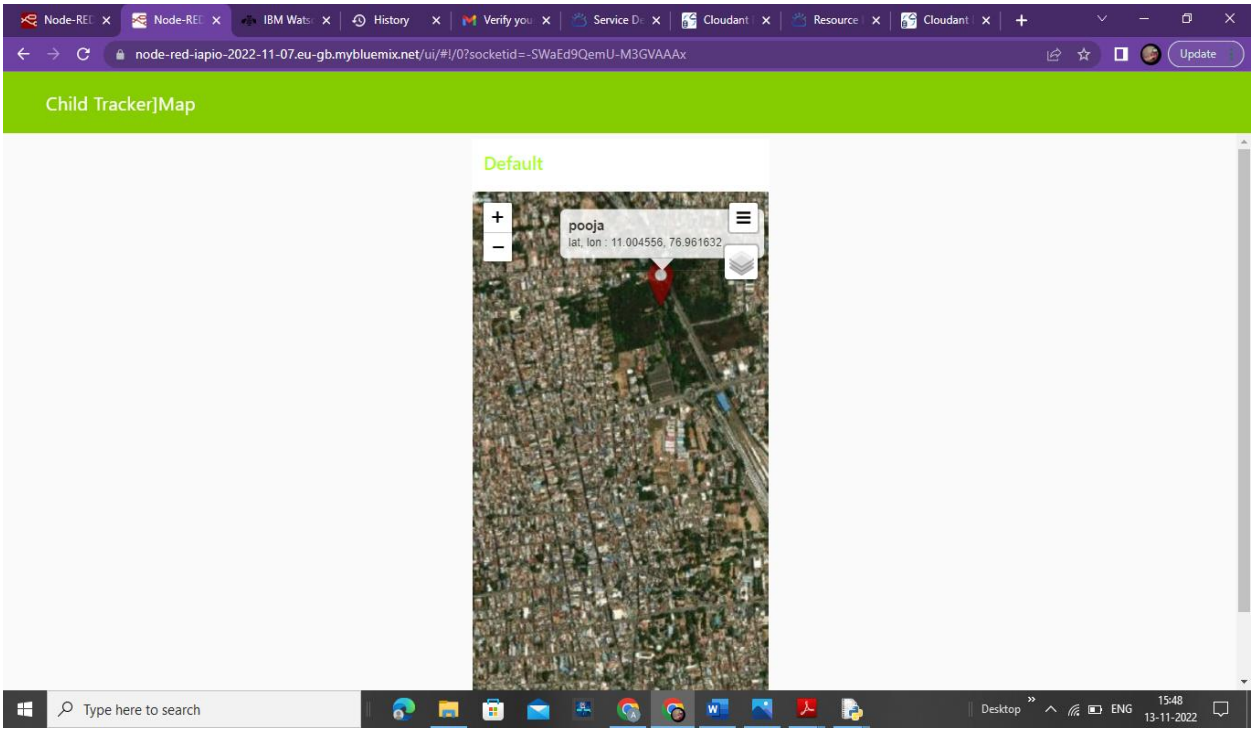
```
        print ("Published name = %s " % name, "lat = %s " % latitude, "lon = %s " % longitude, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(5)

        deviceCli.commandCallback = 'myCommandCallback'


    client.disconnect()
```

7.2 Feature 2: Tracking child location image:



8.TESTING :

8.1 Test Cases:

Test case ID	Feature Type	Component	Test Scenario
LoginPage_TC_OO1	Functional	Home Page	Verify user is able to monitor child safety
LoginPage_TC_OO2	UI	Home Page	to capture the child for safety the pi camera is used
LoginPage_TC_OO3	Functional	Home page	various sensors are used
LoginPage_TC_OO4	Functional	Login page	GSM module is used for notification alert
LoginPage_TC_OO4	Functional	Login page	Geofencing is used to set the boundary

8.2 User Acceptance Testing:

Acceptance Testing
UAT Execution & Report Submission

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the **Project Name** 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	8	6	4	3	21
Duplicate	2	0	5	0	7
External	4	3	0	1	8
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	25	14	13	26	78

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	7
Client Application	51	0	0	51
Security	3	0	0	2
Outsource Shipping	4	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4

9. RESULTS:

9.1 Performance Metrics:

Project Development Phase

Date	18 November 2022
Team ID	PNT2022 TMID49507
Project Name	Project-IOT based safety gadgets for child safety monitoring and notification
Maximum Marks	10 Marks

			NFT - Risk Assessment						
S. No	Project Name	Scope\ feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/ Volume Changes	Risk Score	Justi-fication
1	IOT based safety gadgets for child safety monitoring and notification	New	Moderate	No Changes	Moderate	low	>5 to 10%	ORANGE	we have improve the scalability, stability and speed of the system.

10. Advantages & Disadvantages :

Advantage:

- To avoid child missing and to monitor the activities of the child.
- Allow parents to track the their children in crowd/public places.
- Tracking information on real time basis.
- Minimises the risk of abuse and explotitation.
- Ability to monitor the health fitness level.
- Notification can alert the parents for their child safe.

Disadvantage:

- Physical and mental health damage to children.
- Besides the risk of cyber attacks and data breaches.
- Battery life is short which is a concern.
- Sometimes it should inaccurate data.
- Some gadgets will be expensive for the middleclass parents

11. CONCLUSION:

The child safety wearable device can act as a smart device. It provides parents with the real-time location, surrounding temperature, geo-fencing for their child's surrounding and the ability to locate their child or alert by standers in acting to rescue or comfort the child. The smart child safety wearable can be enhanced much more in the future by using highly compact raspberry pi module the can be saved into fabrics. Also more power efficient model will have to be created which will be capable of holding the battery for a longer time.

12. FUTURE SCOPE:

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.

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.

13.APPENDIX:

Source Code:

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials
organization = "8bchp4"
deviceType = "pdharani"
deviceId = "12345678"
authMethod = "token"
authToken = "12345678"

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
authMethod, "auth-token": authToken}
    deviceCli = ibmiotf.device.Client(deviceOptions)
    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))
    sys.exit()
```

```
    # Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
    deviceCli.connect()

    while True:
        #Get Sensor Data from DHT11

        name="pooja"
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        latitude=11.004556
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        data = { 'name' : name, 'lat': latitude, 'lon':longitude }
        #print data
        def myOnPublishCallback():
            print ("Published name = %s " % name, "lat = %s " % latitude, "lon = %s " % longitude, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(5)

        deviceCli.commandCallback = 'myCommandCallback'
        client.disconnect()
```

GitHub & Project Demo Link:

Github link:

https://github.com/IBM-EPBL/IBM-Project-20711-1659761193

project demo link:

https://drive.google.com/file/d/10T0x8JtORdA7jaJGcqAvqC-GU3mv_w1t/view?usp=drivesdk