Project Report

Date	25 November 2022
Team ID	PNT2022TMID14548
Project Name	Project – IOT-Based Safety Gadget for Child Safety Monitoring and Notification

Team Members

Bolleneni Venkata Sai Nishitha

Bommisetty Keerthi Sai

Gadikota Vaishnavi

Koneti Kavya

1. **INTRODUCTION**
    a. Project Overview
    b. Purpose
2. **LITERATURE SURVEY**
    a. Existing problem
    b. References
    c. Problem Statement Definition
3. **IDEATION & PROPOSED SOLUTION**
    a. Empathy Map Canvas
    b. Ideation & Brainstorming
    c. Proposed Solution
    d. Problem Solution fit
4. **REQUIREMENT ANALYSIS**
    a. Functional requirement
    b. Non-Functional requirements
5. **PROJECT DESIGN**
    a. Data Flow Diagrams

b. Solution & Technical Architecture

1. INTRODUCTION

Project Overview

Child tracker helps the parents in continuously monitoring the child's location. They can simply leave their children in school or parks and create a geofence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geofence. Notifications will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in the database.

Purpose

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. By this, parents know what is happening remotely and can take actions if something goes wrong. It provides parents with the real-time location to monitor the child. It makes parents to make monitor their child from their workplace.Parents can be relax and calm by using this device.

2. LITERATURE SURVEY

Existing Problem

Parents need to ensure safety of their children but in realtime they need to get to work and need to worry about their child whether he/she is safe or not.So to ensure safety they need to monitor & to notify their child what he/she is doing and to know whether they are in safe atmosphere or not to ensure the safety of the child.

References

- A. Jatti, M. Kannan, R. M. Alisha, P. Vijayalakshmi and S. Sinha, "Design and development of an IOT based wearable device for the safety and security of women and girl children," 2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, 2016, pp. 1108-1112.

- David Hanes, Gonzalo, Patrick Grosetete, Robert, Barton, Jerome Henry “IoT Fundamental and Networking Technologies, Protocols”.

Problem Statement Definition

The objective of this project is to safeguard the child from threads. Now a days the safety measures of children has been reduced in huge number. Thus the violence against children increasing day by day.Our project mainly focus on sensing the children’s Temperature and Heartbeat. By monitoring the activities the state of the child is analyzed. By using GSM, if child reaches the critical state then the latitude and longitude of that particular location is sent as an alert message to the parents.

SI.No	AUTHOR	YEAR	JOURNAL NAME	ABOUT
1	N. Senthamilarasi N. Divya Bharathi	2012	Child Safety Monitoring System Based on IoT	It makes parents to easily monitor their children in real time just like staying beside them as well as focusing on their own career without any manual intervention.
2	M Nandini Priyanka, S Murugan, K N H Srinivas, T D S Sarveswararao, E Kusuma Kumari.	2019	International Journal of Innovative Technology and Exploring Engineering (IJITEE) Smart IOT Device for Child Safety and Tracking https://www.ijitee.org/wp-content/uploads/papers/v8i8/H6836068819.pdf	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
3	Mr.Vinod Mane, Durgesh Musale, Rohan Joshi, Aditya Toney, Anand Pande, Shashank Kohade	2020	IoT Enabled Children Safety System (International Research Journal of Engineering and Technology (IRJET)) https://www.irjet.net/archives/V7/i1/IRJET-V7I143.pdf	It is a IOT based project and their approach is to monitor school bus in this new era of smart cities
4	Lai Yi Heng, Intan Farahana Binti Kamsin	2021	(Proceedings of the 3rd International Conference on Integrated Intelligent Computing Communication & Security (ICIIC 2021) IoT-based Child Security Monitoring System	Enable tracking of the child's location and capturing of data remotely such as temperature, pulse, respiratory rate, quality of sleep and many more. To show the child's actual data with reference values.•
5	Fathima, N., Ahammed, A., Banu, R.,	2017	Optimized neighbor discovery in Internet of Things (IoT).	This device helps in optimized discovery of the child using data collected

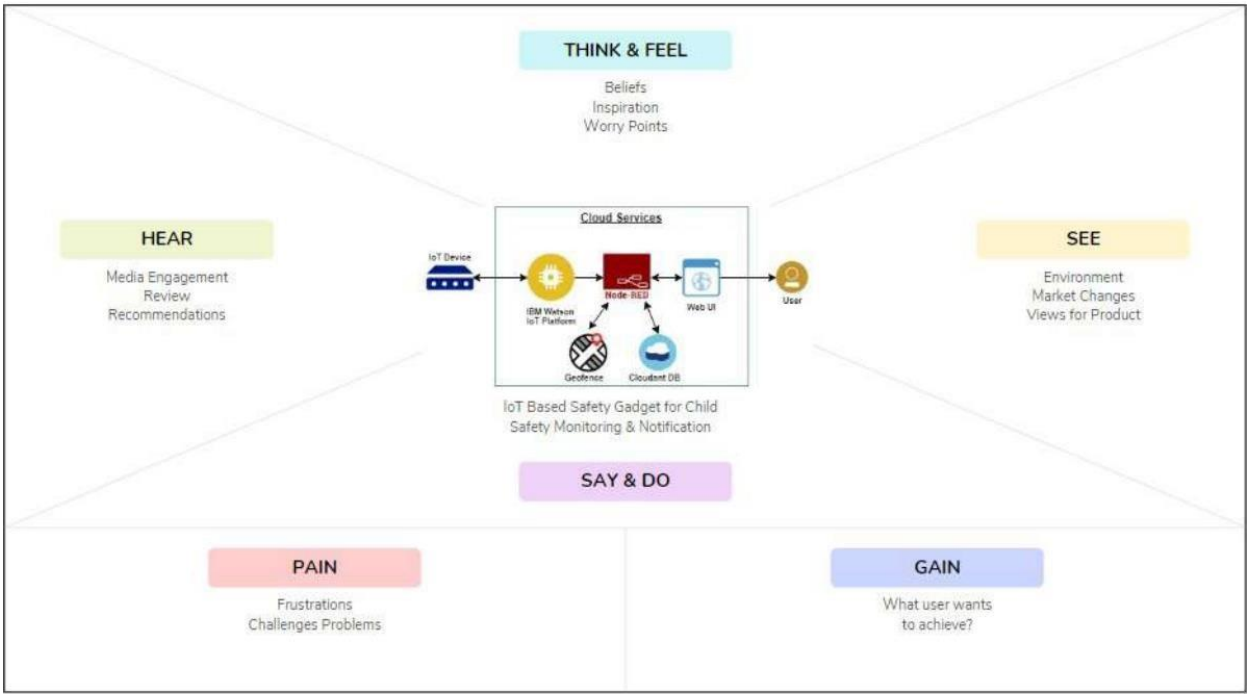
	Parameshachari, B.D Naik, N.M		(International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT) (pp. 1-5). IEEE.)	
6	Prakriti Agarwal, R Ramya, Rachana Ravikumar, Sabarish G, Sreenivasa Setty	2020	Survey on Child Safety Wearable Device Using IoT Sensors and Cloud Computing (International Journal of Innovative Science and Research Technology)	The design of this model involves developing a medium for communication between the parent/guardian and the child's wearable device. The child's location is tracked using GSM mobile communication to specify the location of the child in real-time.
7	Mrs. P Chitra, Aarthi S, Anitha K, Angammal R, Abinaya D	2022	Monitoring and Prevention of Child Abuse Using IoT https://www.ijraset.com/research-paper/monitoring-and-prevention-of-child-abuse-using-iot	This paper focuses on the important issue of how people surrounding a missing child can assist the youngster and play a crucial role in the child's safety and health monitoring until they are reunited with their parents.
8	Dr. T. VP. Sundararajan	2018	Activity Tracker Wrist Band for Children Monitoring using IOT	The children with Activity Tracker that has access to IOT monitoring and GSM technology keeps monitoring the children. The system has sensors interfaced with the processor which keeps sensing the vital signals such as heart beat rate, temperature, etc. So whenever some perilous situations arise there may be an indication to parents
9	Pietro Battistoni *ORCID,Monica SebilloORCID	2021	An IoT-Based Mobile System for Safety Monitoring of Lone Workers	This paper proposes a distributed solution of Smart Personal Protective Equipment for the safety

	andGiuliana Vitiello			monitoring of Lone Workers by adopting low-cost electronic devices. In addition to the same hazards as anyone else, Lone Workers need additional and specific systems due to the higher risk they run on a work site. To this end, the *Edge-Computing* paradigm can be adopted to deploy an architecture embedding wearable devices, which alerts safety managers when workers do not wear the prescribed Personal Protective Equipment and supports a fast rescue when a worker seeks help or an accidental fall is automatically detected.
10	Fei Mingming , Shi Yanli	2014	Design and implementation anti-lost children system based on internet of things	In this paper, the current rapid development of society for children brought to this reality is lost, combined with existing and emerging technologies, Internet of Things inlife related application solutions proposed, which can be determined at any location to avoid the safety of children parents worry about other issues. Although at present no specific implementation, and the idea is still preliminary stage, but levels of the method, rationality, practicality and applicability have good theoretical basis, and the method utilizes advanced technology, with good

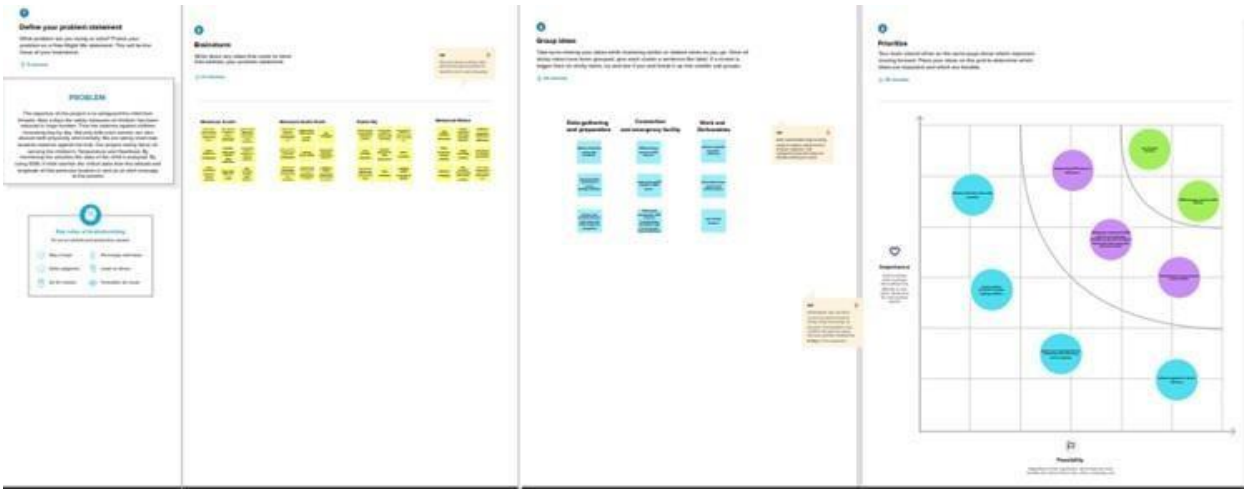
				scalability and adaptability, with some room for development, there is a certain profit margin.

3.IDEATION & PROPOSED SOLUTION

Empathy Map Canvas



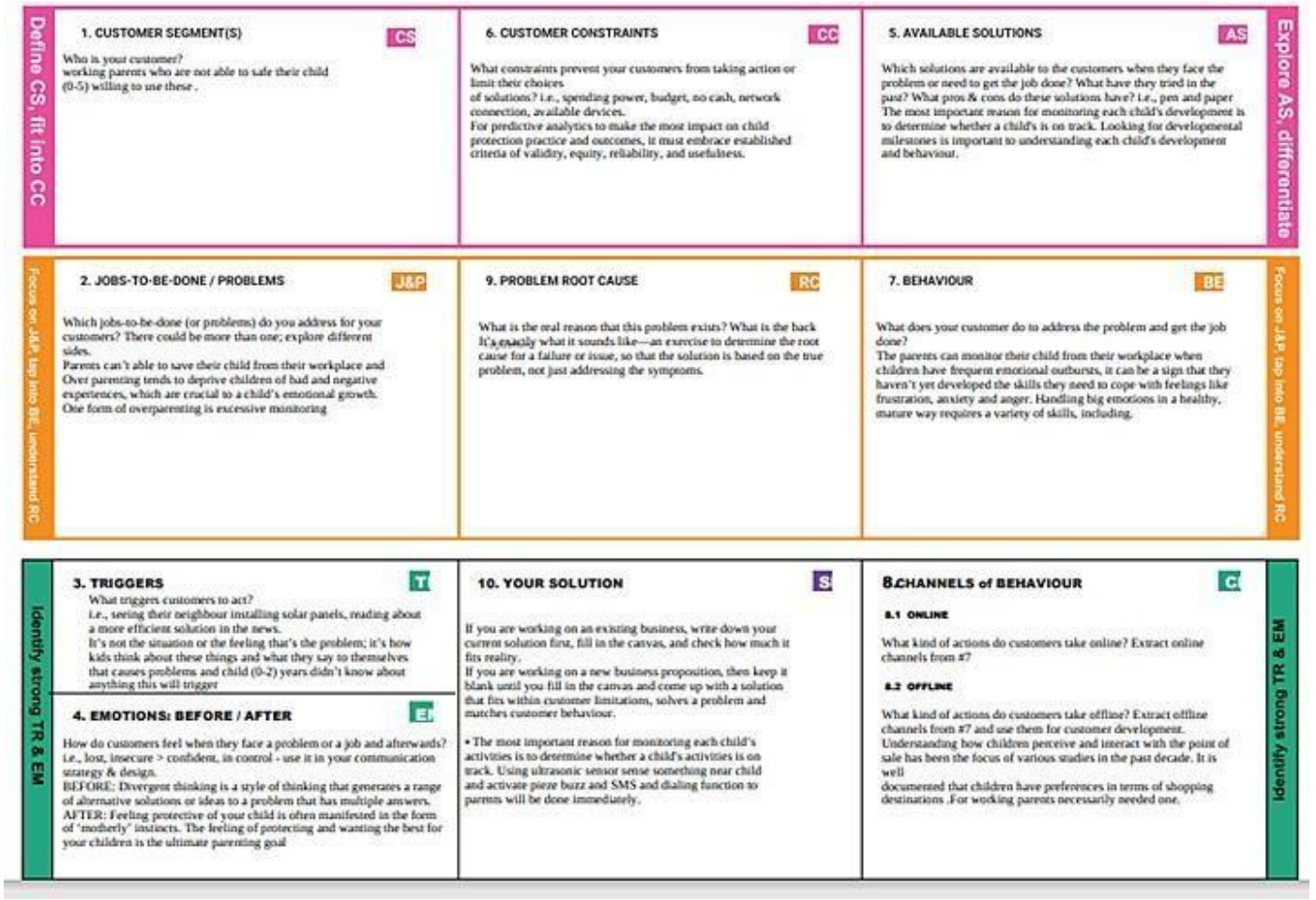
Ideation & Brainstorming



Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	When someone near the child this device alerts the parents whereas the parents in other distanced place.
2.	Idea / Solution description	The aim of this device is to provide safety to the child by allowing the parent to locate the child and view their surroundings. This device can be used to monitor the temperature and motion of the child. The other features of the device are emergency light and alarm buzzer which are activated when the ultrasonic sensor sense something near child. After automatically send the SMS to parents and call also received to the parents .
3.	Novelty / Uniqueness	The enchantments will be adding more features, software, applications, hardware to make the proposed system.
4.	Social Impact / Customer Satisfaction	The feedbacks of parents and children were highly promising. Results showed that 86.4% of the parents are satisfied with the time controller, around 91.1% of the children are satisfied with the proposed interface and 100% of the children are satisfied with the multiple sessions of the time allowed and video algorithm
5.	Business Model (Revenue Model)	Iot based risk monitoring device for child is done through smart device i.e., smart watch Through this device the respected parameters are monitored by the connected person.
6.	Scalability of the Solution	It can be given up to 4 out of 5.

Problem Solution fit



4. REQUIREMENT ANALYSIS

Functional Requirements

SI No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
1.	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
2.	User Confirmation	Confirmation via Email Confirmation via OTP
3.	Authentication	Only the authorized person for that product will know Ensures security

4.	User Interface	The Inventor Able to see the location of children when they are out of geofence will also track the exact information about the children
5.	Notification	Notified through mobile and mail

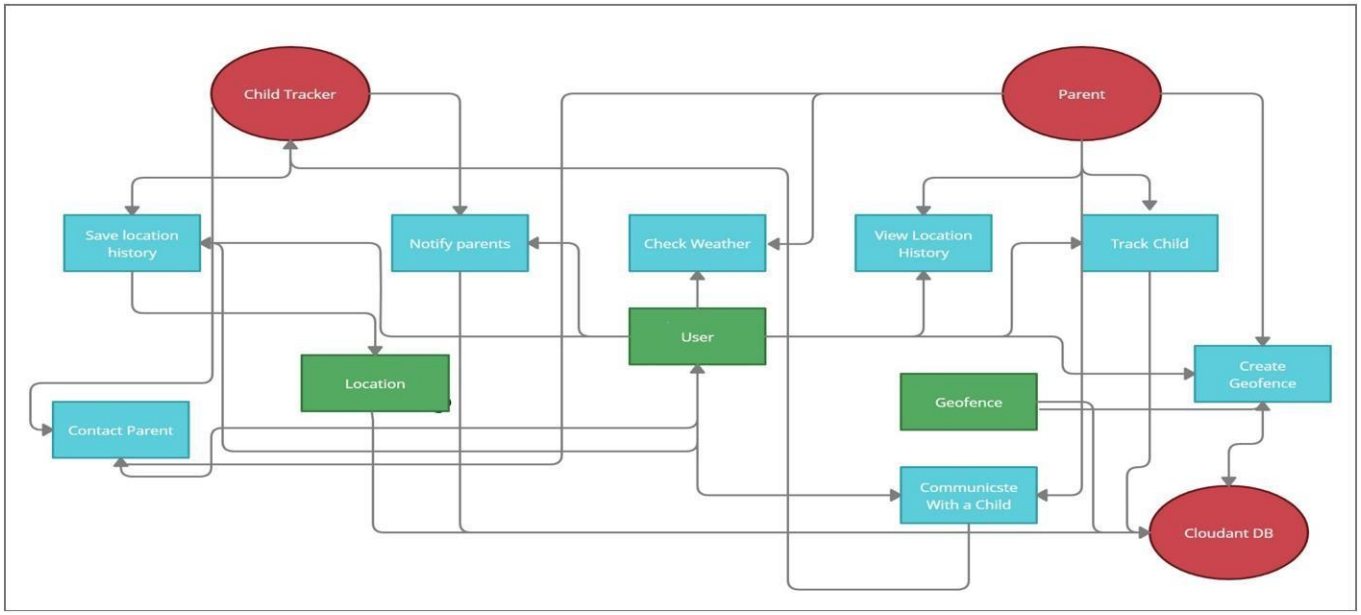
Non- Functional Requirements

SI No.	Non-Functional Requirement	Description
1.	Usability	Accessed through Mobile App Showing location (latitude and longitude) of child and also other measures to ensure safety like notification. Portable and comfortable to use.
2.	Security	Database security and ensuring the safety of the product while in use.
3.	Reliability	Once logged in, the webpage is available until logging out of the app, and a comfortable platform or creates a good environment for users to use.
4.	Performance	Each page must load within 4 seconds and database needs to be updated every few seconds and a notification must be sent immediately if seen a change in the child's location.
5.	Availability	The data must be available whenever needed and the product should be able to use at any time.

6.	Scalability	The process must be flexible to use at anytime and versatile.

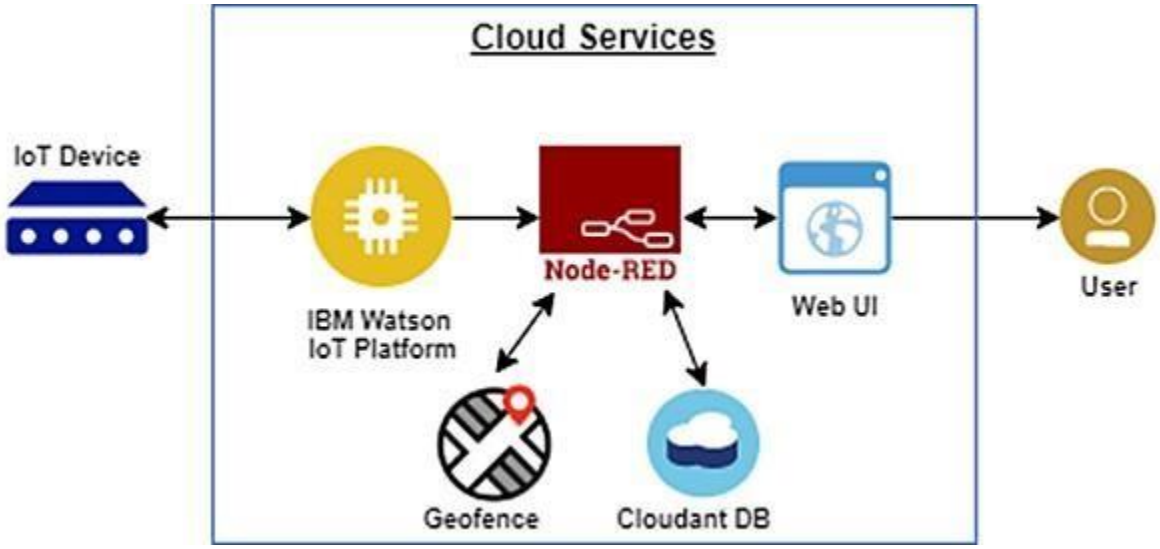
5. PROJECT DESIGN

Data Flow Diagrams



Solution & Technical Architecture

The device has IOT monitoring allows to monitor the child from anywhere with any portable devices. Ultrasonic sensor are used which sense when someone near child and alarm buzz will established SMS and dialing function is made to parent



User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1 (FATHER)	As a user, I can register by entering my email, password, and confirming my password. I can access the location of my children using the credentials provided as a Father.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-2 (MOTHER)	As a user, I can register by entering my email, password, and confirming my password. I can access the location of my children using the credentials provided as a Mother.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-3 (GUARDIAN/ CARETAKER)	As a user, I can also monitor the children's activities using a safety gadget monitoring system.	I can access my account / dashboard and receive confirmation email & click confirm	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password.	I can access my account / dashboard.	Medium	Sprint-2
	Dashboard	USN-5	As a user, I can fix the geofence for my child's location so that I will receive alerts if	I can monitor the current location of my child.	High	Sprint-2

			my child crosses the geofence.			
Customer (Web user)	Registration	USN-1 (FATHER)	As a user, I can register by entering my email, password, and confirming my password. I can access the location of my children using the credentials provided as a Father.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-2 (MOTHER)	As a user, I can register by entering my email, password, and confirming my password. I can access the location of my children using the credentials provided as a Mother.	I can access my account / dashboard and receive confirmation email & click confirm	High	Sprint-1
		USN-3 (GUARDIAN/ CARETAKER)	As a user, I can also monitor the children's activities using a safety gadget monitoring system.	I can access my account / dashboard and receive confirmation email & click confirm	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password.	I can access my account / dashboard.	Medium	Sprint-2
	Dashboard	USN-5	As a user, I can fix the geofence for my child's location so that I will receive alerts if my child crosses the geofence.	I can monitor the current location of my child.	High	Sprint-2
Customer Care	Dashboard	USN-6	As a customer care service person, whenever I receive a complaint, I forward the complaint and ensure that the complaint is resolved.	I can keep track of all the complaints and the status of the complaints received.	Medium	Sprint-3
Administrator	Admin Dashboard	USN-7	As an administrator, I will take care of all the payment processes, queries and complaints and login credentials.	I can access all the customer details, payment details and complaints received.	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation

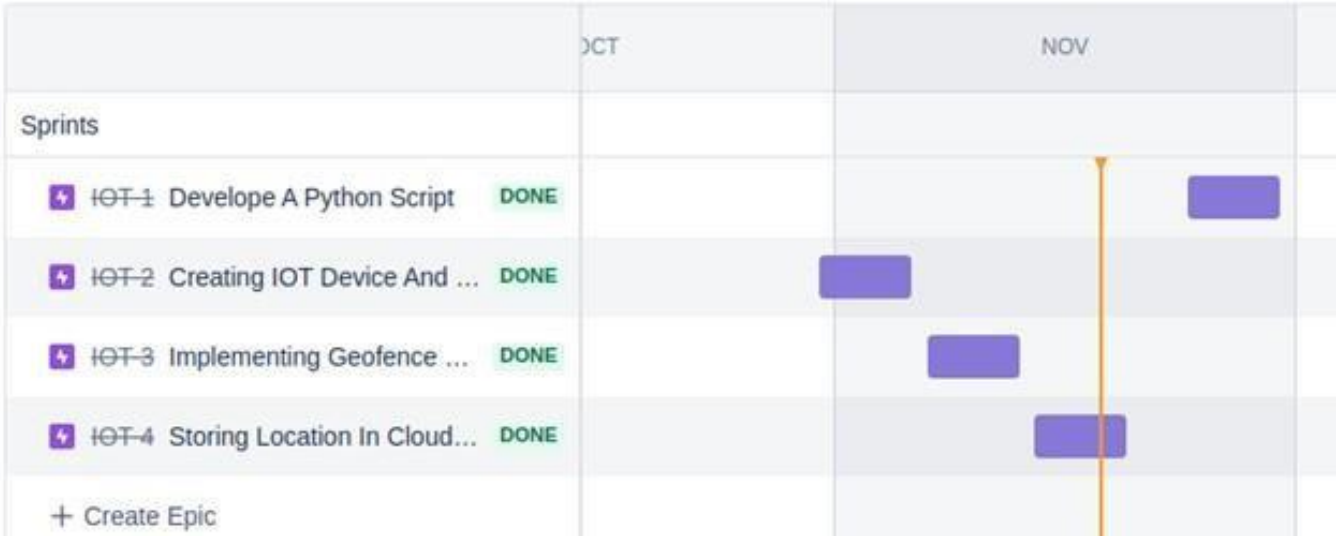
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password.	4	High	BOLLENENI VENKATA SAI NISHITHA
Sprint-1	Confirmation Email	USN-2	As a user, I will receive a confirmation email once I have registered for the application	4	High	GADIKOTA VAISHNAVI
Sprint-1	Authentication	USN-3	As a user, I can register for the application through Gmail and mobile app.	4	Medium	BOMMISETTY KEERTHI SAI
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	4	High	KONETI KAVYA
Sprint-1	Dashboard	USN-1	As a user, I need to be able to view the functions that I can perform	4	High	BOLLENENI VENKATA SAI NISHITHA
Sprint-2	Notification	USN-1	As a user, I should be able to notify my parent and guardian in emergency situations	10	High	BOMMISETTY KERTHI SAI
Sprint-2	Store data	USN-2	As a user, I need to continuously store my location data into the database.	10	Medium	GADIKOTA VAISHNAVI
Sprint-3	Communication	USN-3,1	I should be able to communicate with my parents	6	Low	KONETI KAVYA
Sprint-3	IoT Device – Watson communication	USN-1,4	The data from IoT device should reach IBM Cloud	7	Medium	BOLLENENI VENKATA SAI NISHITHA,BOMMISETTY KEERTHI SAI
Sprint-3	Node RED-Cloudant DB communication	USN-1,2	The data stored in IBM Cloud should be properly integrated with Cloudant DB	7	High	BOLLENENI VENKATA SAI NISHITHA,K

						ONETI KAVYA
Sprint-4	User – WebUI interface	USN-1,4	The Web UI should get inputs from the user	6	High	BOMMIS ETTY KEERTHI SAI,GADI KOTA VAISHNA VI
Sprint-4	Geofencing	USN-2,3,1	The geofencing of the child should be done based on the geographical coordinates	7	High	GADIKOTA VAISHNAVI ,KONETI KAVYA

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

Reports from JIRA



7. CODING

Coding

```
import json

import wiotp.sdk.device

import time

myConfig ={

   "identity":{

   "orgId": "rdegyk",

   "typeId":"safetygad",

   "deviceId":"gad1"

   },

   "auth":{

      "token":"gyg06jzil(!lTGsKxV"

     }

}

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)

client.connect()
```

```
while True:
    name="locater"
    #in area location
    #latitude=13.145997614532394
    #longitude=80.0619303452179
    #out area location
    latitude=13.15412
    longitude=80.05729
    myData={'name':name, 'lat':latitude, 'lon':longitude}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
    print("Data published to IBM Iot platform: ",myData)
    time.sleep(2)
client.disconnect()
```

Geo-fence

A geofence is a virtual perimeter for a real-world geographic area.[1] A geofence could be dynamically generated (as in a radius around a point location) or match a predefined set of boundaries (such as school zones or neighborhood boundaries).The use of a geofence is called geofencing, and one example of use involves a location-aware device of a location-based service (LBS) user entering or

exiting a geofence. This activity could trigger an alert to the device's user as well as messaging to the geofence operator. This info, which could contain the location of the device, could be sent to a mobile telephone or an email account.

8. RESULTS

Performance Metrics

It is being used as it allows the correct sample of respondents to be selected due to which becomes convenient to obtain results. Besides, the results offered are affordable and usable. Since the respondents are properly chosen, the results tend to be more accurate, precise and reliable.

9. ADVANTAGES & DISADVANTAGES

Advantages

In our system, we provide an environment where this problem can be resolved in an efficient manner. It makes parents to easily monitor their children in real time just like staying beside them as well as focusing on their own career without any manual intervention.

Disadvantages

It can be easily removed or damaged while playing and by any intruders.This requires internet connectivity to get monitored and to notify alert messages to parents.

10. CONCLUSION

The word Future resembles the word Children. As Dr. A.P.J Abdul Kalam’s words “Youngsters are thefuture 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.

11. 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.

12. APPENDIX

Source Code

Code for IN Area Location:

```
import json import

wiotp.sdk.device

import time myConfig

={

 "identity":{

 "orgId": "rdegyk",
```

```
 "typeId":"safetygad",
 "deviceId":"gad1"
 },
 "auth":{
 "token":"gyg06jzil(!lTGsKxV"
 } } client =
wiotp.sdk.device.DeviceClient(config=myConfig,
logHandlers=None) client.connect() while True:
name="locater"
 #in area location
 latitude=13.145997614532394
 longitude=80.0619303452179
  myData={'name':name, 'lat':latitude, 'lon':longitude}
client.publishEvent(eventId="status", msgFormat="json",
data=myData, qos=0, onPublish=None)
 print("Data published to IBM Iot platform: ",myData)
 time.sleep(2)
 client.disconnect()
```

Code for OUT Area Location:

```
import json import

wiotp.sdk.device

import time myConfig

={

 "identity":{

 "orgId": "rdegyk",

 "typeId":"safetygad",

 "deviceId":"gad1"

 },

 "auth":{

 "token":"gyg06jzil(!lTGsKxV"

 } } client =

wiotp.sdk.device.DeviceClient(config=myConfig,

logHandlers=None) client.connect() while True:

name="locater"

#out area location

 latitude=13.15412
```

```
longitude=80.05729

myData={'name':name, 'lat':latitude, 'lon':longitude}

client.publishEvent(eventId="status", msgFormat="json",

data=myData, qos=0, onPublish=None)

print("Data published to IBM Iot platform: ",myData)

time.sleep(2)

client.disconnect()
```

GitHub Link: https://github.com/IBM-EPBL/IBM-Project-37364-1660305739

Project Demo:
https://drive.google.com/drive/folders/16KZ1m4tSVH1l7udrLHGF_PND4_tTEFTi