Project Report

DATE	**23.11.2022**
TEAM.ID	**PNT2022TMID46212**
PROJECT NAME	**IoT Based Safety Gadget for Child Safety Monitoring & Notification**

Team members

TEAM LEAD : RESHMA K

TEAM MEMBER 1: PRIYADHARSHINI S

TEAM MEMBER 2: ELAKKIYA B

TEAM MEMBER 3: RUPA U

2. Non-Functional requirements

5. PROJECT DESIGN

1. Data Flow Diagrams

2. Solution & Technical Architecture

3. User Stories

6. PROJECT PLANNING & SCHEDULING

1. Sprint Planning & Estimation

2. Sprint Delivery Schedule

3. Reports from JIRA

7. **CODING & SOLUTIONING (Explain the features added in the project along with code)** 1. Feature 1

2. Feature 2

3. Database Schema (if Applicable)

8. TESTING

1. Test Cases

2. User Acceptance Testing

9. RESULTS

1. Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

Source Code

GitHub & Project Demo Link

1. INTRODUCTION

1.1 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.

1.2 Purpose

1.2 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 monitor their child from their workplace. Parents can relax and calm by using this device.

2. LITERATURE SURVEY

2.1 Existing Problem:

Parents need to ensure the safety of their children but in real time 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.

2.2 References

[1] Arun Francis G, Janani I, Kavya S and Ramiyadevi K. Child Safety Wearable Device Using Raspberry Pi. Waffen-UND Kostumkunde Journal. 11(2). 2020. pp.135-137.

[2] A. Helen, Kalaiselvi V.K.G, M. Fathima Fathila and R. Rijwana. A smart watch for women security based on iot concept ‘watch me’, International Conference on Computing and Communications Technologies (ICCCT). 2017.

[3] Alexey Vinel Feng Xia and Laurence T. Yang and Lizhe Wang. Internet of Things. International Journal of Communication Systems. 25(9). 2012. pp.1101-1102. DOI: https://doi.org/10.1002/dac.2417

[4] Anjum Khairi, M.U. Farooq, Muhammad Waseem, Sadia Mazhar and Talha Kamal, M.U. Farooq, Muhammad Waseem and Sadia Mazhar. A Review on Internet of Things (IoT). International Journal of Computer Applications. 113(1). 2015. pp.1-7. DOI: https;//doi.org/10.5120/19787-1571

[5] Arun K Mani1, M.Gokilavani, Shreevani D, Samra Said and Unnikrishnan K N. A Review: IoT And Cloud Computing For Future Internet. International Research Journal of Engineering and Technology (IRJET). 6(5). 2019. pp.1098-1102.

[6] AbdelRahman H. Hussein. Internet of Things (IOT): Research Challenges and Future Applications. (IJACSA) International Journal of Advanced Computer Science and Applications. 10(6). 2019. pp77-82.

[7] Chamandeep Kaur. The Cloud Computing and Internet of Things (IoT). International Journal of Scientific Research in Science, Engineering and Technology. 7(1). 2020. pp.19-22. DOI: https://doi.org/10.32628/IJSRSET196657

2.3 Problem Statement Definition

Our device 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 a child reaches the critical state then the latitude and longitude of that particular location is sent as an alert message to the parents. particular location is sent as an alert message to the parents.

S.NO	AUTHOR	YEAR	JOURNAL NAME	ABOUT
1	N.Senthamilarasi N.Divya Bharathi	2012	Child Safety Monitoring Systems 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/wpcontent/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

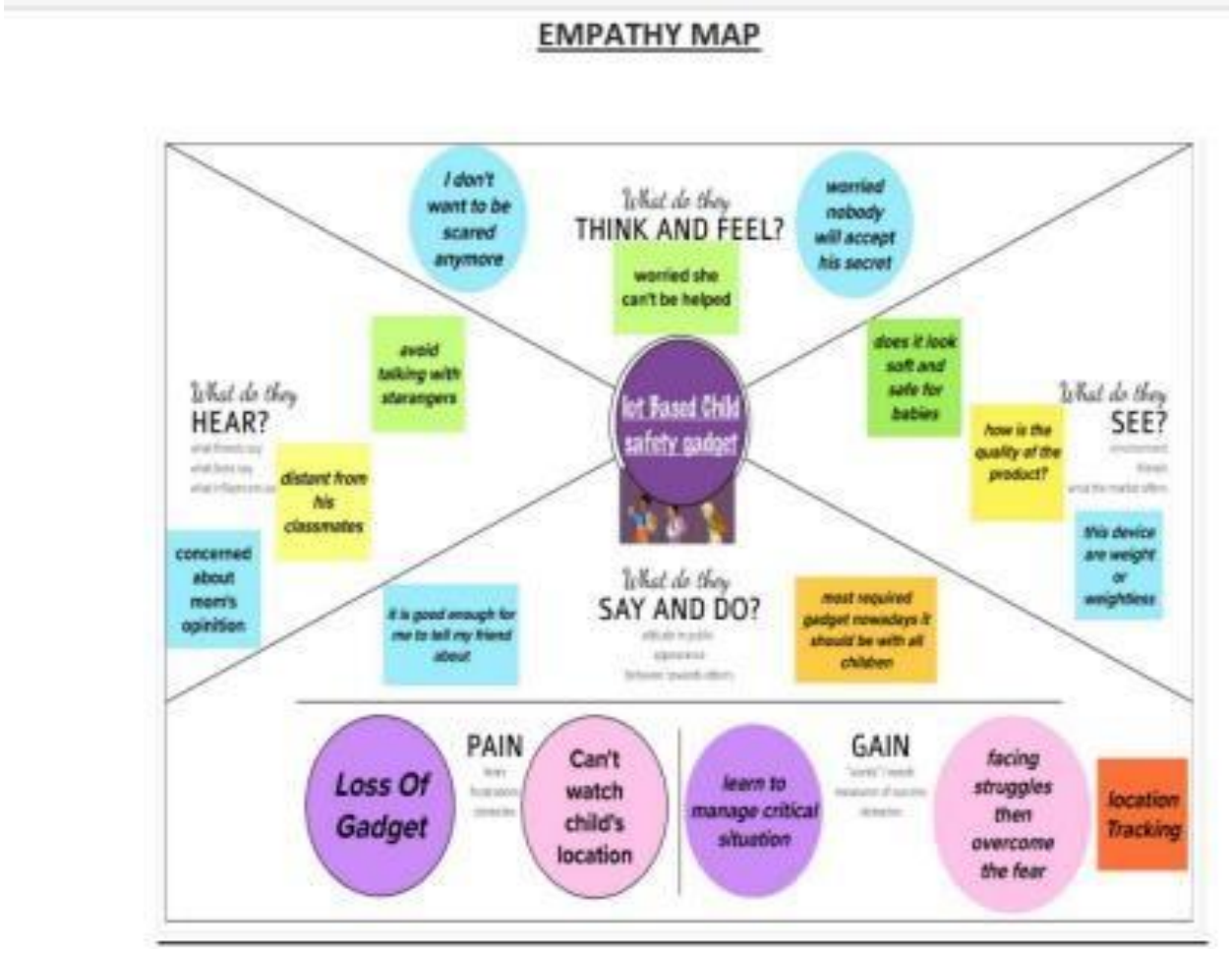
3	Mr.Vinod Mane, Durgesh Musale, Rohan Joshi, Aditya Toney, Anand Pande, Shashank Kohade	2020	IoT Enabled Children Safety System (International Research Journal of Engineering and Technology (IRJET)) https://www.irjet.net/archives/V7/i1/IRJETV7I143.p	It is a IOT based project and their approach is to 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., Parameshachari, B.D Naik, N.M	2017	Optimized neighbor discovery in Internet of Things (IoT). (International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT) (pp. 1-5). IEEE.)	This device helps in optimized discovery of the child using data collected
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,	2022	Monitoring and Prevention of Child Abuse Using IoT	This paper focuses on the important issue of how people surrounding a missing

	Abinaya D		https://www.ijraset.com/research-paper/monitoringand-prevention-of-childabuse-using-iot	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 andGiuliana Vitiello	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 monitoring of Lone Workers by adopting lowcost 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 EdgeComputing 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.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brain Storming

Idea Prioritization

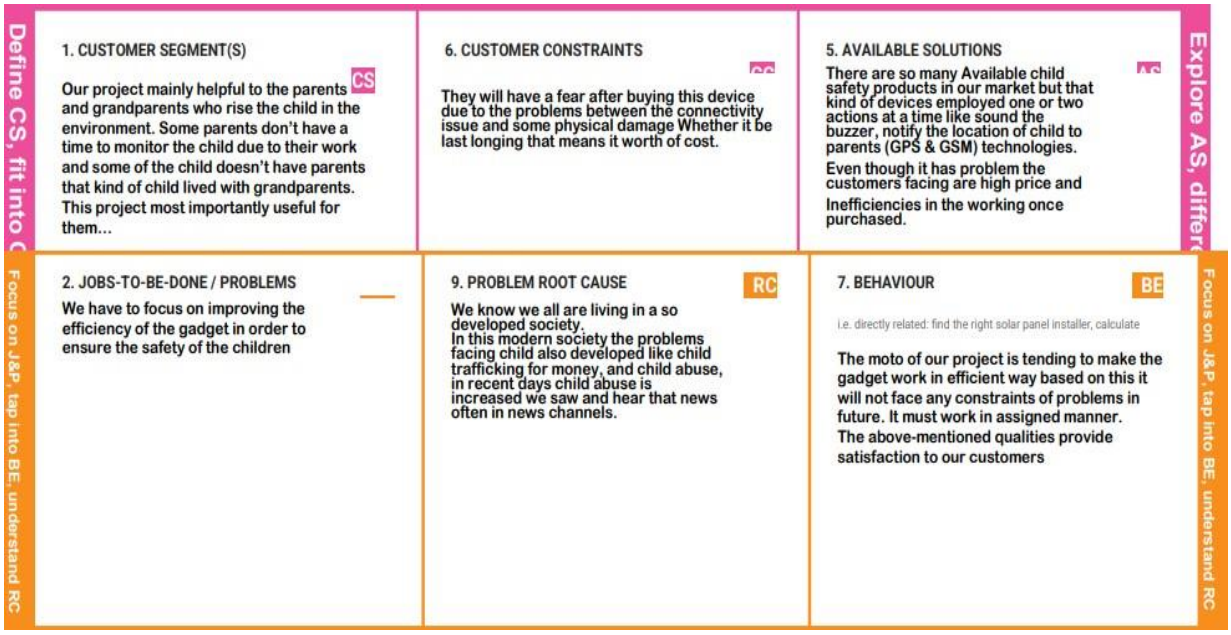
The section mainly discussed the significance of the research and why this study needs to be carried out. The child security system benefits parents as well as children. Since it aids in locating children, monitoring child's condition and security status instantly at anyplace and any time, parents who are often tied up in work or neglect their children are gaining advantages from it. Through the proposed system, immediate actions can be taken forthwith in case the child is threatened. Thus, child security is guaranteed, crime rate related to children is reduced and eventually, parents can rest assured. In fact, reduction of crime rate brings about long-term positive effects such as improving the country's reputation and quality of life, increasing community security, safety, and cohesion as well as generating economic benefits for individuals, committee and taxpayers. Besides, the proposed system makes ample use of IoT, proving IoT is evolving which can be included in multiple areas comprising the child security field. Throughout the research, it is clearly explained the IoT concept, child safety issues and the need of using child security systems. Some previous studies have been included for designing the IoT-based child security smart band. 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. However, the proposed device is not robust enough and does not contain

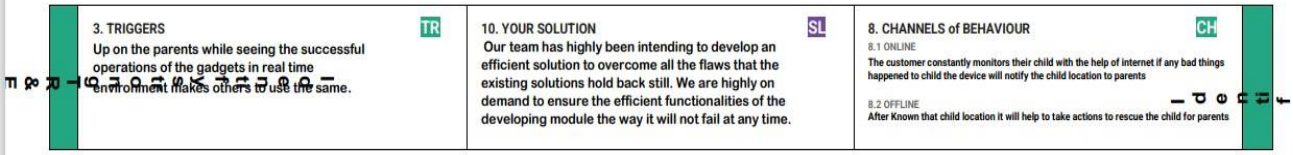
sufficient functions to operate like a mobile phone. Hence, the future enchantments will be adding more features, software, applications, hardware to make
the proposed system capable of working more intelligently, meanwhile guarantee the safety of children.

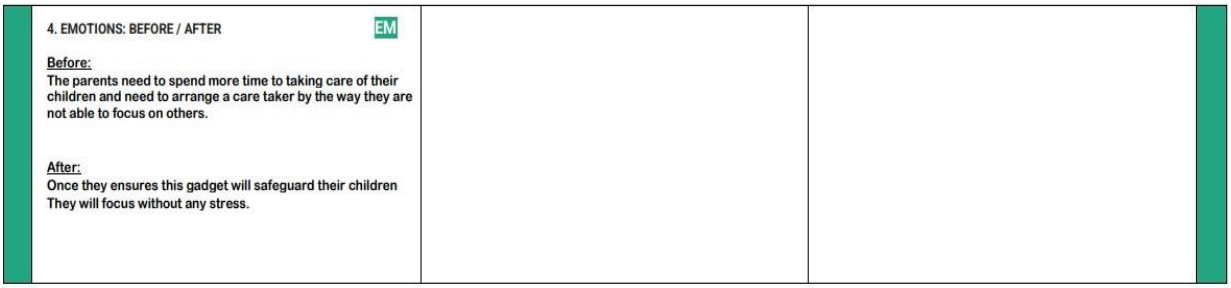
3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Children are facing lot of problems like this exposing to hazardous, health issues, crowd Missing, abuse, unexpected accident.
2.	Idea / Solution description	Child safety gadget to Monitor the children and to alert the parent in case of any issues in the safety.
3.	Novelty / Uniqueness	Trustworthy and Child wearable device.
4.	Social Impact / Customer Satisfaction	Ensure the safety of the children.
5.	Business Model (Revenue Model)	Compatible and small in size.
6.	Scalability of the Solution	Reliable and Cost Effective.

3.4 Problem Solution fit







4.REQUIREMENT ANALYSIS

4.1. Functional requirement

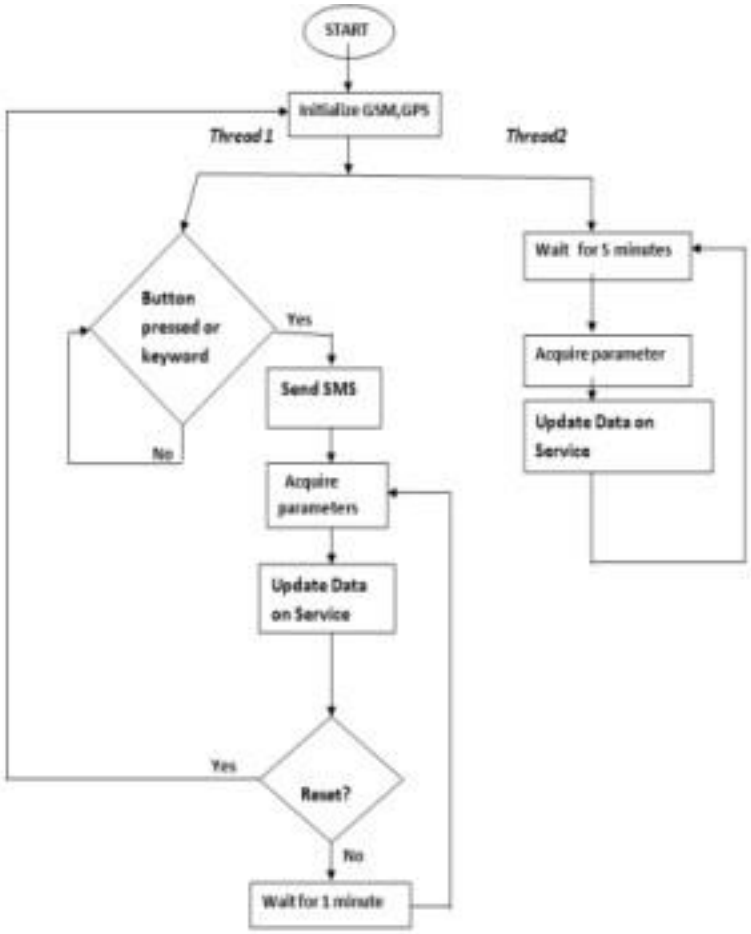
FR No	Functional Requirement (Epic)	Sub Requirement (story/Sub-Task)
FR-1	User Registration	Registration through From Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Notification	Notified via mobile app
FR-4	Detecting Child Location	Detecting Location via app and SMS
FR-5	User Interface	Able to see the exact location of child when they are out of geofence

4.2 Non-Functional Requirement

FR NO	Non-Functional Requirement	Description
NFR-1	Usability	The mobile app has use in GSM deliver the current location of child's and at time inform the parents
NFR-2	Security	When then children cross the specific area, will get an instant notification to parents and police
NRF-3	Reliability	Once logged in the webpage is available until logging out of the app and easy to use
NRF-4	Performance	The tracking device continuously monitoring the child's location. The notification sends the parents and child entire location stored
NRF-5	Availability	Track when child even in a crowded, when the child removes the device alert the parent automatically on in buzzer
NRF-6	Scalability	The process must be flexible to use at any time and long-life battery

5.PROJECT DESIGN

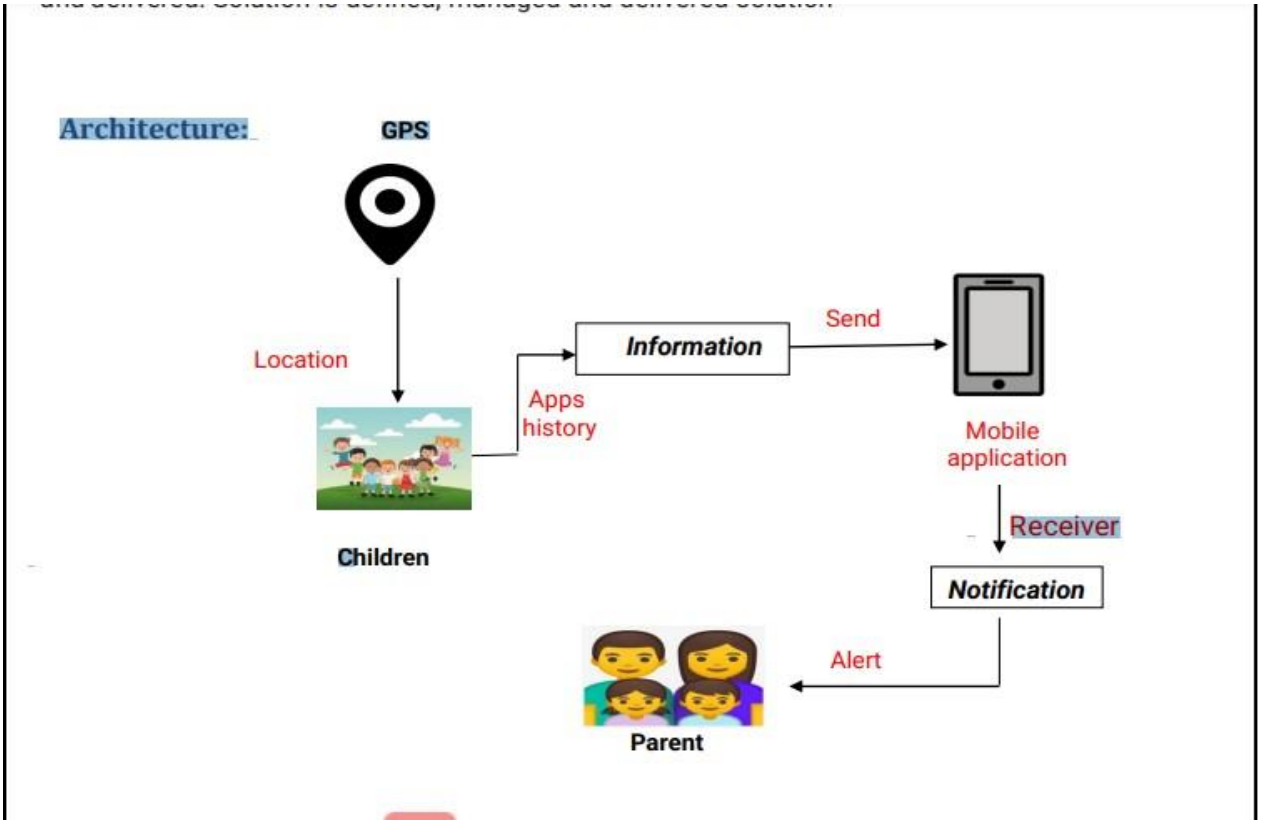
5.1 Data Flow Diagrams



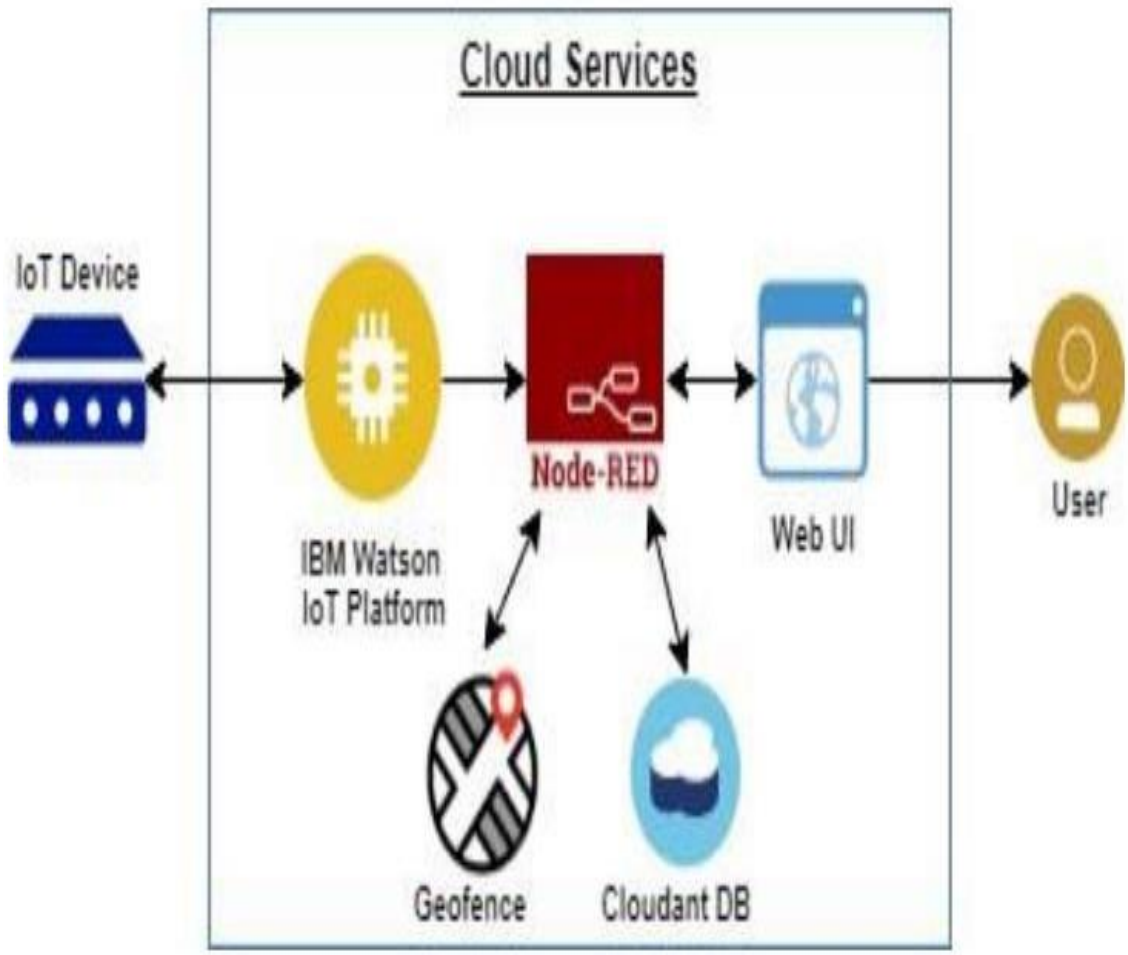
DATA FLOW DIAGRAM: IOT based safety gadget for child safety monitoring & notification

5.2 Solution & Technical Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to: • Find the best tech solution to solve existing business problems. • Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders. • Define features, development phases, and solution requirements. • Provide specifications according to which the solution is defined, managed, and delivered. Solution is defined, managed and delivered solution



Technical Architecture



5.3 User Stories

Many parents don’t have an easy solution to this challenge. Cell phones are essential communication tools for adults, but in the hands of children, they may prove to be an expensive distraction. Plus, some communication tools come with potential security threats that parents want to avoid. IoT technology offers a simple solution to this dilemma: child tracking systems that are designed with communication and safety in mind. By developing this technology to meet a child’s unique needs, we can ensure that our children stay safe throughout the day, without interrupting their valuable playtime. Child tracking systems and communication tools need to be completely secure from end-to-end, leaving parents with full control over who communicates with their children. Many existing smartphone apps cannot retain this level of security, in part, due to the many endpoint vulnerabilities that exist in a smartphone. While ease of communication and security are essential features in a child tracking system, these devices must also be sufficiently durable to keep up with a young child’s lifestyle. Kids run, jump and climb playground equipment all day, and they don’t want to become overburdened by bulky hardware. You can’t use a child tracking system that’s too small and delicate either, as children could lose the device or break it. Devices like Okie-talkie are designed specifically for a child’s lifestyle, featuring portable, rugged modules that don’t break easily. The technology used to connect to the network is also designed for daily use.

6. PROJECT PLANNING & SCHEDULING

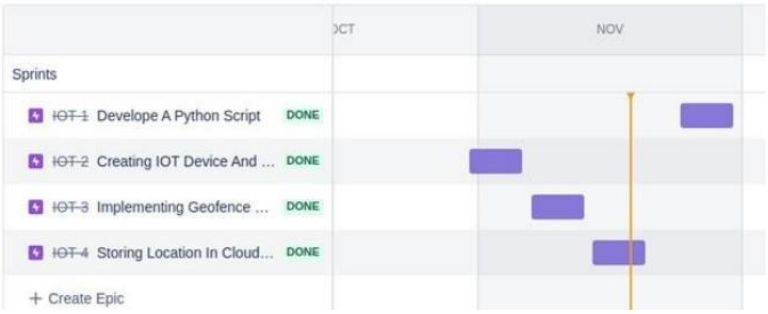
6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a Parent/Guardian,I can register for the application by entering my email, password, and confirming my password.	2	High	Mohammed Yusuf, Venkateshwaran, sahayaThabitha, ShanmugaPriya, ThangamuthuRani, Kaviya, Devaprasanna
Sprint-1		USN-2	As a Parent/ Guardian, I can register for the application through Gmail	1	Medium	Mohammed Yusuf, Venkateshwaran, sahayaThabitha, ShanmugaPriya, ThangamuthuRani, Kaviya, Devaprasanna
Sprint-1	User Confirmation	USN-3	As a parent I will receive connection , location in sms / mail once I have entered this application	1	High	Mohammed Yusuf, Venkateshwaran, sahayaThabitha, ShanmugaPriya, ThangamuthuRani, Kaviya, Devaprasanna
Sprint-1	Login	USN-4	As a parent/ guardian , I can log into the application by entering mail and password.	2	High	Mohammed Yusuf, Venkateshwaran, sahayaThabitha, ShanmugaPriya, ThangamuthuRani, Kaviya, Devaprasanna

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	27-Oct-2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	03-Nov-2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	08-Nov-2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	15-Nov-2022

6.3 Reports from Jira



7.CODING

7.1 Coding

```
import json
import wiotp.sdk.device
import time
import random

myConfig = {
        "identity":{
        "orgId": "q6wu16",
        "typeId": "NodeMCU",
        "deviceId": "Test"
        },
        "auth": {
        "token": "O7Wygbmfnub0vUlbE5"
        }
        }
client=wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
        name= "Child Tracker"

        #in area location
        latitude=8.72444
        longitude=78.10808
```

```
        #out area location

        #latitude=8.72444

        #longitude=78.10808


        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(5)


        client.disconnect()
```

7.2 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

8.1 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

9.1 Advantages

In our system, we provide an environment where this problem can be resolved in an efficient manner. It allows 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.

9.2 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 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 fall into the dark world of abuse, which entirely ruins 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 a web camera and GPS to monitor. It is difficult to monitor when there occurs any hindrance to satellite communication or any network issue. There also occurs time delays in video streaming through the server. Hence in the future, these issues can be overcome by using the 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
import random

myConfig = {
        "identity":{
        "orgId": "q6wu16",
        "typeId": "NodeMCU",
        "deviceId": "Test"
        },
        "auth": {
        "token": "O7Wygbmfnub0vUlbE5"
        }
        }
client=wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
```

```
while True:

        name= "Child Tracker"


        #in area location

        latitude=8.72444

        longitude=78.10808


        #out area location

        #latitude=8.72444

        #longitude=78.10808


        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(5)


        client.disconnect()
```

Code for Out Area Location:

```
import json

import wiotp.sdk.device

import time

import random


myConfig = {

        "identity":{

        "orgId": "q6wu16",

        "typeId": "NodeMCU",

        "deviceId": "Test"

        },

        "auth": {

        "token": "O7Wygbmfnub0vUlbE5"

        }

        }

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

client.connect()


while True:

        name= "Child Tracker"


        #in area location
```

```
        latitude=8.0563

        longitude=78.1136


        #out area location

        #latitude=8.72444

        #longitude=78.10808


        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(5)


        client.disconnect()
```

Git Hub Link: https://github.com/IBM-EPBL/IBM-Project-6521-1658830780

ProjectDemoLink:https://drive.google.com/file/d/1cmwN2Ir_42ZyjII5KZqHqjAde8VsOUE9/view?usp=share_link