IoT Based Safety Gadget For Child Monitoring & Notification

1. INTRODUCTION

1.1 Project Overview

Child and women safety is a challenging problem nowadays due to antisocial elements in society. This enable tracking of the child's location and capturing of data remotely such as temperature, humidity.

1.2 Purpose

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 geo-fence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geo-fence. 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.

2. LITERATURE SURVEY

2.1 Existing Problem

S.NO	AUTHOR	TITLE	DESCRIPTION	DISADVANTAGES
1	Asghar Pasha, Bi Bi Khatija , M. Shaista Tarannum , K. R. Harris , Nida Sayedi , Aseema	Child safety monitoring system based IOT	The idea behind this proposed system empowers guardian to locate children effortlessly. This gadget is modified to consistently screen the subject's parameters.	• Battery life is less due to smaller device.
2	Lai Yi Heng, Intan Farahana Binti Kamsin	IoT-based Child Security Monitoring System	This research is conducted to propose a child security smart band utilizing IoT technology. By this, parents know what is happening remotely and can take actions if something goes wrong.	• Hackers may gain access to the system and steal personal information.
3	Senthamilarasi	Child safety monitoring system based IoT	It is difficult for parents to identify their children are being abused. This research is proposed to prevent children before being attacked, an autonomous real-time monitoring system is necessary for every child out there.	• With the complexity of systems, there are many ways for them to fail.
4	N. Manjunatha, H. M. Jayashree, N. Komal, K. Nayana	IoT Based Smart Gadget for Child Safety and Tracking	The proposed system is equipped with GSM and GPS modules for sending and receiving call and SMS between safety gadget and parental phone, the proposed system also consists of Wi-Fi module using IoT and send all the parameters to the cloud for android app monitoring on parental phone.	• Communication dependent

5	Dipali Badgujar, Neha Sawant, Dnyaneshwar Kundande	Smart and Secure IoT based Child Monitoring System	In this proposed system, it mainly focusing on child remote monitoring system and also using the radar devices as well as obstacle sensors which will detect the alert when the child enters the danger zone or else he/she is approaching towards harmful object then alert will be given to the caretaker through the mobile using an alarm or notification.	• The sensor is placed in the simple locket that is given to the baby,if the locket is missed it will leads to danger
6	Vibha Chandrala ,Niveditha N,Neha B. Reddy ,Urmila N,Deepak G.	Child monitoring system using IoT	The objective behind the project is to design a child safety system through smartphones that provide the possibility to trace child's location as well as during emergency children can alert parents by saying a child is in an emergency via message.	• Low resolution camera system
7	M. Nandini Priyanka, S. Murugan, K.N.H. Srinivas, T.D.S. Sarveswararao, E. Kusuma Kumari	Smart IoT Device for Child Safety and Tracking	Child safety is a challenging problem nowadays due to antisocial elements in the society. The crime rate is day by day increasing. The solution to this problem is to design an IoT device, which senses the child's location and environment and during emergency, it should send the alert to the parents automatically.	• Low resolution camera system.

8	P. Poonkuzhlai, R. Aarthi, Yaazhini.V.M, Yuvashri. S, Vidhyalakshmi.G	Child Monitoring and Safety System using WSN and IoT	This project uses the IoT based embedded system. So, the system is proposed to continuously monitor the parameters of the child and also their location for safety purpose. The system provides smart child tracking and monitoring system.	• Not robust enough.

2.2 References

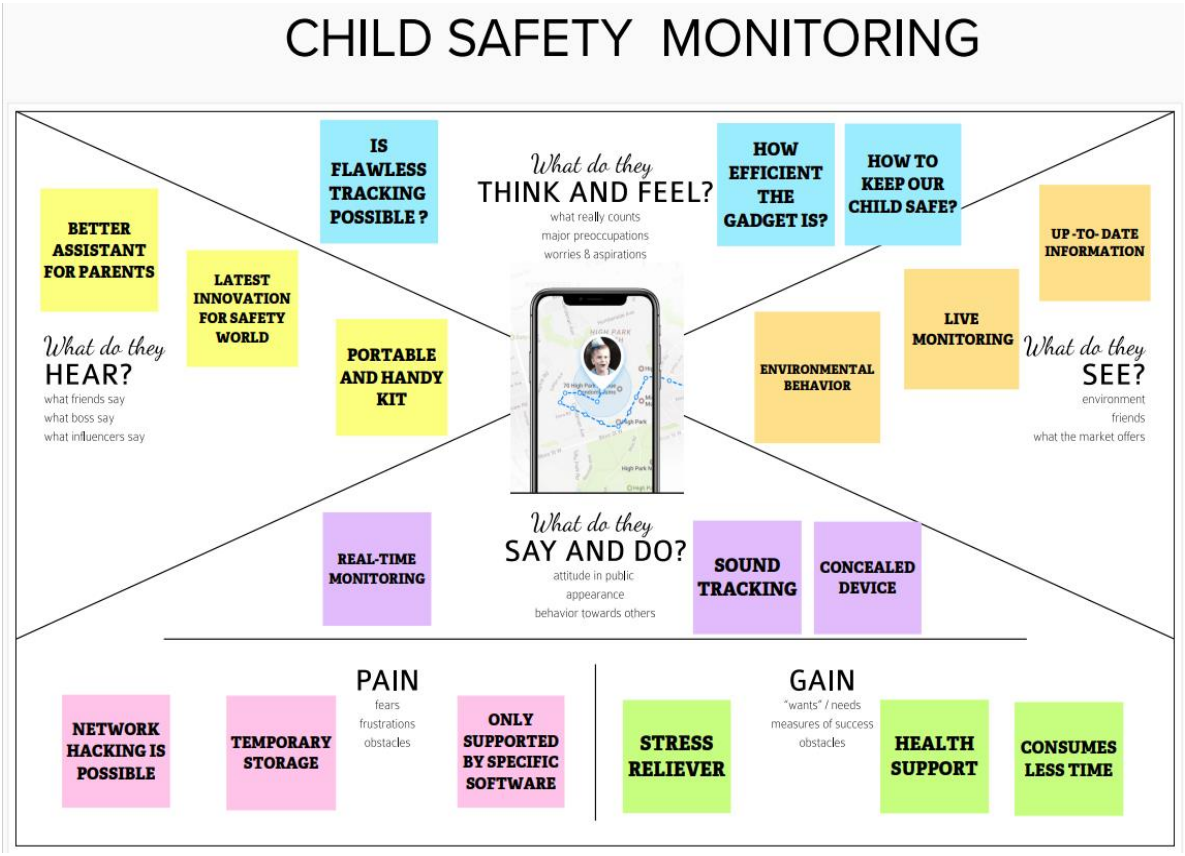
[1] AkashMoodbidri, Hamid Shahnasser, ”Child Safety Wearable Device”, Department of Electrical and Computer Engineering San Francisco State University.
[2] AnandJatti, MadhviKannan , Alisha RM, Vijayalakshmi P, ShresthaSinha, " Design and Development of an IOT based wearable device for the Safety and Security of women and girl children “, IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 20-21, 2016, India.
[3] Anwaar Al-Lawati, Shaikha Al-Jahdhami.
[4] " RFID-based System for School Children Transportation Safety Enhancement ", Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015.
[5] Dr. R. Kamalraj, ” A Hybrid Model on Child Security and Activities Monitoring System using IoT”.
[6] Pooja.K.Biradar1, Prof S.B.Jamge2,” An Innovative Monitoring Application for Child Safety”.
[7] 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.
[8] Sari fah Putri Raflesia, Firdaus, Dinda Lestarini, “An Integrated Child Safety using Geo-fencing Information on Mobile Devices", INTERNATIONAL CONFERENCE ON ELECTRICAL ENGINEERING AND COMPUTER SCIENCE (ICECOS) 2018.
[9] Zejun Huang1, ZhigangGao,” An Mobile Safety Monitoring System for Children”, 2014 10th International Conference on Mobile Ad-hoc and Sensor Networks.

2.3 Problem Statement Definition

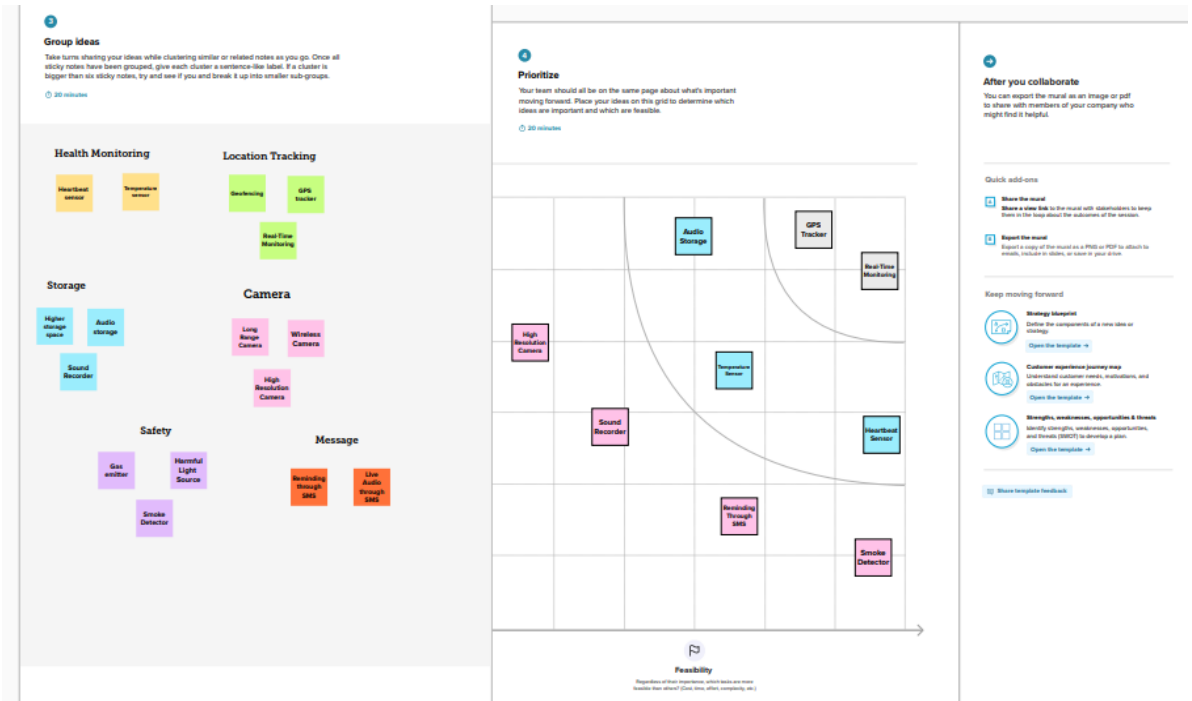
Children can be easily geo-fenced by using this gadget so the children can be protected by the harmful obstacles against them. By using this gadget, parents can easily monitor what was happening beside of their children using IoT. Temperature of the children is monitored using the temperature sensor fixed in the gadget, it plays a major role of child safety in order to make the parents to be updated and the heart beat of the children is also monitored by using heart beat sensor. The smart IoT device can be used to track and monitor the safety of a child. If any abnormal values are read by the sensor then an SMS is sent to the parent's mobile and an real time video is recorded by the camera it was stored in the storage for reference whenever it is required. A child guard system for mobile devices helps parents and guardians to monitor their children.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



3.3 Proposed Solution

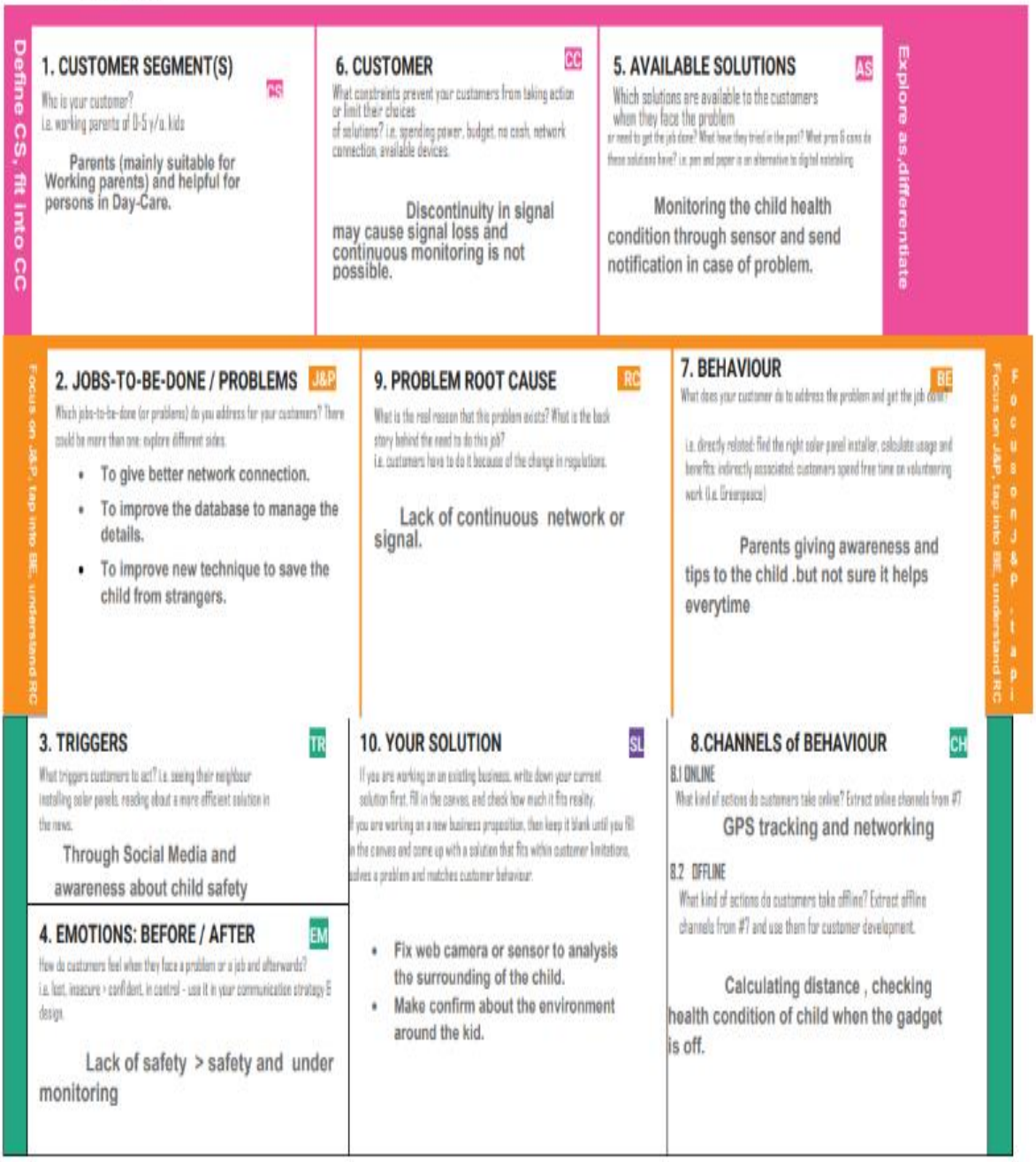
S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Tracking the child activities, location and notifying their position to their parents.
2.	Idea / Solution description	Designing the project with sensors like temperature sensor, heartbeat sensor, using long range camera with high storage and protecting by emitting harmful light sources or gas.
3.	Novelty / Uniqueness	In this proposed system, gas emitter or harmful light source or smoke detector is used than other systems.
4.	Social Impact / Customer Satisfaction	Secured information, cost efficient and Real-time tracking is possible.
5.	Business Model (Revenue Model)	The proposed system can be used for child security. Selling the product directly to the parents Selling the product to the child care centers
6.	Scalability of the Solution	The proposed system has less complexity and portable system. Highly secured database handled and highly strong communication.

3.4 Problem Solution Fit

Project Title: IoT based safety gadget for child safety monitoring and notification

Project Design Phase-I - Solution Fit Template

Team ID:PNT2022TMID32775



4. REQUIREMENT ANALYSIS

4.1 Functional Requirements

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through IP address
FR-2	User Confirmation	Confirmation via OTP
FR-3	Notification	Notified via Mobile Web app –MIT app inventor
FR-4	Database	Create and maintain a database containing user(child's) locations
FR-6	User interface	Mobile app inventor-MIT app inventor Able to see location of children when they are out of range

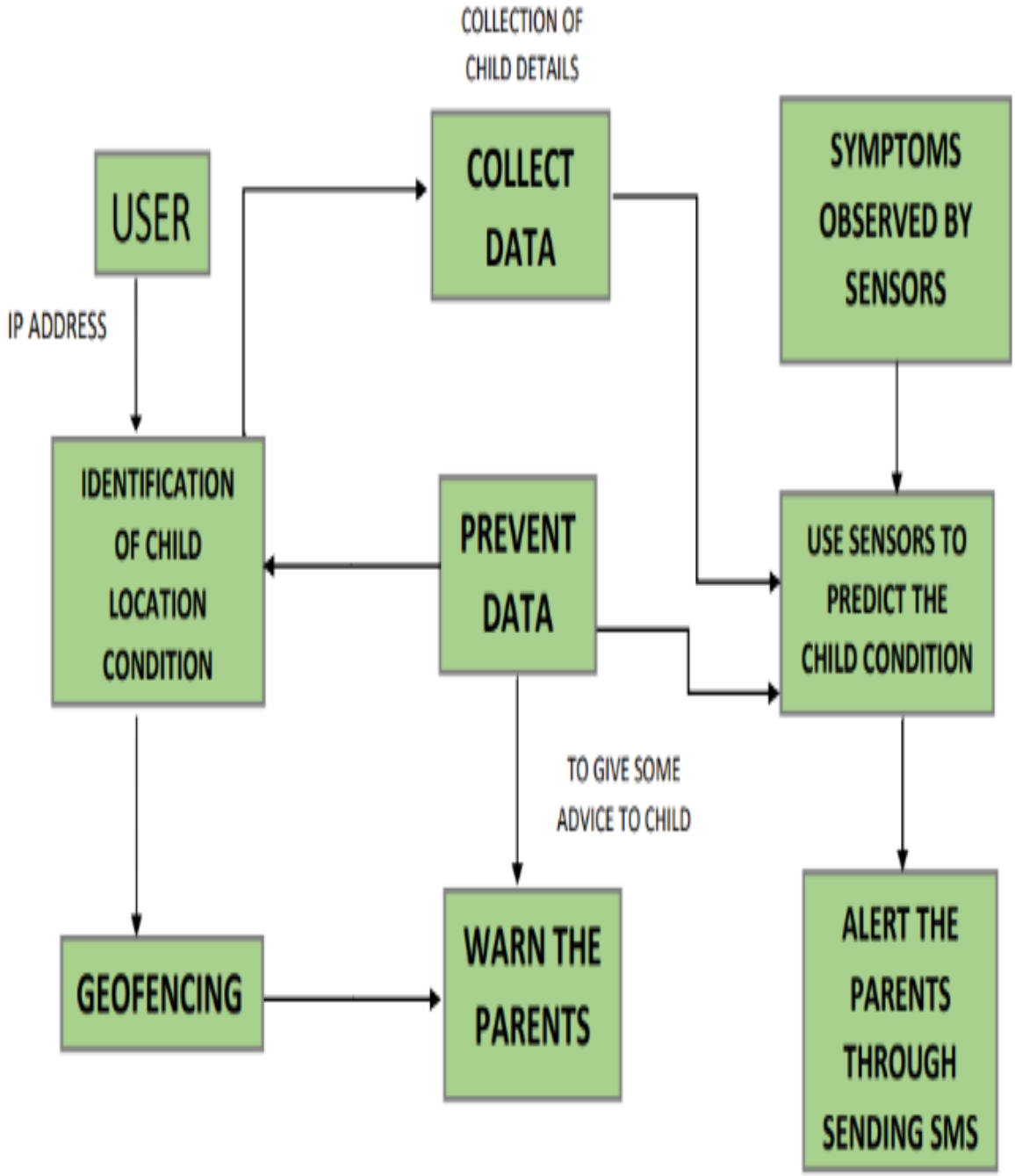
4.2 Non-Functional Requirements

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The device and its applications are user-friendly. The device is portable and easy to use.
NFR-2	**Security**	Providing permission for some information can only be decided by the user
NFR-3	**Reliability**	Webpage gets automatically logout unless signal is not distorted
NFR-4	**Performance**	Each page must load with minimum time
NFR-5	**Availability**	Can last as long as backup power supply is available
NFR-6	**Scalability**	Short term scalability where memory is stored and erased can be scaled to keep records in the future

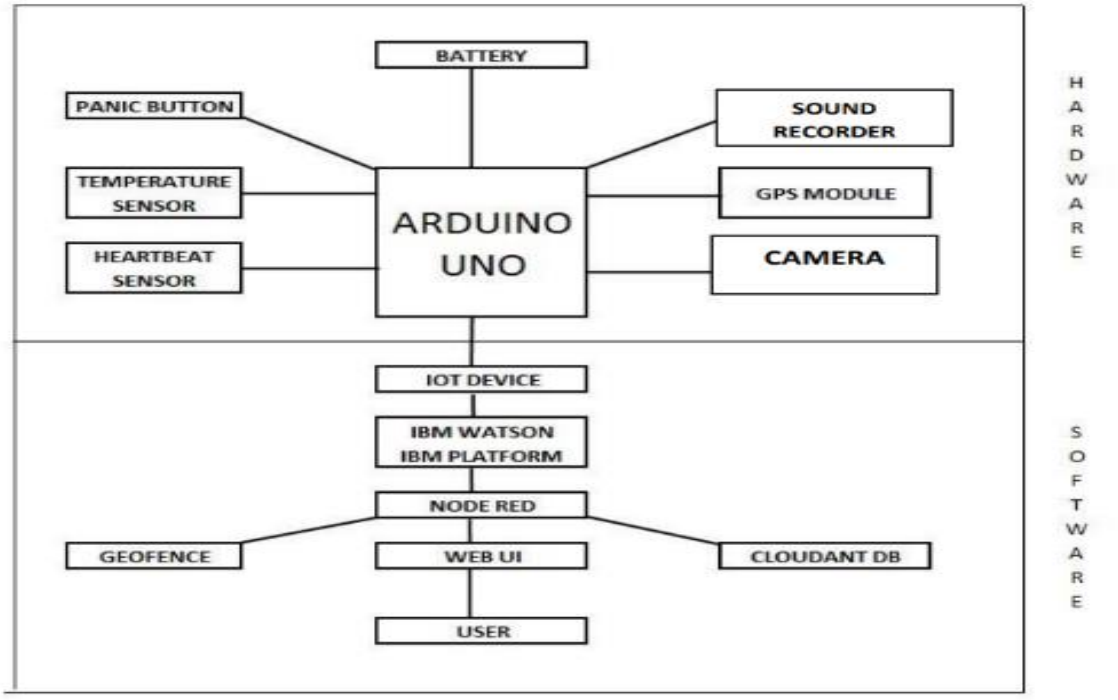
5. PROJECT DESIGN

5.1 Data Flow diagram

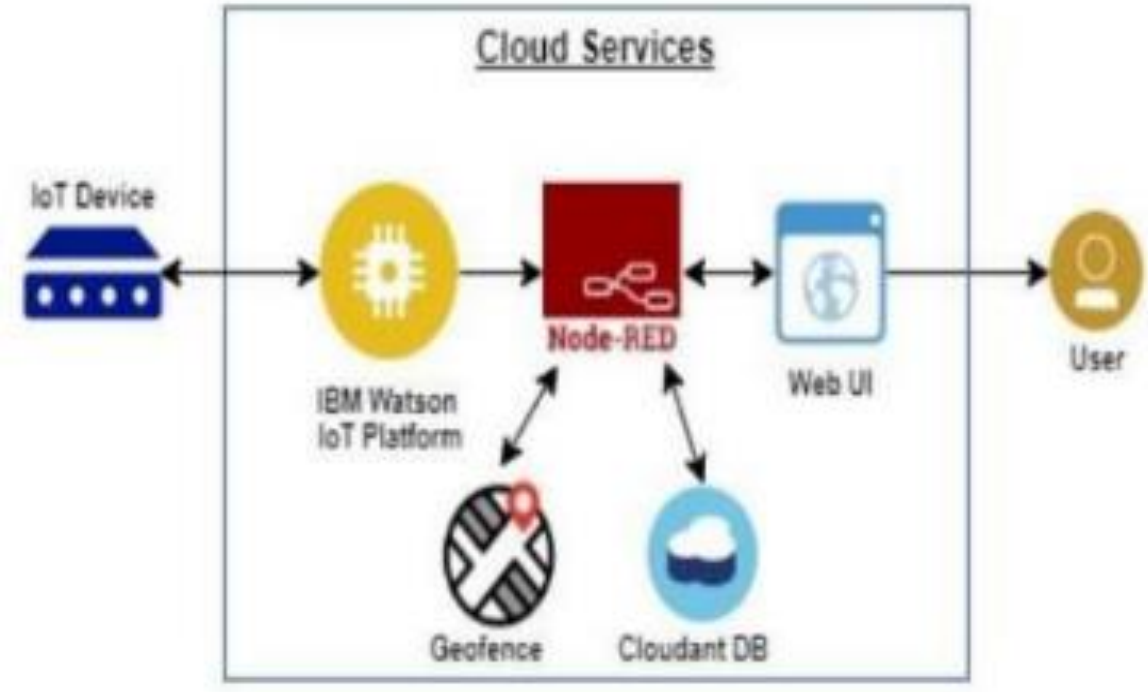


5.2 Solution & Technical Architecture

Solution Architecture



Technical Architecture



6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

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

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Registration	USN-1	Registration through app	10	High	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-1	User Confirmation	USN-2	Confirmation through SMS	5	High	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-1	Authentication	USN-3	Authentication through app	5	High	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-2	User login	USN-4	Log into the application by entering username & password.	10	Low	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-2	App permission	USN-5	Grant the permission for the app to access location, contact	10	Medium	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Setting Geo-Fencing	USN-6	Creating the Geo-Fencing area in the map.	10	Medium	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-3	Sensors using Node-RED	USN-7	Sensing the temperature and humidity	10	High	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S
Sprint-4	Tracking Location	USN-8	Tracking the location	20	High	NIVEDHA. R PUJA SRI. K RAGAVI. S SIVETHA. S

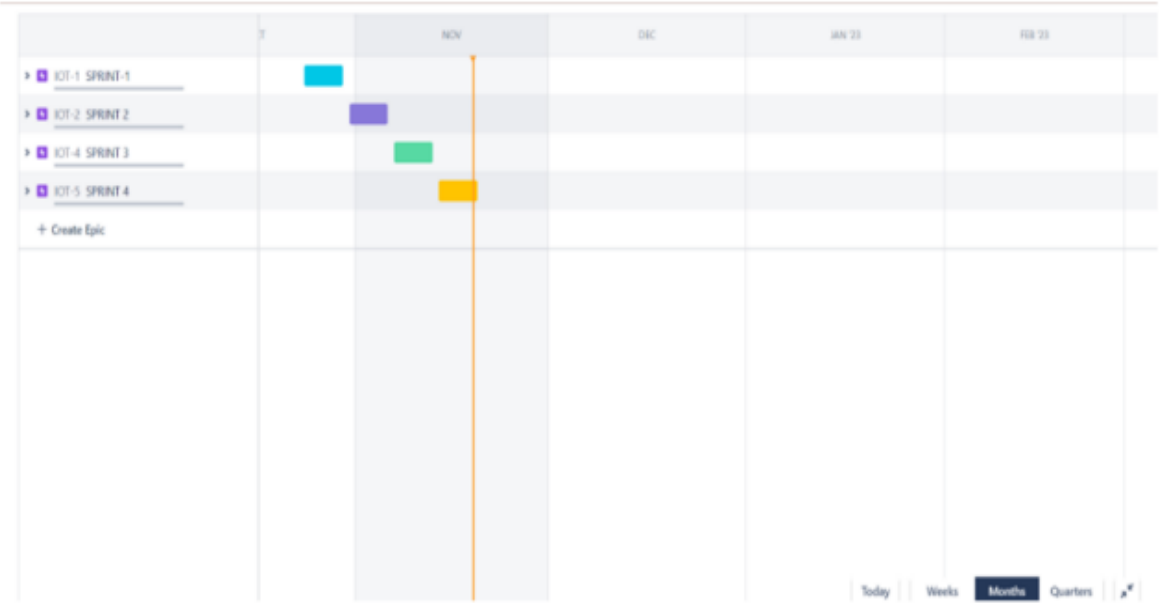
6.2 Sprint Delivery Schedule

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Gather/collect the relevant information on project use case, refer the existing solutions, technical papers, research publications etc.	3 SEPTEMBER 2022
Prepare Empathy Map	Prepare the empathy map canvas to capture the user Pains & Gains, Prepare list of problem statements	9 SEPTEMBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	17 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	23 SEPTEMBER 2022
Problem Solution Fit	Prepare problem - solution fit document.	1 OCTOBER 2022
Solution Architecture	Prepare solution architecture document.	1 OCTOBER 2022

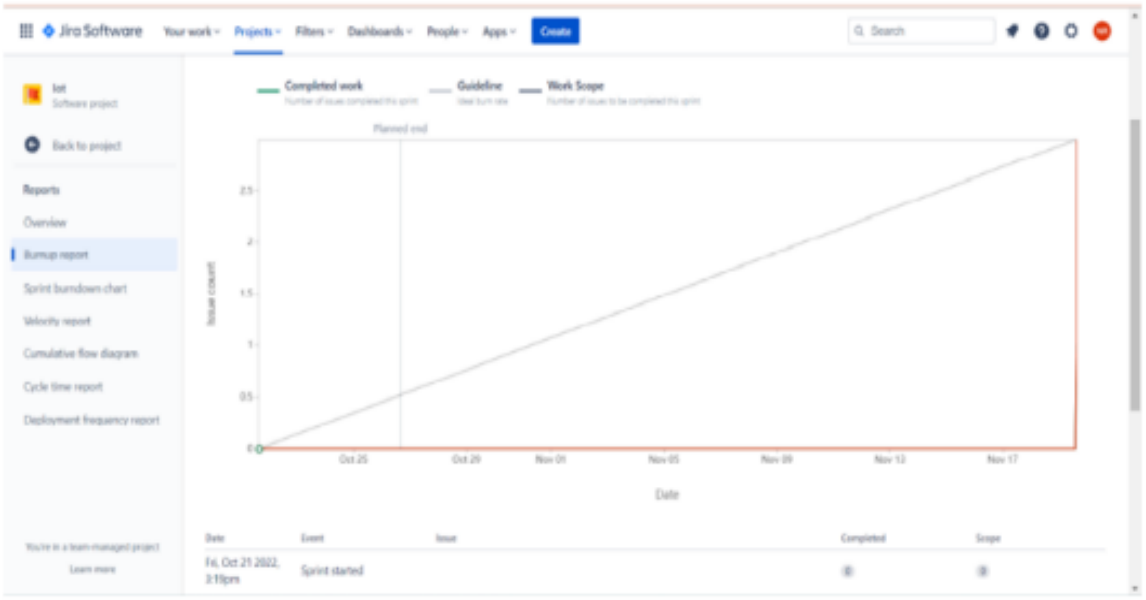
Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	7 OCTOBER 2022
Functional Requirement	Prepare the functional requirement document.	15 OCTOBER 2022
Data Flow Diagrams	Prepare the data flow diagrams and submit for review.	15 OCTOBER 2022
Technology Architecture	Draw the technology architecture diagram.	15 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	22 OCTOBER 2022
Project Development - Delivery Of Sprint-1, 2, 3 & 4	Develop & submit the developed code by testing it.	IN PROGRESS

6.3 Reports from Jira

ROADMAP:



BURNDOWN CHART:



7. CODING & SOLUTIONING

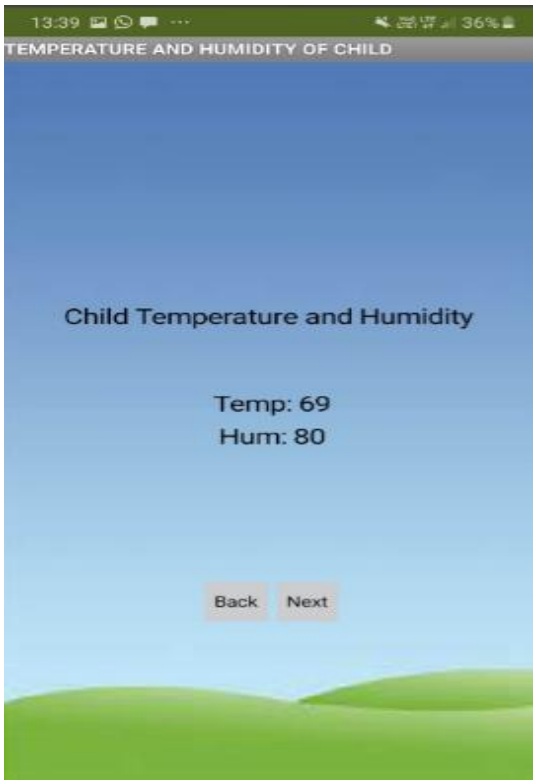
7.1 Feature 1:

This feature is added to track the location of the child with latitude and longitude using Node RED and to provide Geofencing.

```
import json
import wiotp.sdk.device
import time
myconfig = {
  "identity": {
     "orgId": "3jzkgc",
     "typeId": "Iot",
     "deviceId": "12345"
    },
   "auth": {
      "token": "12345678"
    }
}
client = wiotp.sdk.device.Deviceclient(config=myconfig, logHandlers=None)
client.connect()

while True:
    name= "child"
    #in area location

    #latitude=17.4225176
    #longitude=78.5458842
   #out area location
    latitude=17.4219272
    longitude=78.5488783
    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()
```

8. TESTING

8.1 Test Cases



9. RESULTS

9.1 Performance Metrics

Thus, tracking the location of the child has been done and tested. The testcase has been tested and implemented succesfully.

10. ADVANTAGES & DISADVANTAGES

Advantages

- Better assistant for parents.
- Stress reliever.
- Fast response.
- Consumes less time.

Disadvantages

- Only supported by specific software.
- Temporary storage.

11. CONCLUSION

Children can be easily geo-fenced so the children can be protected by the harmful obstacles against them. By using this, parents can easily monitor what is happening beside of their children using IoT. Temperature of the children is monitored. A child guard system for mobile devices helps parents and guardians to monitor their children.

12. FUTURE SCOPE

The future scope of the work is to ensure the complete solution for child safety problems. The currently proposed system can be improvised by adding other parameters that is required for children. The system can be developed further by implementing additional health monitoring sensors.

13. APPENDIX

GitHub link:

IBM-EPBL/**IBM-Project-16332-1659611619**

Project video demo link:

https://www.mediafire.com/file/5v36cxzdgghoahw/Video_20221119151456312_by_videoshow.mp4/file