IoT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING & NOTIIFICATION

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

The internet of things (IoT) refers to the set of devices and system that stay interconnected with real-world sensor and to the internet. Nowadays Child safety is under threat and it is very important to provide a technology-based solution which will help them under panic situations and monitor them using a smart gadget. The proposed system is equipped with GPS modules for sending and SMS between safety gadget and parental phone. Web application can be used to track the current location of safety gadget using its location coordinates on parental phone android app and also via SMS request from parent phone to safety gadget. Alert system is used when a child crosses the determined Geofence, an automatic SMS alert is triggered from safety gadget to the parental phone. So that the parent will be notified about the child's current whereabouts.

1.2 PURPOSE

The main purpose of this guided project is to make sure that the parent/guardian will able to create the Geofence so the child will be monitored frequently and if the child crosses the Geofence the parent will be notified by doing so parent can keep an eye on their child whenever they are not under their direct watch. And also, the child will feel more secure that they are safe. Here the privacy of the child is not bothered.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

The root cause for the need of child tracking devices in the market the rising cases of child disapperances, abuses, kidnappings and accidents. To prevent these unfortuante incidents parents are now aware of devices like these that ensures the protection of their children.
Some of the customers behaviours that leads to buying these child tracking gadgets notifications if includes the insecurity they suffer when their children are left alone in their house when ensure they go to work. When their children are travelling or playing with their friends the parentsthe child's are always concerned about the child's environment and the weather conditions and the use of these devices can reduce their tension in their working place.

2.2 REFERENCES

[1] Authors: M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari.
Title: Smart IoT Device for Child Safety and Tracking.
Published in: 2019 IEEE.

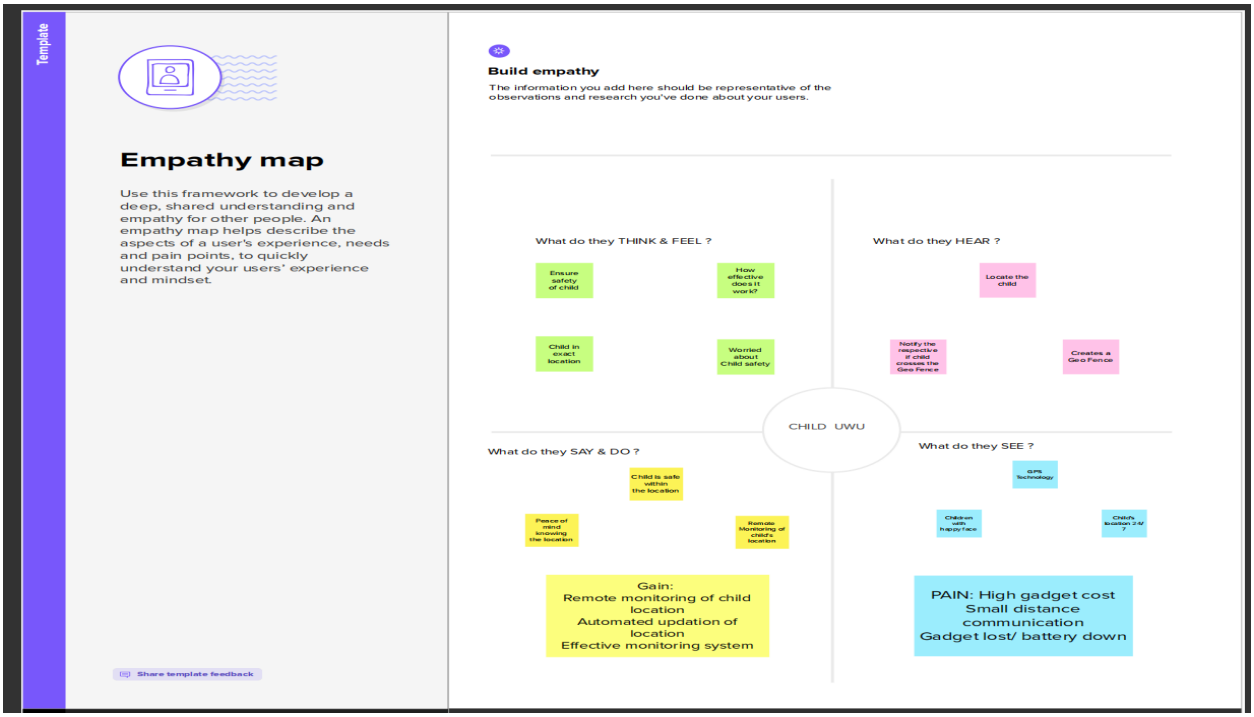
[2]**Authors:** Akash Moodbidri, Hamid Shahnasser.
Title: Child safety wearable device.
Published in: 2017 IEEE.

[3]**Authors:** Aditi Gupta, Vibhor Harit.
Published in: 2016 IEEE.

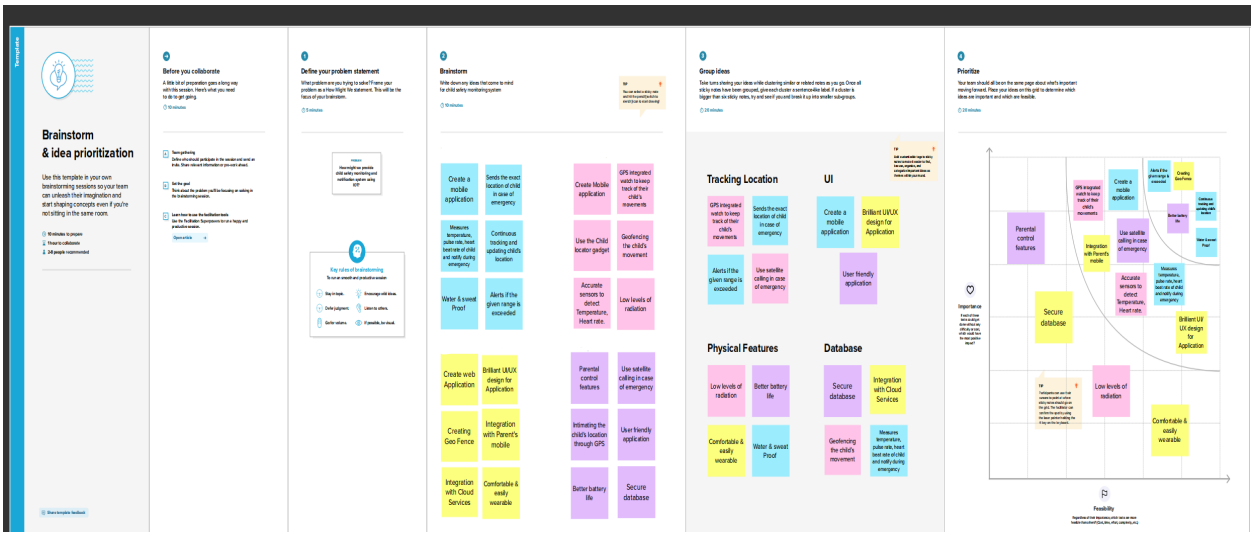
[4]**Authors:** Dheeraj Sunehera, Pottabhatini Laxmi Priya.
Title: Children Location Monitoring on Google Maps Using GPS and GSM.
Published in: 2016 IEEE.

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING



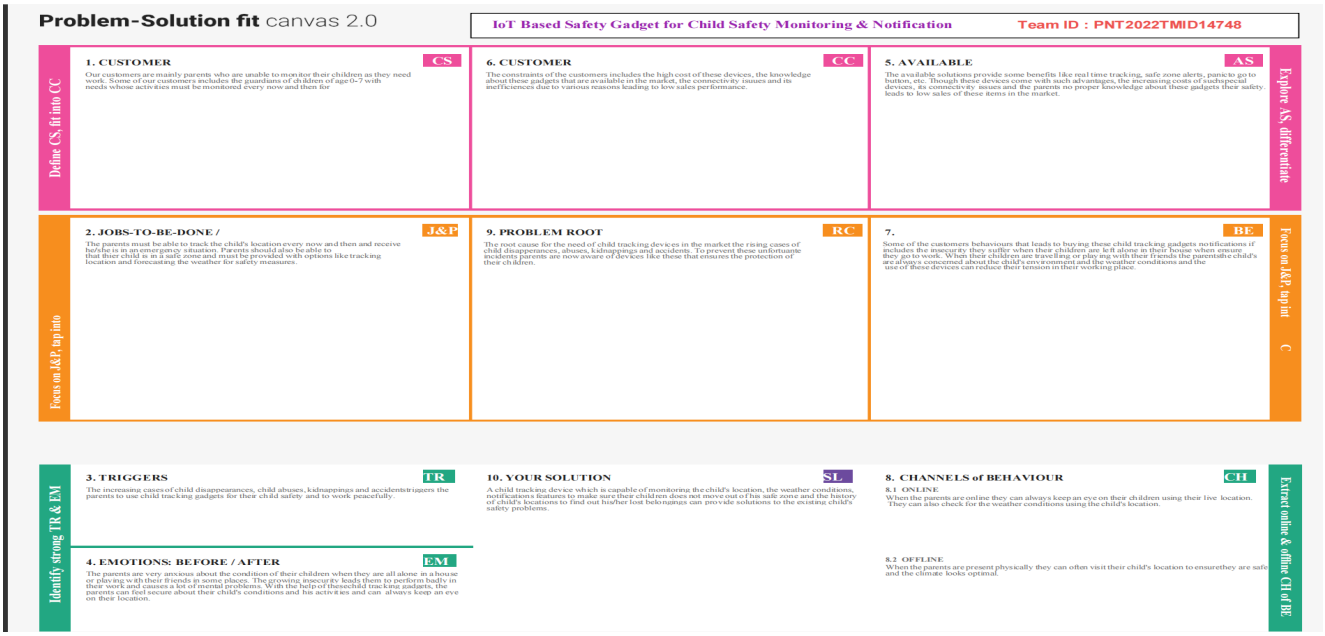
3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	I) Parents will not be able to monitor their children's whereabouts at all times and can't relax without knowing the exact location of them. II) Parents cannot know if their children are in a hazardous or unsafe environment. III) Parents cannot know the previous location history of their children to find any lost belongings of them.
2.	Idea / Solution description	I) 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 location. II) By continuously checking the child's location notifications will be provided 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. III) Child can also initiate emergency notifications to the parents incase of unsafe situation.
3.	Novelty / Uniqueness	I) Easily understandable software. II) Security. III) 24/7 monitoring. IV) Fast tracking.

4.	Social Impact / Customer Satisfaction	I) Cases of child disappearances, kidnapping , child accidents can be reduced drastically. II) Parents can be relaxed knowing their child's status especially when they are at a far distance from them. III) Parents can act quickly when their children are in a danger. IV) To reduce the anxiety, nervousness of a parent.

5.	Business Model (Revenue Model)	I)Selling the product to child care organizations or centers. II) Selling the product via e-commerce. III) Premium. IV) Licensing Model.
6.	Scalability of the Solution	I) Reliable. II) Cost effective. III) Highly scalable.

3.4 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

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 Gmail Registration through Mobile number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Interface	To create geofence and store it in db To show and check the current location of that user
FR-4	Notification	Via SMS contains user's current location
FR-5	SOS Emergency	Inbuilt button will be provided in the mobile app to call the emergency contact

4.2 NON FUNCTIONAL REQUIREMENTS

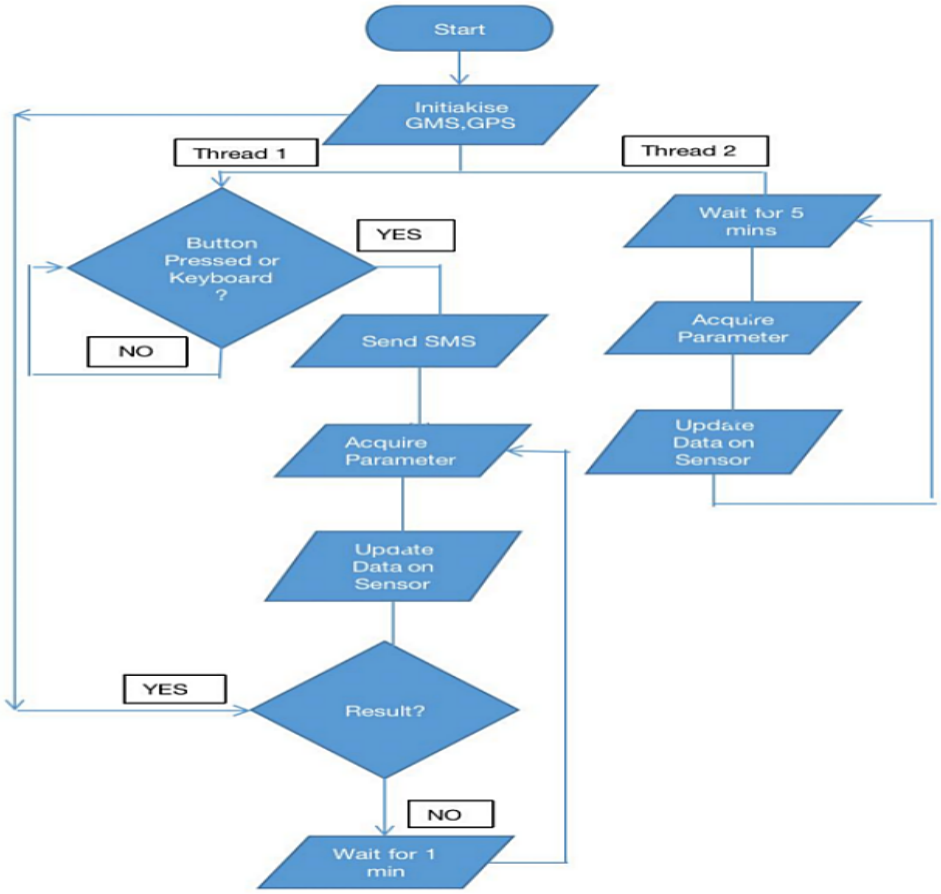
Non-functional Requirements:

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

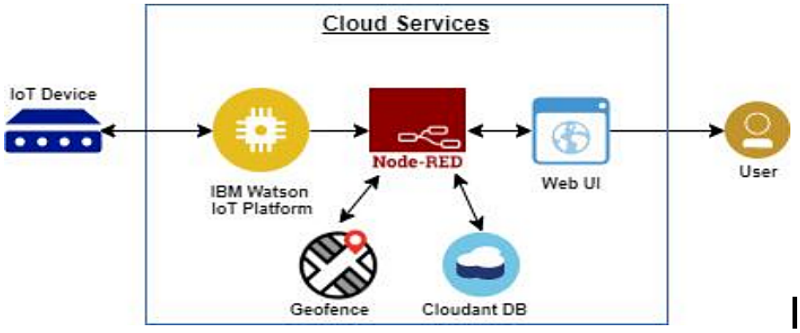
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	To create the geofence and check whether the user is within the geofence, if not. To alert the emergency contact
NFR-2	Security	Data security must meet HIPAA requirement
NFR-3	Reliability	Accurate data results must be provided at all times
NFR-4	Performance	Each button assigned with their own functionalities must provide fast and efficient service to the user
NFR-5	Availability	The data collected by the mobile app must be available at any time
NFR-6	Scalability	Ability to process and update user's data instantly

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 USER STORIES

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN- 1 (FATHER)	I can access the location of my children using the credentials provided as a Father.	I can access my account / dashboard	High	Sprint- 1
		USN-2 (MOTHER)	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)	I too can monitor the children's activities using safety gadget monitoring system.	I can access my account / dashboard and receive confirmation email & click confirm	Low	Sprint-2
		USN-4	Same function to be performed as in previous cases.	Same function to be performed as in previous cases.	Not Yet Determined	-------
	Login	USN-5	Same function to be performed as in previous cases.	Same function to be performed as in previous cases.	Not Yet Determined	-------

6. PROJECT PLANNING & SCHEDULING

6.1 PROJECT PLANNING & ESTIMATION

Product Backlog, Sprint Schedule, and 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	SARVESH KUMAR M
Sprint-1	Confirmation Email	USN-2	As a user, I will receive a confirmation email once I have registered for the application	4	High	TARUNSAI C B
Sprint-1	Authentication	USN-3	As a user, I can register for the application through Gmail and mobile app.	4	Medium	SIDDHARTH S
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	4	High	SRIVATSAAN V
Sprint-1	Dashboard	USN-1	As a user, I need to be able to view the functions that I can perform	4	High	SARVESH KUMAR M

Sprint-2	Notification	USN-1	As a user, I should be able to notify my parent and guardian in emergency situations	10	High	SARVESH KUMAR M
Sprint-2	Store data	USN-2	As a user, I need to continuously store my location data into the database.	10	Medium	TARUNSAI C B

Sprint-3	Communication	USN-1,3	I should be able to communicate with my parents	6	Low	SARVESH KUMAR, SIDDHARTH S
Sprint-3	IoT Device – Watson communication	USN-1,4	The data from IoT device should reach IBM Cloud	7	Medium	SARVESH KUMAR, SRIVATSAAN V
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	TARUNSAI C B, SARVESH KUMAR M
Sprint-4	User – WebUI interface	USN-1,4	The Web UI should get inputs from the user	6	High	SARVESH KUMAR, SRIVATSAAN V
Sprint-4	Geofencing	USN-1,3,4	The geofencing of the child should be done based on the geographical coordinates	7	High	SARVESH KUMAR, SIDDHARTH S, SRIVATSAAN V

7. CODING & SOLUTION

7.1 FEATURE 1

- IBM Watson Platform.
- Node Red Service.
- Python Code.

7.2 FEATURE 2

- Cloudant DB.
- IoT.

8. RESULTS

8.1 PERFORMANCE METRICS

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.

9. ADVANTAGES

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

10. DISADVANTAGES

The wearable 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.

11. CONCLUSION

Today's children are tomorrow's youngsters, preserving their dreams and life for a better future is necessary. Therefore, each and every parent should take care of their own children, without letting them to fall into the dark world of abusements, which entirely ruin them physically, mentally and emotionally destroying our future. Hence, considering the importance of our future, our project makes it easy for parents to track their children and to visually monitor them on regular basis, which makes them ensure the safety of their children and reduces the rate of incidents of child abuse.

12. FUTURE SCOPE

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

13. APPENDIX

13.1 SOURCE CODE

Python Script

```
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()
```

14. GITHUB LINK

https://github.com/IBM-EPBL/IBM-Project-33653-1660224972