PROJECT REPORT

Team id	PNT2022TMID46762
Title	Iot based child safety gadget for child safety monitoring and notification

INTRODUCTION

In today's world child safety has become a major issue as they can't step out of their house at any given time due to physical/sexual abuse and a fear of violence. Even in the 21st century where the technology is rapidly growing and new gadgets were developed but still childrens are facing problems.

children are adept at mobilizing diverse groups for a common reason. They often work across ethnic, religious, political, and cultural divides to promote liberty. We are all aware of importance of women safety, but we must analyse that they should be properly protected. child are not as physically fit as men in an emergency situation a helping hand would be assistance for them. The best way to curtail your probability of becoming a dupe of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defence and look up resources to help you out of hazardous situation.

1.1 PROJECT OVERVIEW

In the light of recent out range in Delhi nation and which shock nation and woke us to the safety issues for children people are finding up in ways to different defend .Here we introduce a device which ensures the protection of women This helps to identify protect and call on resources to help the one cut of dangerous situations. The device consists of microcontroller, GSM module ,GPS modules. The system resembles a normal watch which when activated tracks the place of the women using GPS(global positioning system) and send emergency messages using GSM

(global system for mobile communication) to contacts the police control room .The main advantage of this system is that user does not require a smart phone unlike other applications that have been developed earlier. The use of sophisticated components ensures accuracy and makes its reliable. The GSM and GPS are presented in IoT modem itself**.**

1.2 PURPOSE

When a violation of child safety is identified, a certain sensor in the child module will emit a signal, which is the main function of the suggested child tracking system. These sensors and WFPS will send this signal to the microcontroller, which will then send it to the transmitter, which will then send it to the parent module. The decision will be made by the parent module, and the violation handling procedure will begin. The kid tracking system's functionality necessitates hardware between the child and parent models, which comprises a drive circuit for the sensors' activation

2.1 EXISTING PROBLEM

The child needs to be monitored even when the parents are distracted. A momentary lack in parental supervision should be combated. The child needs to stay generally within the line of sight. It is necessary for the proposed system to alert the parents when the child walks too far away and outside the “circle of safety” even if the parents are distracted. If the child does go missing, the aid of technology can increase efficiency and decrease the time necessary to locate the child. The child needs to be located, only at the will of the authorized persons.

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

2.3 PROBLEM STATEMENT DEFINITION

More families are now spending time on work and social duties, hence away from their children. This causes increased concerns towards their safety and whereabouts, and has made keeping a track of their activities quite challenging. Crimes against children are increasing Year on Year. According to a study, roughly 60,000 children go missing in India every year. There is an assumption that every 10 minutes, a child goes missing. Mumbai and Delhi have the highest rate when compared to other metro cities. With the lack of availability of affordable child monitoring systems it is hard to monitor the whereabouts of Children. Safety of children is very critical since children cannot protect themselves.

A momentary lack in parental supervision should be combated with an appropriate IT solution in context. Therefore, it is necessary for the proposed system to alert the parents when the child walks too far away and/or outside the “circle of safety” when they are away. In case of an emergency, or in a situation of panic, the child must be able to communicate with their parents. This can be done via live transmission of audio from the device with the child, to the parent’s device

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user’s behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user’s perspective along with his or her goals and challenges.

Template

Empathy map canvas

Use this framework to empathize with a customer, user, or any person who is affected by a team's work. Document and discuss your observations and note your assumptions to gain more empathy for the people you serve.

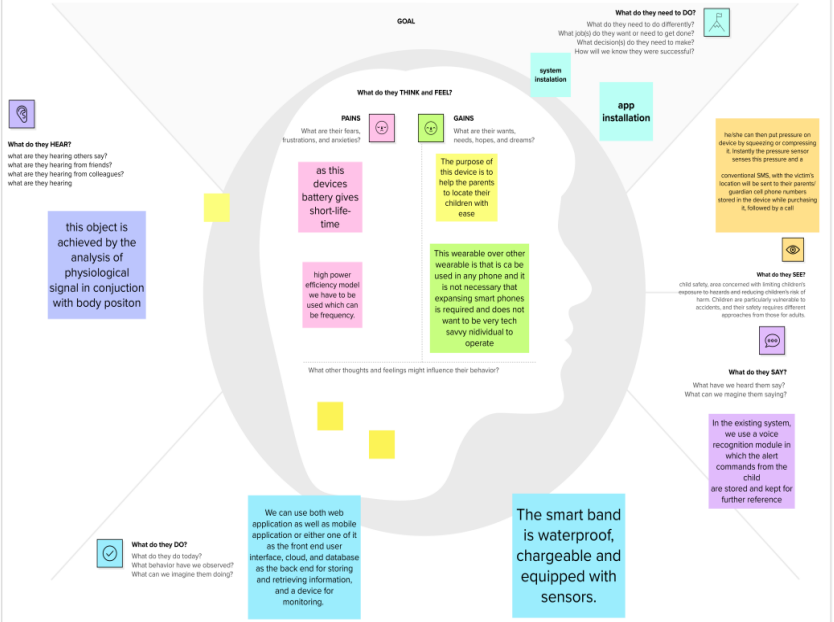
Originally created by Dave Gray at

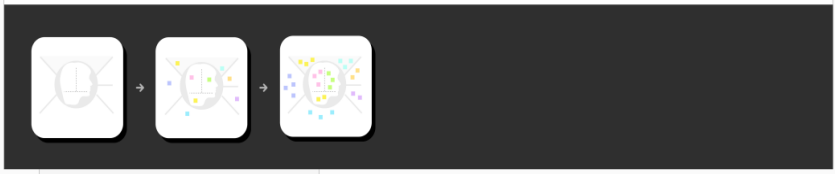
XPLANE

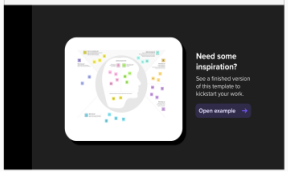
Share template feedback

Develop shared understanding and empathy

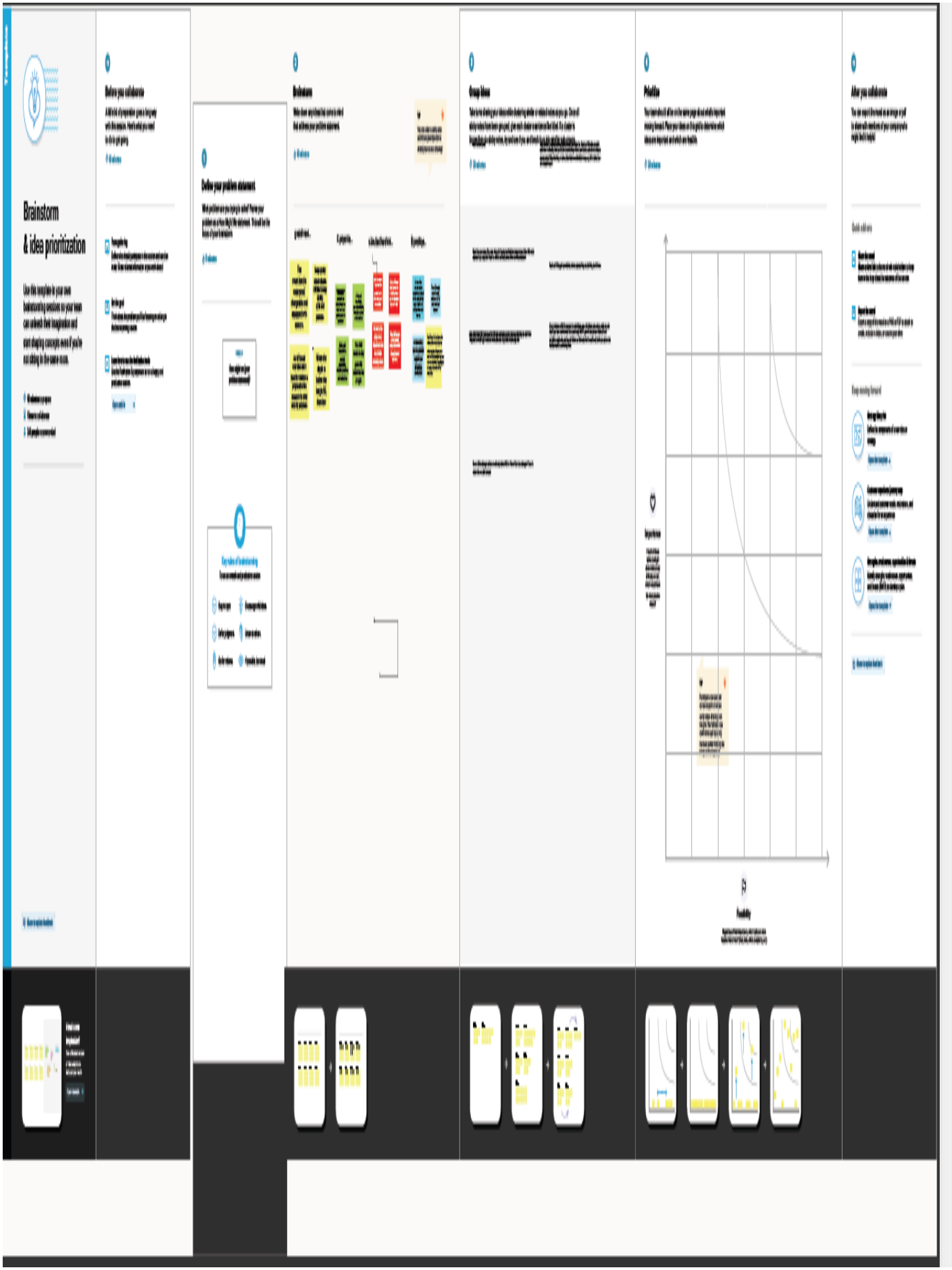
Summarize the data you have gathered related to the people that are impacted by your work. It will help you generate ideas, prioritize features, or discuss decisions.







3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

S.NO	parameter	Description
1.	Problem Statement (Problem to be solved)	The child needs to be monitored even when the parents are distracted. A momentary lack in parental supervision should be combated . The child needs to stay generally within the line of sight. It is necessary for the proposed system to alert the parents when the child walks too far away and outside the „circle of safety" even if the parents are distracted. If the child does go missing, the aid of technology can increase efficiency and decrease the time necessary to locate the child. The child needs to be located, only at the will of the authorized persons .
2.	Idea / Solution description	Early childhood development is crucial to how a person develops later on in life. Reasons for a how a person acts, behaves, and thinks can be traced back to their childhood circumstances and environment. Parents also play a very important role in a child's development.
3.	Novelty / Uniqueness	Although there is certainly some influence we parents can have on who our children ultimately become, the essence of who your child is isn't actually something that can be changed very much. Realizing this is a light bulb moment for many parents who may be trying to push their child be something they are not or something they, as parents, wish their child would be.

4.	Social Impact / Customer Satisfaction	social and economic costs Child abuse and neglect is, at a minimum, any recent act or failure to act on the part of a parent or caretaker, which results in death, serious physical or emotional harm, sexual abuse or exploitation (including sexual abuse as determined under section 111), or an act or failure to act which presents an imminent risk of serious harm.
5.	Business Model (Revenue Model)	✓ Contrast your concept through competition ✓ Leverage local marketing tactics ✓ Keep an updated tech toolbox ✓ Commit to quality and your core focus
6.	Scalability of the Solution	It is a IOT based project and their approach is to monitor school bus in this new era of smart cities. As there first attempt was to recognize the speed of bus and calculate the arrival time of child to inform their parents.

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 Linked IN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User safety	Communication to the when the scalability sensor alerts
FR-4	User communication	Donevia Wifi and Gps
FR-5	User response	Suitable action taken

4.2 NON FUNCTIONAL REQUIREMENT

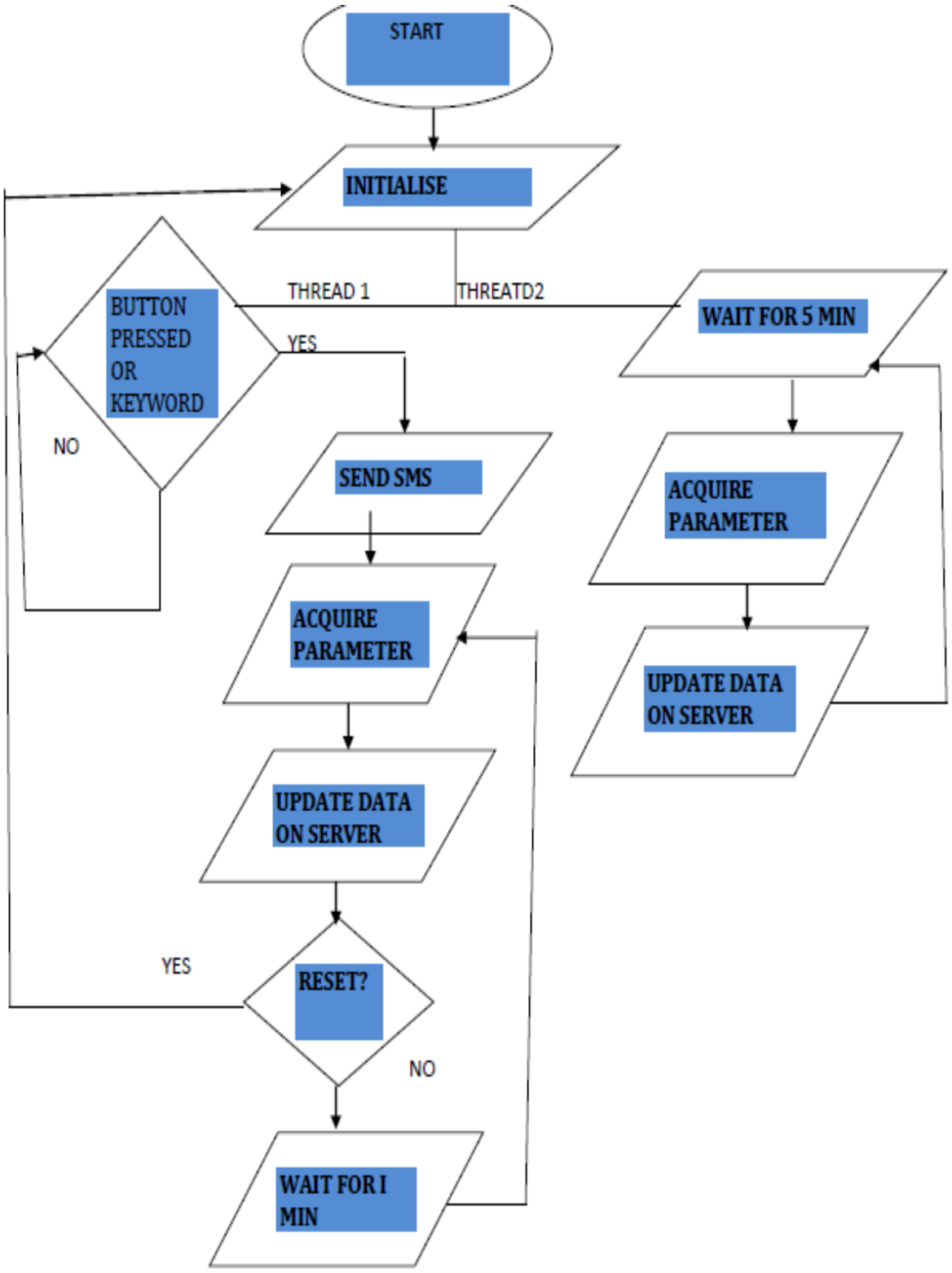
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	child safety, area concerned with limiting children's exposure to hazards and reducing children's risk of harm. Children are particularly vulnerable to accidents, and their safety requires different approaches from those for adults.

NFR2	**Security**	Kids must feel safe and sound, with their basic survival needs met: shelter, food, clothing, medical care and protection from harm.
NFR3	**Reliability**	A safe and healthy workplace not only protects workers from injury and illness, it can also lower injury/illness costs, reduce absenteeism and turnover, increase productivity and quality, and raise employee morale. In other words, safety is good for business. Plus, protecting workers is the right thing to do.
NFR-4	**Performance**	The increasing use of performance measurement by government means that child protection services are under pressure to demonstrate effectiveness in protecting children from harm and efficiency in the use of public funds to help children and families. Is that a critical approach to performance measurement in child protection can contribute to improved service delivery to clients.

NFR-5	**Availability**	saying and showing you love your kids can overcome almost any parenting "mistakes" you might make. Even when your kids have disobeyed, angered, frustrated and rebelled against you, show them you love them and that you'll always love them.
NFR-6	**Scalability**	Step 1: Build consensus on a child protection vision Step 2: Determine what to scale Step 3: Assess scalability Step 4: Develop or revise scaling strategy and plan Step 5: Implement plan and monitor Step 6: Learn and adapt.

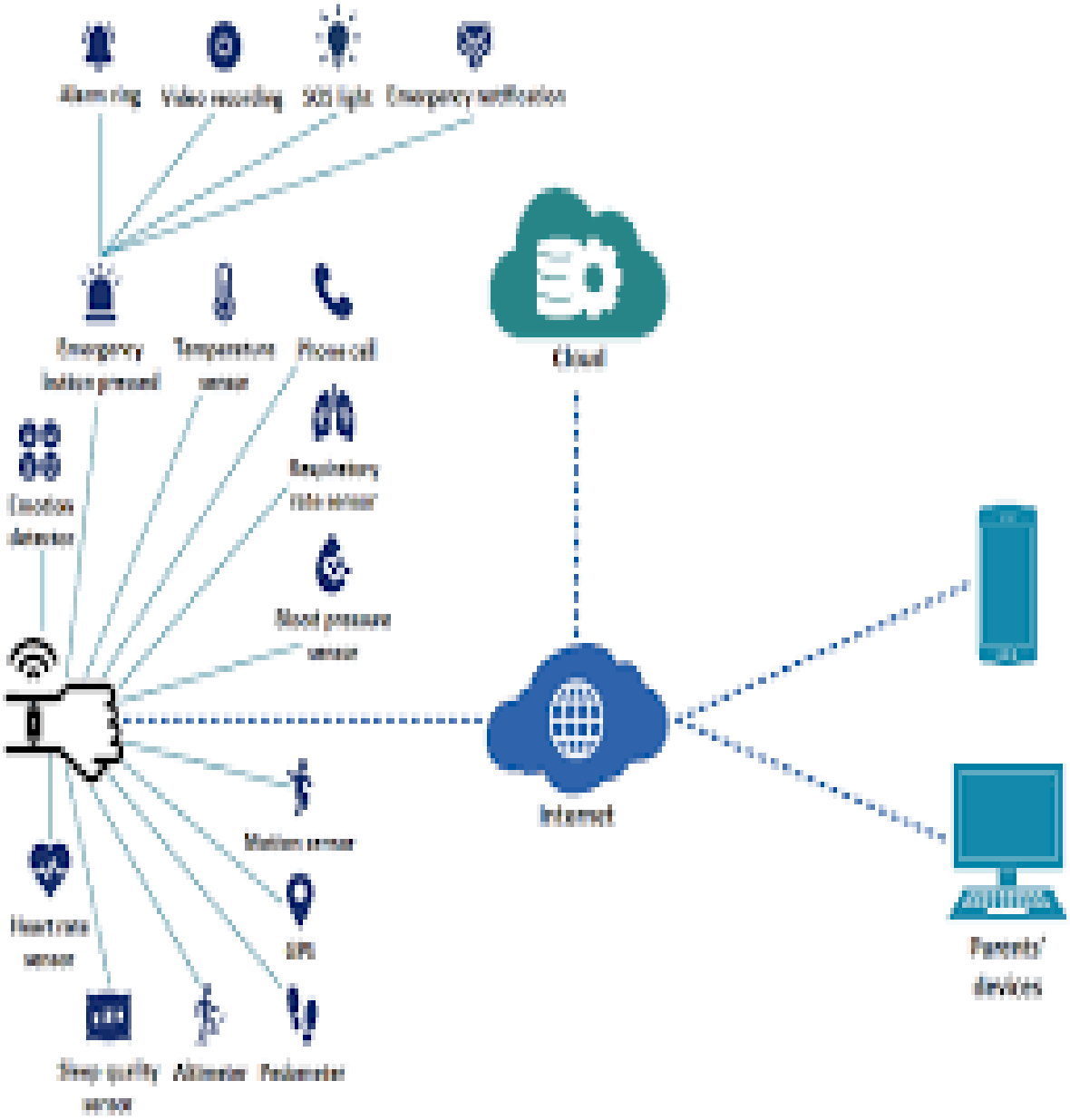
5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION ARCHITECTURE

An IoT based wearable smart band for children is proposed in this research for child security purposes. The smart band is waterproof, chargeable and equipped with sensors. Heart rate sensor measures pulse rate and BPM. Sleep quality sensor obtains children's sleep quality, cycle and positions. On the other hand, pedometer is used for counting steps. Apart from that, this smart band contains GPS for tracking, identifying children's location and setting geo fences. Via the smart band, children can also contact parents. Emergency button, a feature in which will automatically record video and automatically call 4 emergency contacts when it is pressed



6.PROJECT PLANNING &SCHEDULING

6.1SPRINT 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	G.Vaishnavi
Sprint-1		USN-2	As a Parent/ Guardian, I can register for the application through Gmail	1	Medium	S.Kirubadharshini
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	K.Priyanka
Sprint-1	Login	USN-4	As a parent/ guardian , I can log into the application by entering mail and password.	2	low	B.Prethiya

6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total story points	duration	Sprint start date	Sprint end date	Story points completed	Sprint release date
Sprint-1	20	4days	24oct 2022	27oct 2022	20	29oct 2022
Sprint-2	20	5days	28oct 2022	01nov 2022	20	04nov 2022
Sprint-3	20	8days	09nov 2022	09nov 2022	20	11nov 2022
Sprint-4	20	9days	10nov 2022	18nov 2022	20	19nov 2022

7.CODING &SOLUTIONING

7.2 FEATURE 2

```
Import pandas as pd
Import numpy as np
Import matplotlib.pyplot as plt
From PIL import Image, ImageDraw

Data_path = 'data.csv'
Data = pd.read_csv(data_path, names=['LATITUDE', 'LONGITUDE'],
sep=',')

Gps_data = tuple(zip(data['LATITUDE'].values,
data['LONGITUDE'].values))

Image = Image. open('map.png', 'r')  # Load map image.
Img_points = []
For d in gps_data:
   X1, y1 = scale _to _img(d, (image. size[0], image. size[1]))  #
Convert GPS coordinates to image coordinates.
   Img_points.append((x1, y1))
Draw = Image Draw .Draw(image)
```

```
Draw .line(img _points, fill=(255, 0, 0), width=2)  # Draw converted records to the map image.

Image .save('resultMap.png')

X_ticks = map(lambda x: round(x, 4), np.linspace(lon1, lon2, num=7))
Y_ticks = map(lambda x: round(x, 4), np.linspace(lat1, lat2, num=8))
Y_ticks = sorted(y_ticks, reverse=True)  # y ticks must be reversed due to conversion to image coordinates.

Fig, axis1 = plt.subplots(fig size=(10, 10))
Axis1.imshow(plt.imread('resultMap.png'))  # Load the image to matplotlib plot.
Axis1.set_xlabel('Longitude')
Axis1.set_ylabel('Latitude')
Axis1.set_xticklabels(x_ticks)
Axis1.set_yticklabels(y_ticks)
Axis1.grid()
Plt.show()
```

8.TESTING

Testing and integration is most important because app already working or not this kind information we can get using this. That means all functionality of project must be checked. It is the software testing phase. Integration testing is conducted to evaluate the compliance of a system or component with specified functional requirements. It is occurs after unit testing and before validation testing.

8.1 TEST CASES

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N	BUG ID
1	Functional	Registration	Registration through the form by Filling in my details		1.Click on register 2.Fill the registration form 3.click Register		Registration form to be filled or to be displayed	Working as expected	PASS			
2	UI	Generating OTP	Generating the otp for further process		1.Generating of OTP number		user can register through phone	Working as	PASS			
3	Functional	OTP verification	Verify user otp using mail		1.Enter gmail id and enter password 2.click submit	Username: railways password: admin	OTP verified is to be displayed	Working as expected	FAIL			
4	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter into login page 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: railways password: admin	Application should show 'Incorrect email or password' validation message.	Working as expected	FAIL			
5	Functional	Display Train details	The user can view about the available train details		1.As a user, I can enter the start and destination to get the list of trains available connecting the	Username: railways password: admin	A user can view about the available trains to enter start and destination details	Working as expected	PASS			

10.ADVANTAGES

- Parent could be able to track child using their separate android application provided for the parent.
- Parent could track the location and also could get all the call logs, messages and contact list from the child mobile phone.
- Parent can locate and retrieve details anywhere and anytime.

DISADVANTAGES

- enquires active internet connection.
- Child need to login once into the application.
- System will provide inaccurate results if data not entered correctly.

11.CONCLUSION

Through this device, the parent can track and monitor their child with just a simple app and one hardware device which will be with the child. It is not possible to always stay beside children as most of the parents need to go for work. With this

project, parents can track the location of their children and get alerts whenever the child is in danger. It becomes easy for parents to look after their child while working. This device is efficient to use. Thus by keeping in mind the advantages and applications we are developing a child monitoring device. In order to avoid kidnapping cases, the child monitoring system is needed.

12.FUTURE SCOPE

This project is developed for parents to keep track of their child's whereabouts. Nowadays, children are easily influenced by their friends, and might even get cheated or kidnapped by any stranger. By this system, it is comparatively easier to keep a track of a child's current location. The Web application will deal with the Android platform and is utilized for GPS following between the device and parents phone. The Web application is mindful to keep track of the location of the device. The edit access for the child profile is given to the parents themselves, along with their account. The Web application will include the route history trace where the parent tracks the route their child traversed during a particular period. The Web application in the device will update the location of the child at an interval of 30 min, 1 hour, and 2 hours. Parents can select the interval time to view the current location of the child. They also can make calls from the Web application to the particular school if any inconvenience happens when the location is not found or tracked. Nowadays, crime rates are increasing day by day, especially kidnapping children. Moreover, it is not possible for parents to always stay beside them due to the rising culture of working parents. In such a case, the proposed system can reduce the number of child missing cases. This system provides a tracking solution for the parent to keep tracking their child's location outdoors by using GPS as it allows them to determine the exact location of the child. It, therefore, helps to minimize this tragedy to reoccur in the future.

Github -https://github.com/IBM-EPBL/IBM-Project-44672-1668781725