IBM PROJECT

IoT based safety gadget for child safety monitoring and notification - Project Report

Batch: B6-6M2E

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Team Members:

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1.Introduction

1.1.Project Overview

- An app is built for the user (child) which enables him to set the alarm using through the buzzer.
- If the problem arrives the wearable device will send the notification to the IoT Device through the IBM IoT platform.
- The device will receive the notification and the parents will alert from this notification.

1.2.Purpose

- Sometimes parents cannot together with their child while going to school.
- And it is difficult for parents to monitor their child around the clock. To avoid this problem, this child safety wearable device system was developed.

2.Literature survey

2.1. Existing problem

Child trafficking has emerged as a worldwide concern owning to its clandestine and pervasive nature. The lack of means for a child, to respond or be tracked during such an incident increases the prevalence of such nefarious activities. Existing solutions put the onus on the child to respond promptly, under such as situation, or are too intricate that they incur additional infrastructural costs and monitoring. Many of these solutions mandate the use of electronic detectors that are often exposed and thus discernible to a trafficker making the user vulnerable.

2.2.References

1. 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.

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

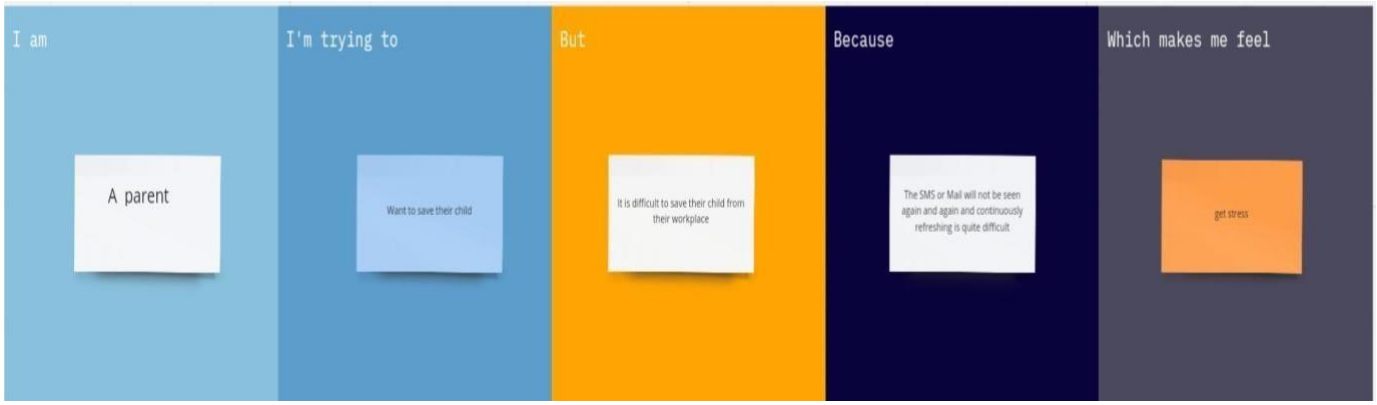
2.3.Problem statement definition

Customer Problem Statement Template:

I am	**Describe customer with 3-4 key characteristics -who are they child (0-5) yrs**	**Customer are parents who having child and willing to take care of their child**
I'm trying to	**List their outcome or "job" the care about what are they trying to achieve**	**The parents are trying to achieve their child in safer side.**
But	**Describe what problems or barriers stand in the way – what bothers them most**	**The parents can't able to spend more time with the child Inspite of their work.They can't able to safe their child to overcome this situation parents from their workplace itself can monitor their child**

Because	**Enter the "root cause" of why the problem or barrier exist what needs to be solved**	**Ultrasonic sensor is fixed to the device with the child when any object exist near child using pieze buzzer alarm established and SMS & Mail will automatically hit the parents Mobile .SMS and Mail again and again Noticing is quite difficult** **The needs to solve: Everyone give more importance to call rather than SMS and mail.Hence using dialing/ calling method is used to overcome this problem**
Which makes me feel	**Describe the emotions from the customer 's point of**	**It reduce the customer stress and feels them relax**
	view – how Does it impact them emotionally	

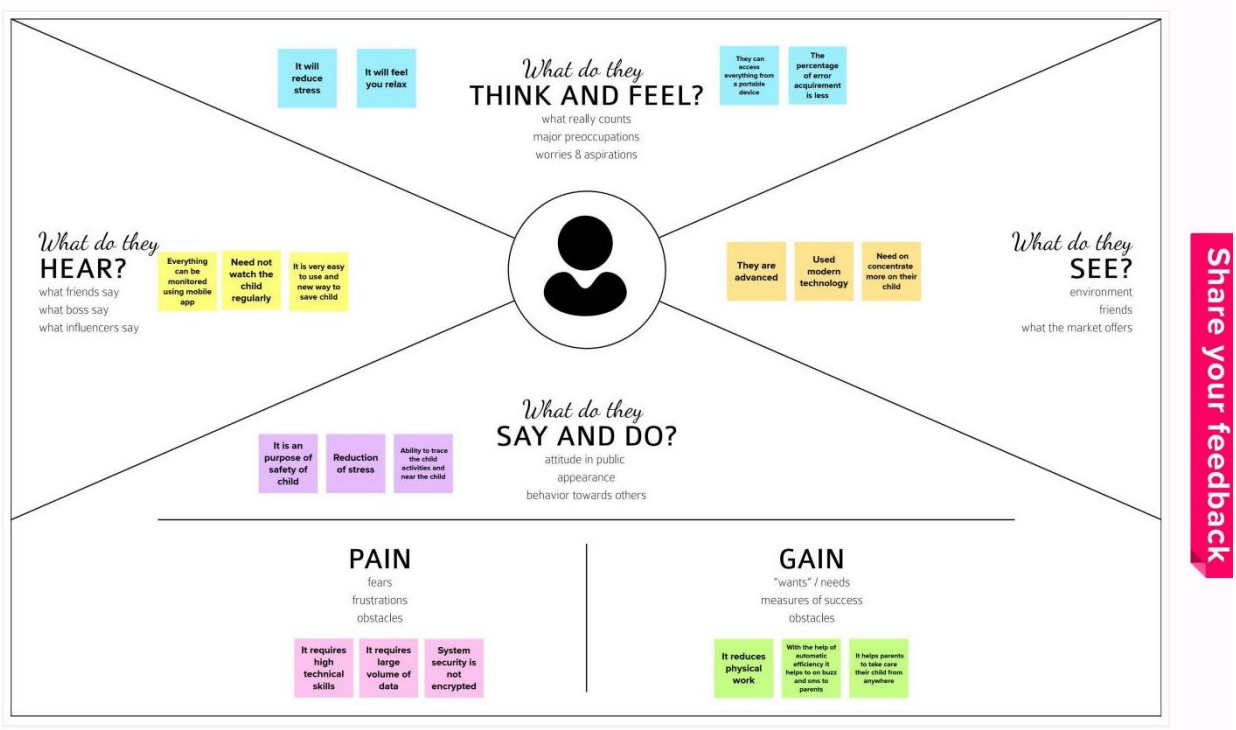
Reference: https://miro.com/app/board/uXjVPSqvoTk=/ **Example:**



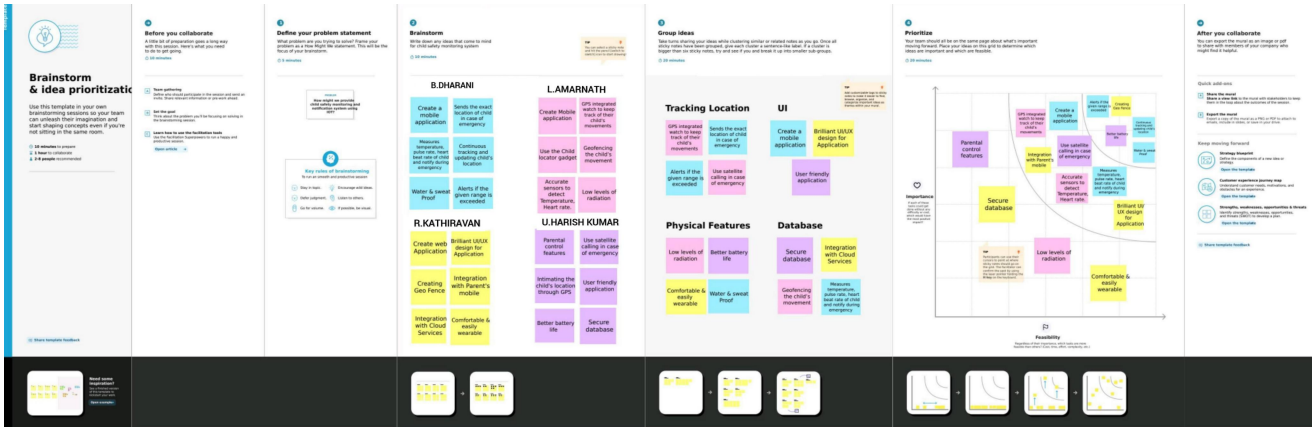
Problem Statement (PS)	**I am (Customer)**	**I'm trying to**	**But**	**Because**	**Which makes me feel**
PS-1	A parent	Want to save their child	It is difficult to save their child from their workplace	The SMS or Mail will not be seen again and again	Get stress
PS-2	A parent	Want to save their child	It is difficult to save their child from various place	The alarm buzzer will may disturb the child	Disturb the child
PS-3	A parent	Want to save their child	It is difficult to save their child	Wi-fi and Bluetooth are used	It may in certain range

3.Ideation and proposed solution

3.1.Empathy map canvas



3.2.Ideation and Brainstorming



3.3. 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	Theauthorstestedthesystemagainstdifferenttypesofusers.Thefeedbacksofparentsandchildrenwerehighlypromising.Resultsshowedthat86.4%of the parents are satisfied with the time controller,around91.1%ofthechildrenaresatisfiedwiththeproposedinterface and 100% ofthechildrenaresatisfiedwiththemultiplesessionsofthetimeallowedandvideo 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 there parameters Are monitored by the connected person.
6.	Scalability of the Solution	It can be given upto4out of5.

3.4.Problem Solution fit

1.CUSTOMERSEGMENT	6.CUSTOMERCONSTRAINTS	5.AVAILABLESOLUTIONS
Whoisyourcustomer? working parents who are not able to safe their child(0-5)willingtous ethese.	Whatconstraintspreventyourcustomersfromtakingactionorlimitthei rchoices ofsolutions?i.e.,spendingpower,budget,nocash,networkconnection,available devices. For predictive analytics to make the most impact on childprotectionpracticeandoutcomes,itmustembraceestablishedcri teriaofvalidity, equity,reliability,andusefulness.	Which solutions are available to the customers when they face theproblem or need to get the job done? What have they tried in thepast?Whatpros&consdothesesolutionshave?i.e.,penandpaper Themostimportantreasonformonitoringeachchild'sdevelopmentisto determine whether a child's is on track. Looking for developmentalmilestones is important to understanding each child's developmentandbehaviour.
2.JOBS-TO-BE-DONE/PROBLEMS Which jobs-to-be-done (or problems) do you address for yourcustomers? There could be more than one; explore differentsides. Parents can't able to save their child from their workplace andOver parenting tends to deprive children of bad and negativeexperiences, which are crucial to a child's emotional growth.One formof overparentingisexcessivemonitoring.	9.PROBLEMROOTCAUSE Whatisthe realreasonthatthisproblemexists?Whatis theback It's exactly what it sounds like—an exercise to determine the rootcauseforafailureorissue,sothat thesolutionisbasedonthetrueproblem,not justaddressingthe symptoms.	7.BEHAVIOUR Whatdoes yourcustomer dotoaddress theproblemandgetthejobdone? The parents can monitor their child from their workplace whenchildren have frequent emotional outbursts, it can be a sign that theyhaven't yet developed the skills they need to cope with feelings likefrustration, anxiety and anger. Handling big emotions in a healthy,mature way requiresavariety ofskills,including.
3.TRIGGERS Whattriggerscustomerstoact?	10. YOURSOLUTION If you are working on an	8.CHANNELSofBEHAVIOUR ONLINE

i.e.,seeingtheirneighbourinstallingsolarpanels,readingaboutamoreefficientsolutioninthenews. It'snotthesituationorthefeelingthat'stheproblem;it's howkids think about these things and what they say to themselvesthat causes problems and child (0-2) years didn'tknow aboutanythingthiswill trigger.	existing business, write down yourcurrentsolutionfirst,fillinthecanvas,andcheckhowmuchitfits reality. Ifyouareworking onanewbusinesspropositi on,thenkeepit blankuntilyoufillinthecanvasandcomeupwithasolution that fits within customer limitations, solves a problem andmatchescustomerbehaviour. ▪ The most important reason for monitoring each child'sactivitiesis to determine whether a child's activities is ontrack. Usingultrasonic sensor sense something near childand activate pieze buzz and SMS and dialing function toparents will be doneimmediately.	Whatkindofactionsdocustomerstakeonline?Extractonlinechannels from#7 **OFFLINE** Whatkindofactionsdocustomerstakeoffline?Extractoffline channels from #7 and use them for customer development.Understanding how children perceive and interact with the point ofsalehasbeenthefocusofvariousstudiesinthepastdecade.Itiswelldocum ented that children have preferences in terms of shoppingdestinations.Forworkingparentsnecessarily neededone.

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 Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Notification	Notified via Mobile App
FR-4	User Interface	Mobile App- MIT App Inventor Able to see location of children when they are out of geofence

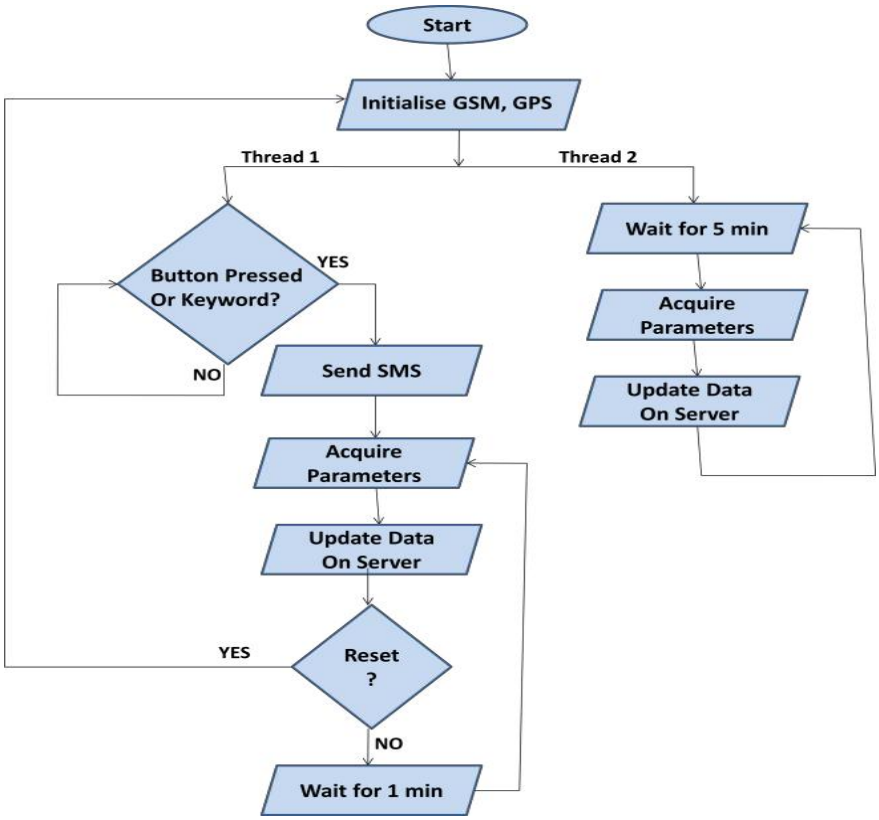
4.2.Non-Functional Requirements

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

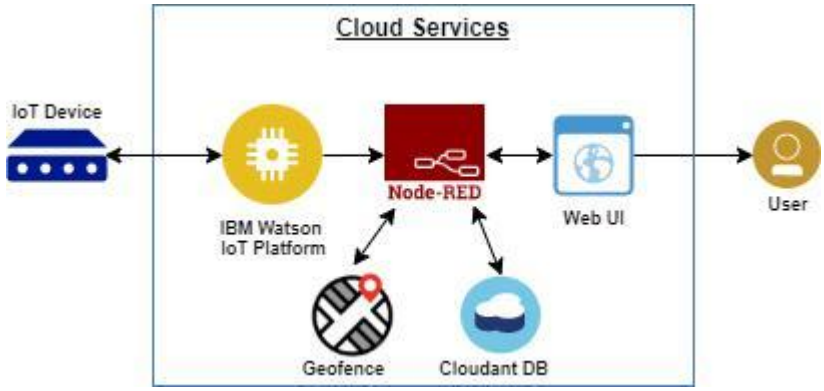
FR No.	Non -Functional Requirement	Description
NFR-1	**Usability**	Accessed through Mobile App Showing location(latitude and longitude)of child
NFR-2	**Security**	Database security must meet HIPAA requirements
NFR-3	**Reliability and Availability**	Once logged in,web page is available until logging out
NFR-4	**Performance**	Eachpagemustloadwithin2seconds
NFR-6	**Scalability**	Theprocessmustfinishwithin3hourssodataisavailableby8a.m.local time after an over night update

5.Project Design

5.1.Data flow diagrams



5.2.Technical architecture



5.3.User stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer(Parents 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 and receive confirmation email & click confirm	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	Medium	Sprint-2
	Login	USN-4 (if required)	Same function to be performed as in previous cases.	Same function to be performed as in previous cases.	Not Yet Determined	----
	Dashboard	USN-5 (if required)	Same function to be performed as in previous cases.	Same function to be performed as in previous cases.	Not Yet Determined	----

6. Sprint delivery plan

6.1Product Backlog, Sprint Schedule, and Estimation

Use the below template to create product backlog and sprint schedule

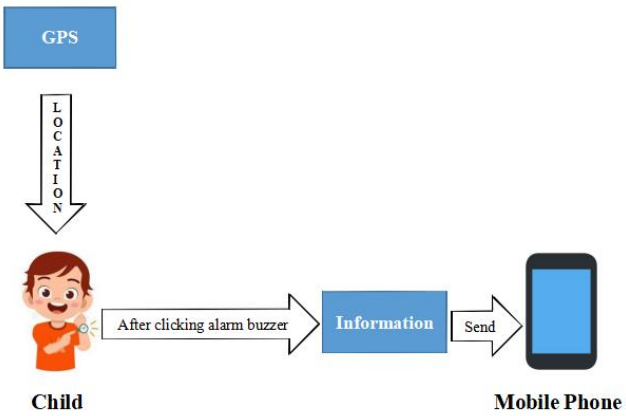
Sprint	Functional Requirement (Epic)	User Story Number	User Story /Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Collect data. Explanation and overview of sprint delivery plan.	9	High	Dharani B Kathiravan R
Sprint-1	And GPS locator process.	USN-2	Set GPS locator on the device to identify where the boy is going.	8	Medium	Amarnath L HarishKumar U
Sprint-2	Mobile call intimation	USN-3	Mobile call intimation to the parent.	10	High	HarishKumar U Dharani B
Sprint-2	Mobile call feature	USN-4	Adding a certain ordinary mobile feature in a device to speak what happened there.	7	Medium	Amarnath L Kathiravan R
Sprint-3	Notification	USN-5	To create a button in that device to sending a notification to the kid's parents.	9	High	Kathiravan R HarishKumar U
Sprint-4	Implementation of the device(Testing and deployment)	USN-6	Diagrammatic overview of sprint delivery plan.	8	Medium	Dharani B Amarnath L

6.2.Project tracker,Velocity & Burndown chart

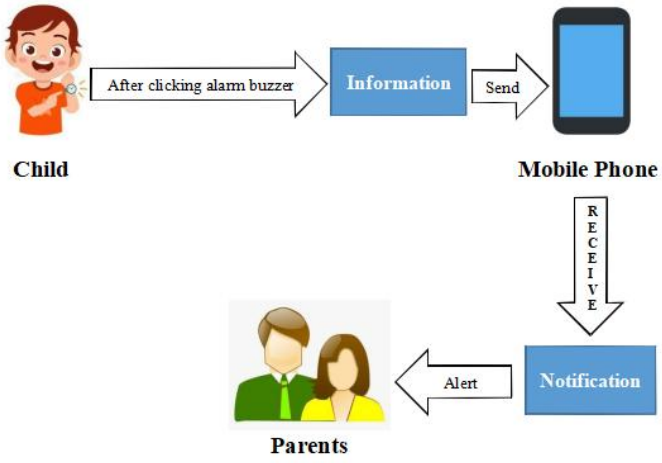
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	10	6Days	24 Oct2022	29 Oct2022	8	29 Oct2022
Sprint-2	10	6Days	31 Oct2022	04 Nov2022	5	04 Nov2022
Sprint-3	10	6Days	07 Nov2022	11 Nov2022	7	11 Nov2022
Sprint-4	10	6Days	14 Nov2022	18 Nov2022	5	18 Nov2022

7. Coding, Solutioning & Testing

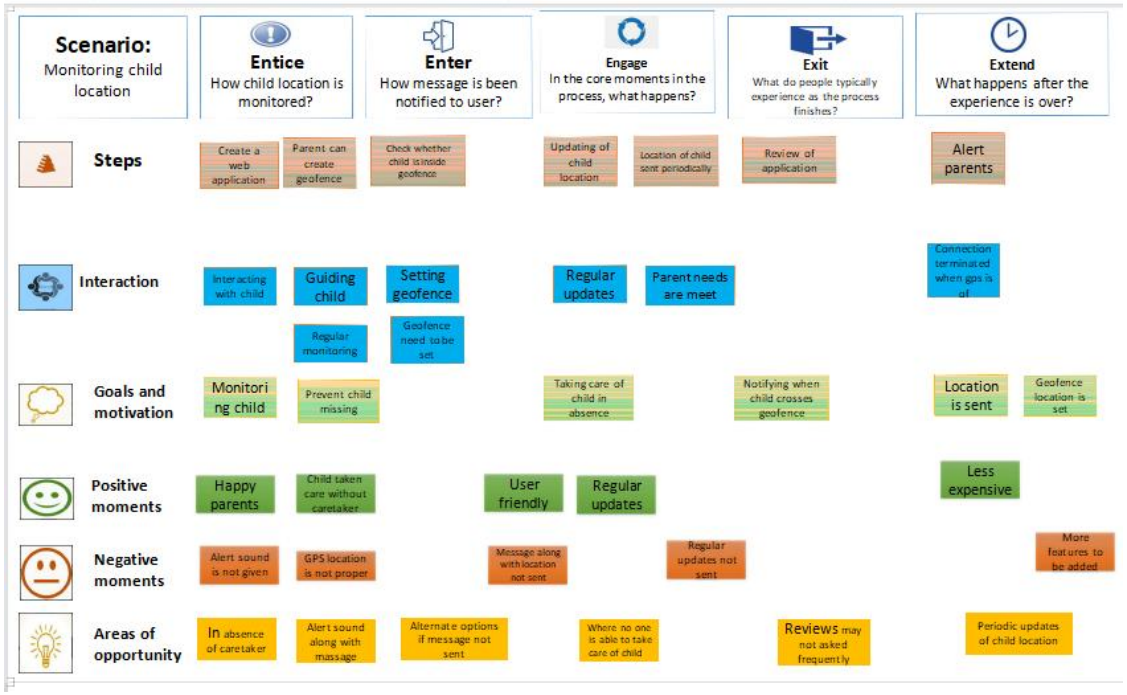
7.1.Feature 1



7.2.Feature 2



8. Results



9. Advantages & Disadvantages

Advantages

✧ In Panic situation of child or women the device notifies parent or guardian revealing child's or women's distress.
✧ To prevent an individual from drooping, we have accelerometer that determines the change in body position of child.
✧ With aid of GSM module, current location of child or women can be detected accurately in a short span of time.

Disadvantages

✧ Technical difficulties.
✧ Poor data quality.
✧ Poor design or unfashionable design of the device.

10. Conclusion

The child safety wearable device is capable of acting as a smart IOT device. It provides parents with the real-time location, surrounding temperature along with Distress alarm buzzer for their child's surroundings and the ability to locate their child or alert bystanders in acting to rescue or comfort the child. The smart child safety wearable can be enhanced much more in the future by using highly compact Arduino modules such as the LilyPadArduino which can be sewed into fabrics. Also a more power efficient model will have to be created which will be capable of holding the battery for a longer time.

GitHub link: https://github.com/IBM-EPBL/IBM-Project-15432-1659598597

Project demo link:
https://photos.app.goo.gl/Wh4oXqdsefBaib7j9